REMAKING BANKING FOR A WORLD OF BIGTECH ECOSYSTEMS

- An exploratory case study of Ant Financial and Amazon in banking

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PAGES
83
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We would like to thank our supervisor, Jonas Hedman, for his helpful guidance and his continuous encouragement towards independent thinking.

Further, we would like to thank our interviewed industry experts and leaders. Without your knowledge and collaboration this paper would not have been the same.
The global economy is to an increasing extent coalescing around a few digital superpowers or “BigTechs”, and we see evidence that a winner-take-it-all world is emerging in which these BigTechs occupy central positions (Iansiti & Lakhani, 2017). These BigTech’s are reshaping one industry after another and blurring industry boundaries as they expand their ecosystems into new and adjacent industries seeking to be all things to all people (Citi, 2018).

These mysterious and fascinating BigTechs are companies such as Alibaba, Alphabet/Google, Amazon, Apple, Baidu, Facebook, Microsoft and Tencent.
ABSTRACT

Banking is to a far-reaching extent being re-imagined and re-created in China by BigTechs leveraging their existing significant user bases, vast consumer data, technology ecosystems, culture of customer centricity and deep funding pockets. This paper sets out to explore this contemporary phenomenon of BigTech in banking by (1) investigating the underlying dynamics that have made BigTech’s recent move into banking possible and (2) analysing the strategic considerations and incentives behind this move.

To achieve this aim, we adopt the theoretical model of technology ecosystems from Adomavicius et al. (2007) to build a conceptual framework for the construction and analysis of two exploratory cases studies of Ant Financial and Amazon. This framework is contextualised by, first, incorporating literature informed demand-side forces, and, second, incorporating a strategic variable based on insights from expert interviews with industry leaders and white papers from leading industry practitioners.

Through data triangulation and cross-analysis of our two cases studies, we find three similarities in the underlying dynamics; first, the focus on developing modular and shared core capabilities within component technologies. Second, the importance of integrating additional internal business infrastructure to further create value for the focal technology and ecosystem, and, third, a latent demand from neglected segments.

The strategic consideration behind moving into banking was found to be a customer-centric effort to solve strategic business problems for the individual BigTech’s platform users and business ecosystem.

We contribute to the literature of technology ecosystems and evolution by, first, illustrating how the model of technology ecosystems can be contextualised and made company-specific, and still identify paths of influence, and, second, by illustrating how the internally controlled parts of the technology ecosystems were particularly important in the evolution and the competition from the BigTechs.

From a practical point of view, we hypothesise that banking could be on the verge of being re-imagined for a world of digital ecosystems. We argue this by extrapolating the recent success and strategy of e-commerce related BigTechs in finance.

Lastly, the application of our conceptual framework revealed three potential refinements, hence we propose to model for consumer trust, government forces and BigTech’s customer dependencies.

KEYWORDS:
# Table of Contents

**ABSTRACT** .................................................................................................................................................. 0

**KEYWORDS:** ............................................................................................................................................... 0

1. **INTRODUCTION: THE CHINESE DRAGONS ARE RISING** .................................................................... 3

   1.1 Research Problem: BigTech and the Ant-ification of Banking ................................................................. 5
   1.2 Research Question: How and Why are BigTechs Moving into Banking? .................................................. 5
   1.3 Practical, Theoretical and Empirical Relevance ......................................................................................... 7
   1.4 Delimitations ........................................................................................................................................... 8
   1.6 Concept Distinctions ................................................................................................................................. 9

2. **BIGTECH IN BANKING INTRODUCTION** ............................................................................................ 10

   2.1 BigTech, Not FinTech, Causing Greatest Disruption to Banking ............................................................. 10
   2.2 The Rise of the Chinese Internet Finance Dragons .................................................................................. 11
   2.3 Classification of BigTech Players ............................................................................................................. 12
   2.4 Characteristics of BigTech in Banking ..................................................................................................... 16

3. **THEORY INTRODUCTION AND REVIEW** ............................................................................................. 18

   3.1 Theory Requirements for BigTech Analysis ............................................................................................... 18
   3.2 Technology Ecosystems: Setting the Stage ............................................................................................... 19
   3.3 Technology Ecosystems: The Relevance .................................................................................................... 19
   3.4 Adopting an Ecosystem Perspective ......................................................................................................... 20
   3.5 Focal Technology and Context of Use ....................................................................................................... 21
   3.6 Technology Roles in Ecosystems .............................................................................................................. 22
   3.7 Identification of Technology Ecosystems ................................................................................................... 22
   3.8 Classifying Technology Innovations with Paths of Influence ................................................................. 23
   3.9 Defining Nine Paths of Influence ............................................................................................................ 24
   3.10 Technology Ecosystems Suggested Future Research ............................................................................ 26
   3.11 Later Applications and Extensions of the Technology Ecosystem ......................................................... 27

4. **FRAMEWORK DEVELOPMENT** ........................................................................................................... 29

   4.1 Elements from Technology Ecosystems .................................................................................................... 30
   4.2 Elements from BigTech Mapping and Characterisation ............................................................................ 30
   4.3 Final Integrated Framework ..................................................................................................................... 31

5. **METHODOLOGY** ..................................................................................................................................... 32

   5.1 What is Case Study Research and Why is it Relevant? ............................................................................ 33
   5.2 Exploratory and Hypothesis-Generating Case Studies ............................................................................ 34
   5.3 Case Identification and Selection ............................................................................................................ 34
   5.4 Case Research Design and Considerations ............................................................................................... 35
   5.5 Reasoning for Selecting Ant Financial and Amazon .................................................................................. 36
5.6 Data Collection and Analysis .................................................................................. 37
5.7 Expert Interviews and Analysis ............................................................................... 38
5.8 Document Analysis .................................................................................................. 39

6. CASE STUDY I: ANT FINANCIAL ........................................................................... 41
  6.1 Introduction to Alibaba Group ................................................................................. 41
  6.2 Introduction to Ant Financial and Brief History ...................................................... 42
  6.3 Ant Financial Business Model Description ............................................................ 43
  6.4 Introduction to Financial Services Offered by Ant Financial ................................. 45
  6.5 Integrated Technology Ecosystem Framework with External Forces ..................... 49
  6.6 Main Findings from the Alipay Case Study ............................................................ 58

7. CASE STUDY II: AMAZON: BANKING’S AMAZON MOMENT ............................. 60
  7.1 Introduction to Amazon ........................................................................................... 60
  7.2 Amazon’s Strategy and Technological Capabilities ................................................. 62
  7.3 Introduction to Financial Services Offered by Amazon ........................................... 64
  7.4 Integrated Technology Ecosystem Framework with External Forces ..................... 66
  7.5 Main Findings from the Amazon Lending Case Study ............................................ 71

8. CROSS-CASE ANALYSIS: ANT FINANCIAL AND AMAZON ......................... 73

9. DISCUSSION ............................................................................................................. 76
  9.1 Internal Technology Ecosystems .............................................................................. 76
  9.2 Framework Application and Refinements .............................................................. 77
  9.3 Practical Implications - Remaking Banking for a World of BigTech Ecosystems ...... 81

10. LIMITATIONS .......................................................................................................... 82

11. FUTURE RESEARCH ............................................................................................. 83

12. CONCLUSION ......................................................................................................... 84

REFERENCE LIST ....................................................................................................... 86

APPENDIX .................................................................................................................... 98
1. Introduction: The Chinese Dragons are Rising

“What do you get if you give a FinTech start-up a billion users, access to technological superpowers and the deepest funding pockets in the industry? You get a BigTech moving into banking”

– Jesper Damm, Partner & Managing Director, BCG (2018)

The financial service industry has come back from a point of disaster towards relative health since the financial crisis (McKinsey & Co., 2017). However, in the same period a group of spectacularly successful BigTechs have also gone from being perceived as irrelevant to financial services, to a point where they are perceived, by many industry leaders and practitioners, as behemoths ready to disrupt and conquer yet another industry (Oliver Wyman, 2018). However, it is not the first time disruption to the financial service sector has been predicted. Thus, during the last five years, it was believed by many that it would be the new wave of FinTech start-ups and their promise of a technology led disruption that would be the main threat to the incumbent banks. Consequently, the FinTech start-ups have received a significant amount of funding and attention from all industry stakeholders (Citi, 2018).

Now in 2018, it can be argued that these FinTechs have neither been successful in establishing themselves as dominant players nor captured significant market share (World Economic Forum, 2017). Following the initial hype, the FinTech start-ups experienced that customer-switching costs were high, and that new innovations were often not sufficiently material to warrant the shift to a new provider, especially as the incumbent banks adapted to this new threat. To bypass these difficulties in acquiring customers, many FinTechs have found it necessary to shift to a strategy of collaboration with incumbent banks (Citi, 2018). Although failing on the initial promise of industry wide disruption, it is important to understand that the FinTechs have had an important role to play in pointing the direction of the industry by reshaping the customer expectations and setting new and higher bars for user experience in banking (World Economic Forum, 2017).

As the industry focus has shifted towards customer centricity, we observe a new possible threat in the horizon and this time the threat is not lacking existing users or scale. This new threat is the BigTechs of the world which have started to move into banking by leveraging their existing user bases counted in the billions, vast consumer data, agile technology ecosystems, culture of customer centricity and deep funding pockets (Citi, 2018). Hence, they compete with the power from their entire ecosystems and network assets. It can be argued that we have already seen the far-reaching impact of BigTechs moving into banking in Asia. For instance, in China the e-commerce giant Alibaba has amassed the world’s largest money market fund in less than three years, issued $96 billion of loans in five years, built a mobile payment solution with more than 400 million users, and grown its finance arm Ant Financial to a market capitalisation roughly equivalent to the ninth-largest bank in the US (Bain & Company, 2018). This phenomenon is not
restricted to China. In the US, for example, Amazon has quietly moved into financial services with products such as Amazon Cash, which gives customers the ability to deposit cash directly to their Amazon accounts from more than 10,000 retail locations throughout the US and Amazon SME lending, which has issued more than $3 billion in loans over the past years to small retailers selling through its online platform.

Based on above example with Alibaba and others, we observe that banking to a large extent already has been re-imagined and re-created by BigTechs in China. But what are the underlying dynamics that have made this possible and what are the strategic considerations behind BigTech’s recent attack on banking? These highly interesting questions are still under-researched in academia, as no prior academic research in the form of theories or empirical findings have been produced towards the emergence of BigTech in finance. This constitutes a significant gap in knowledge and literature with a highly relevant practical and theoretical importance.

We seek to explore this contemporary phenomenon and bridge the identified knowledge gap by (1) mapping the characteristics and initiatives of these BigTechs in banking, and (2) build and analyse two exploratory and hypothesis-generating case studies of BigTechs in banking, which are subsequently analysed with our own developed and contextualised framework.

The theoretical guidance of this conceptual framework will be the theory of technology ecosystems by Adomavicius et al. (2007) due to its ability to encompass the dynamic and temporal identity of technology ecosystems and evolution. Our motivation for choosing this theory also relates to Adomavicius et al.’s (2007) suggested future research to include (1) the company behind a specific technology, as it is believed that this can add predictive capabilities to the model, and (2) account for external environmental factors, such as the social and governmental environment, technical forces and economic factors in which the technology ecosystem has its context of use. Thereby, we adopt and extend this model of technology ecosystems to analyse and explain how these BigTechs have leveraged interdependent technology evolution in services, components and infrastructure to offer new and innovative products and customer experiences in banking.

BigTechs are targeting and transforming banking with their digital superpowers and extensive user bases; this paper will assess how and why they do it in a global setting.
1.1 RESEARCH PROBLEM: BIGTECH AND THE ANT-IFICATION OF BANKING

*Is BigTech in banking a Chinese-only phenomenon led by Alibaba/Ant Financial, or a Chinese-first phenomenon that is soon to arrive elsewhere?*

As stated in the introduction, we observe that finance is being re-imagined and re-created in emerging markets by BigTech players, such as Alibaba/Ant Financial and Tencent, leveraging external factors such as the recent proliferation of mobile platforms, a growing middle class and favourable government policies (Citi, 2018).

These BigTechs have commoditised traditional financial services and reorganised a good chunk of the Chinese financial sector around their ecosystems. Furthermore, we see that these BigTechs are competing in a new way; they compete with their network assets, vast user bases, rich data sets, agile technology ecosystems and deep funding pockets (McKinsey & Co., 2017).

These observations where further acknowledged then the authors of this paper recently met with Citi Bank’s Ronit Ghose (2018), Head of Bank Research at Citi Group, where he stated following in above context:

>“Banks should not worry about FinTech start-ups, the real threat is coming from the BigTechs. They have the user bases and can scale up and move much faster, which is what we can see in China and beyond right now”

This new phenomenon of BigTech in banking has slowly started to receive attention in the second half of 2017 and start of 2018 from industry practitioners and stakeholders such as the World Economic Forum (2017), McKinsey & Co. (2017), Bain (2018) and Oliver Wyman (2018). However, the phenomenon has still not received much attention from academia with no theoretical or empirical efforts to understand and analyse this new and potentially disruptive industry change.

Given the pivotal and systemic role of financial services in our society and the considerable revenue pools at stake, we believe that a significant knowledge gap exists, which needs to be addressed. Further, has innovation in financial services also been recognised as an engine of economic growth (Tufano, 1989) and improving welfare for society (Frame & White, 2004) implying general relevance for our research problem and area.

Therefore, we promote the need for moving beyond merely observations and hypotheses in this space and initiate formal research to investigate this phenomenon.

1.2 RESEARCH QUESTION: HOW AND WHY ARE BIGTECHS MOVING INTO BANKING?

Having now established our perceived research area and knowledge gap, we will now present our research question and its believed practical, theoretical and empirical relevance.
The thematic focus of this paper will be on BigTechs’ emergence in banking as a global\(^1\) phenomenon. Thus, at this point we need a broad exploratory approach to initiate a basic understanding of this contemporary phenomenon and the underlying dynamics behind it without limiting our scope to specific financial products or markets.

To ensure a logical structure that will allow us to explore this phenomenon, we will create our own conceptual lens building on academic literature, expert interviews with industry leaders and research findings from practitioners. Findings from practitioners have been included because they constitute *theories-in-use* which can be helpful in guiding research and generate hypotheses (Dul & Hak, 2008).

It is the authors opinion that especially two research areas should be addressed and investigated in this initial research of BigTech in finance; *first*, the underlying dynamics incremental for the emergence of this phenomenon should be addressed. This could be (1) formative external market factors and forces, such as an accommodating regulatory environment or a competitive vacuum in the market, and (2) internal capabilities that have been important and formative in how BigTech have entered, how they are competing and for future banking in general. *This answers the “how” of BigTech in finance.*

*Second*, the BigTech’s incentives and strategic reasoning for moving into financial services should be addressed. *This answers the “why” of BigTech in finance.* Thus, we formulated following research question:

> **What are the underlying dynamics and strategic considerations behind BigTech’s recent move into banking?**

We acknowledge that this is a broad research question, however we believe that it is the right question to ask when faced with a contemporary phenomenon with limited prior academic research conducted. Further, we believe that we have a research situation in which there will likely be more variables of interest than data points. Such a situation creates the need for discovering these variables of interest and formulate hypotheses to guide future research.

To formally answer this research question, this paper will synthesise an analysis of the current landscape of BigTech in banking and provide two in-depth case studies based on our developed conceptual framework. We use case studies because Yin (2003) argues that this method has a distinct advantage when a *how* and/or *why* question is being asked about a contemporary set of events over which the investigator has little or no control. From this we believe it can deduce findings of the most important underlying dynamics and strategic considerations for BigTechs’ moving into banking.

These findings will help guide and direct future research related to this sphere. Hence this paper will pursue following tasks:

\(^1\) See table 1 for a full list of BigTech’s active in banking, their financial services offered and volumes/users/AuM
Descriptive level:
(1) Describe and characterise the phenomenon of BigTech in finance based on findings from interviewed experts, observations and industry practitioners, and (2) provide a mapping and classification of their initiatives in this space. This will be a novel contribution to both practical and academic research.

Analytical level:
(1) Develop a contextualised conceptual framework appropriate for analysing our two case studies, and (2) build two case studies on BigTech in banking and analyse them with our framework to provide findings on the underlying dynamics and strategic considerations. Both developing a contextualised framework and building two case studies on BigTech in banking will be novel contributions to both practical and academic research.

Concluding level:
(1) Discuss the identified dynamics and strategic considerations relevant for BigTech in banking, (2) propose refinements for our conceptual framework in the light of the literature on technology ecosystems, and (3) provide much needed direction on future research in this sphere.

1.3 Practical, Theoretical and Empirical Relevance

This paper contributes with knowledge, which is of both of practical, theoretical and empirical relevance:

Practical relevance: The practical relevance of this paper lies in its exploratory investigation of a contemporary phenomenon in banking that could have immense ramifications for incumbent banks. This paper will provide understanding of a Chinese-first phenomenon, which could be soon to arrive elsewhere. Hence, the findings will be of great relevance and serve as important competitive insights for industry stakeholders such as financial institutions, industry consultants and the greater FinTech sphere.

Theoretical relevance: Above introduced research question is partly approached by developing a conceptual framework based on Adomavicius et al.’s (2007) model of technology ecosystems and Kauffman et al.’s (2014) and Liu et al.’s (2015) extensions of this model. This paper further extends and contextualises this model in relation to the analysis of BigTech in banking, as we take a company-specific point of view. This extension and contextualisation addresses Adomavicius et al.’s (2007) suggested future research of including the company behind a specific technology and account for external environmental factors. Thus, the performance and applicability of this framework will be of relevance for the development of research on technological evolution and ecosystems in an industry specific context.

Empirical relevance: This paper builds empirical knowledge on two case studies from observation of the phenomenon within a contextually rich environment. This is predicated on an extensive collection of secondary data from multiple sources and creation of primary knowledge through eight expert interviews with industry leaders. Furthermore, this paper contributes with the first extensive mapping and
characterisation of BigTech in banking and their offered financial services; this is to our knowledge a novel contribution without any previous attempts\(^2\).

### 1.4 Delimitations

The purpose of this section will be twofold. \textit{First}, it will rationalise the very broad research question and the corresponding delimitations. \textit{Second}, it will clarify the most important delimitations which have been made in terms of scope, theory, research design and methodology.

It can be argued that this paper could have benefitted from more delimitations and boundaries to enhance the validity and generalisability of our findings, for instance in terms of which financial products (e.g. only payments and lending) and markets (e.g. only China) considered. However, we argue that it is not appropriate at this time to limit the scope and thereby potentially miss formative dynamics or strategic considerations relevant for understanding the phenomenon of BigTech in finance. This is argued because (1) the boundaries between BigTech in finance as phenomenon and the context is not clearly evident, (2) the relevant theoretical literature is somewhat limited and not directly applicable to guide delimitations, (3) that we have a research situation in which there will likely be more variables of interest than data points, and (4) because it is assumed that nothing is known yet in relation to the relevant aspects of the object of study. These research circumstances are also the exact reasoning why an exploratory and hypothesis-generating case study design has been chosen, cf. the methodology section. The concept of hypothesis-generating case studies fits well with our academic pursuit and investigation of a contemporary and unique phenomenon not previously researched in an academic setting. Thus, we are starting out with a somewhat undefined notion of possible hypotheses and then aim to formulate more concrete hypotheses (i.e. our findings) that can be tested on multiple cases, which subsequently may inform quantitative and deductive research and potentially more generalisable results.

To accomplish this in an effective and reliable manner, we again argue that a broad scope is needed to allow for the identification of a variety of different explaining variables.

**Scope**

We have made two large delimitations in terms of scope of this paper. It is our opinion that these two areas are still of crucial relevance, but that they cannot be investigated in this paper when considering the research resources at hand and the scale of the paper.

The first delimitation is that this paper will not devote any resources towards analysing any potential competitive end-states for financial service providers and how the emergence of BigTech in finance could affect these potential end-states. Nevertheless, this would be an interesting area for future research when

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\(^2\) This assertion is based on extensive searches on CBS provided databases, Google Scholar and public search engines on multiple relevant keywords
considering the impact of BigTech, FinTech and other entrants’ influence on how the financial sector is structured.

The second delimitation is that this paper will not try to answer the luring question of “how disruptive could BigTechs be in finance” in terms of revenue pools or market share. As interesting and relevant this question might be for both practitioners and scholars, we do not believe that this question can be answered before more is known and understood in relation to the underlying dynamics and strategic considerations behind the emergence of BigTech in finance.

Theoretical Delimitations

In terms of theoretical delimitations towards the development of our contextualised conceptual framework, we choose not to incorporate all demand-side forces from Kauffman et al. (2014) and Liu et al. (2015) and their application of the technology ecosystem model in the financial service industry. For instance, we did not formally include Kauffman et al.’s (2014) stakeholder action perspective, which argues that different stakeholder actions might have either a positive or negative impact on the evolution of technology. This external force was not neglected because of its irrelevance, but merely because other factors perceived higher relevance and under considerations to the scale and scope at hand. Further, we did not model for the potential impact of cooperation in the given competitive context as suggested by Liu et al. (2015), which was again neglected due to above considerations.

Exclusion of such relevant external and demand-side factors will result in a loss of contextual fidelity and analytically richness, effectively decreasing the capability for future predictions of technological evolution in the context of BigTechs in finance. Thus, limiting the number of predictive external constructs that are considered relevant involved a trade-off between complexity and tractability of the framework. Above introduced theoretical delimitations was the same to many of the discovered external variables deemed relevant from industry practitioners and stakeholders.

1.6 Concept Distinctions

Two concept distinctions are relevant for the further reading of this paper to ensure clarity and avoid unnecessary confusion. Below section will briefly outline the use of the terms of FinTech and ecosystems:

FinTech: It should be noted that this paper uses the term FinTech exclusively in relations towards start-ups that through their business model combine financial services with novel and innovative technologies (Dorfleitner, et al., 2017). Normally would FinTech also comprehend larger companies following same business models, and one could further argue that BigTech also could be defined as Fintech’s due to their extensive use of advanced technology in their financial offerings. However, to avoid confusion will this paper henceforth use the term FinTech exclusively in relation to start-ups and not BigTech applying similar strategies.
Ecosystems: The concept of *ecosystem* will be used in two distinct ways in this paper, *first* it will be used in relation to *technology ecosystems* based on the theory of Adomavicius et al.’s (2007), Cf. the theory section of this paper for a definition. *Second*, will the term ecosystem be used in relation to the business models of BigTechs and consequently to describe the business model of Alibaba and Amazon. This use of business ecosystems will be defined as following - An ecosystem is an interconnected set of services through which users can fulfill a variety of needs in one integrated experience. Ecosystems typically provide three types of value: (1) they act as a gateway, reducing friction as a customer switches across related services, (2) they leverage network effects, and (3) they integrate data across a series of services (McKinsey & Co., 2017).

2. BIGTECH IN BANKING INTRODUCTION

The aim of this chapter will be threefold. *First*, it will introduce the phenomenon of BigTech in finance provide a mapping and classification of their initiatives in finance. *Second*, it will describe and characterise the phenomenon of BigTech in finance based on insights from expert interviews with industry leaders and white papers from leading industry practitioners. *Third*, will these two analyses be triangulated to synthesise a working characterisation of BigTech in Finance. Accomplishing these objectives are essential in establishing an overview of what that can be observed and what is already hypothesised in this research area from a practical research point of view. This knowledge will subsequently be used for identifying a relevant theoretical guidance for the development of our conceptual framework.

2.1 BIGTECH, NOT FINTECH, CAUSING GREATEST DISRUPTION TO BANKING

World Economic Forum published a report in August 2017 with the key message that it might be “Big Tech, Not Fintech, Causing Greatest Disruption to Banking and Insurance” (World Economic Forum, 2017). This report was built upon a multi-stakeholder approach involving 150 expert interviews and 10 international workshop sessions.

The report proposed three key findings with the two first being especially relevant for this paper. First, that FinTech start-ups have failed to upend the competitive landscape in finance and capture market share but have been successful in driving innovation. Second, that the competitive landscape in banking and insurance is being shaped increasingly by large technology companies providing critical technology and capabilities to the incumbent players effectively opening for direct competition at a later stage (World Economic Forum, 2017). We will later in this section argue that this “later stage” has already arrived, especially in China with Ant Financial and Tencent.

The report further argues that capabilities in cloud computing, customer-facing artificial intelligence and big data customer analytics are becoming essential capabilities for financial institutions in their pursuit of gaining a competitive advantage and differentiations in the mindset of consumers (World Economic
Noticeably, these capabilities are all technologies where the large technology players such as Amazon, Google, Facebook, Apple, Alibaba and Tencent have significant deeper experience and scale. As a consequence of this, many financial service providers are turning to these large technology companies to provide these new core capabilities and functions. This creates a situation where (1) financial institutions rely increasingly on technology companies for their most strategically sensitive capabilities, and (2) that they can only offer their ongoing business in return. This competitive imperative is suggested by the report to potentially undermine the otherwise reciprocal relationship between the banks and the large tech companies.

2.2 The Rise of the Chinese Internet Finance Dragons

This section will briefly provide the context for what is perceived as a Chinese-first phenomenon of BigTechs moving into payment services and subsequently into adjacent financial services. McKinsey & Co. (2017) recently published a report stating that ecosystems might be the new winning business model in banking. Their analysis is based upon an extrapolation of what is mainly a Chinese-centred phenomenon, however which they see as a Chinese-first phenomenon that is soon to arrive elsewhere (Mckinsey & Co, 2017). This extrapolation implies that companies such as Alibaba, Tencent and Baidu are reshaping industries and blurring sector boundaries as they seek to increase consumption scenarios and be all things to all people.

This competitive behaviour by Alibaba, Tencent and Baidu are also the case in the financial sector in China. For instance, Alibaba is, besides being an e-commerce company, also the provider of the world’s largest money market fund through its asset management services. It provides retail and SME lending, insurance services, financial cloud computing services, have a credit rating company and controls the world’s largest mobile payments company Alipay (Mckinsey & Co, 2017). All these offerings are provided through its subsidiary Ant Financial (Ant Financial, 2018).

Tencent, which is a technology, social network and Internet based conglomerate, is also pursuing a strategy of entering financial services. For example, Tencent provides the payment service WeChat Pay, an online investment platform, credit reference scores based on big data and personal revolving loans with maximum 15 minutes processing time (Young, 2017). Only measured on their payment products Ant Financial and Tencent have 520 and 400 million users as of end 2017 with a 55% and 40% market share as of end Q2 2017 out of a $5.5 trillion mobile payment market in China (Wang, 2017).

Alibaba, Tencent and Baidu have acted as “barbarians from the outside” in the Chinese Internet finance3 sector and have in record time established comprehensive multi-licensed financial ecosystems. However, both companies are different in terms of core business and target groups (Ngai, Qu, & Zhou, 2016).

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3 In China is financial professionals referring to Internet finance instead of Fintech due to translation difficulties, hence this will be used interchangeable in the case study of Ant Financial depending on the sources used (Greeven & Wei, 2018)
Alibaba, leveraged its e-commerce platform as a foundation for its financial activities by first entering into payments which was of strategic importance for facilitating online e-commerce in China. Subsequently, Alibaba used its position to move into wealth management and lending which again exhibited network effects to its ecosystem, cf. case study of Ant Financial (Citi, 2016).

Tencent, on the other hand, leveraged the powerful social nature of its WeChat platform to build P2P transfers and in-app purchases and transactions on public accounts of various brands and offerings through its platform (Ngai, Qu, & Zhou, 2016). Subsequently, Tencent also used this position to move into wealth management by offering money market investment accounts connected to its payment service.

Lastly, the Chinese search engine and technology conglomerate Baidu, somewhat similar to Google, also be brought forward as an example of a large Chinese technology company moving into financial services. Baidu runs the Baidu Wallet, an online credit service and an online wealth management platform (Reuters, 2018a).

Chinese Internet finance companies have been attracting the largest share of global investments in this sector and has poised China to leapfrog developed nations and move to a digital financial market place before more developed nations (EY & Development Bank of Singapore, 2016). Several potential market and behavioural attributes have made China an ideal market for FinTech. To mention some, (1) high levels of Internet and mobile penetration, (2) digitally savvy Chinese consumers who have few reservations about sharing personal information, (3) significant opportunity due to large segments of underbanked or unbanked consumers and SMEs with unmet needs, and (4) the resourceful BigTechs that are leveraging big data from e-commerce, messaging, search, and social media together with other adjacent internet-based services to personalise the customer experience, provide new services and leverage operational efficiency (EY & Development Bank of Singapore, 2016).

Above three BigTechs are some of the clearest examples of these platforms moving into financial services. All three are Chinese and operate in a significantly different environment in terms of size of e-commerce market, favourable regulatory environment and strength of existing retail banks compared to a European and American context (Mckinsey & Co, 2017). However, it is not only Chinese technology and platform companies which have moved into financial services. In a European and American context, both Amazon, Facebook, Google and Apple have made platform expanding moves into banking (Mckinsey & Co, 2017).

2.3 CLASSIFICATION OF BIGTECH PLAYERS

The rise of BigTech moving into financial services was as previously introduced a Chinese-first phenomenon. However, this is not the case anymore with numerous of the world’s largest and most advanced technology companies conducting similar strategic moves. This section will classify this trend

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4 For the period July 2015 to June 2016, investments in Chinese FinTech surged to US$8.8 billion, commanding the largest share of global investment in this sector (EY & Development Bank of Singapore, 2016).
by mapping the most prominent cases of this strategic behaviour based on following variables; (1) number of users in 2018\(^5\), (2) business model (3) financial products offered, and (4) volume in financial products by e.g. transaction volume, asset under management (AuM) or similar.

The purpose of this classification and mapping will be twofold. First it will serve as the first list of such BigTechs based on these parameters, and second, it will serve as input for the next section which aim to identify the defining characteristics of these BigTechs and provide a working characterisation of our believed concept of BigTechs in finance.


Our identification methodology was based on Internet searches, database searches, document screening and informative expert interviews with industry stakeholders. The classification and overview of products and volumes of BigTech players providing financial services can be seen in below table 1.

**Table 1: BigTech in finance overview and classification**

<table>
<thead>
<tr>
<th>E-commerce companies</th>
<th># of users in 2018(^7)</th>
<th>Business Model(^8)</th>
<th>Financial Products</th>
<th>Volume(^9)</th>
</tr>
</thead>
</table>
| **Alibaba (CH)**     | Alibaba – Approx. 515 million active users \((DMR, 2018)\) | Diversified online retailer | 1) Mobile & online payment, 2004 (Alipay)  
2) Wealth and investment management, 2015 (Ant Fortune)  
3) Money market fund, 2013 (Yu’e Bao)  
4) Social credit scoring, 2015 (Zhima credit)  
5) Internet banking, 2015 (MYbank)  
6) Online consumer credit, 2007 (Ant Credit Pay, Ali Micro Loan, Jie Bei, Ant Check Later)  
7) Insurance, 2013 (Ant Insurance & Zhongan)  
8) Cloud technology, 2014 (Ant Financial Cloud)  
9) Crowdfunding, 2013 (iZhexngchou & Taoxinyuan) \((Zhu et al. 2017)\)  
( Ant Financial, 2016)  
(Citi Bank, 2018) | 1) 520 million users (January 2018) and Around $2.6 trillion transactions in 2015  
2) 153 million users (June 2016)  
3) AuM US$233 billion (December 2017)  
4) 130 million users (June 2016)  
5) Aggregate loans of USD 5 billion of loans to 960,000 small and micro businesses (October 2016)  
7) 380 million users (June 2016) \((Zhu et al. 2017)\)  
(Ant Financial, 2016)  
(Citi, 2016) |

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\(^5\) Or most recent available data point  
\(^6\) Year shown in parenthesis is the year then the given player produced its first financial product  
\(^7\) Users on main platforms or interactive products with most recent available numbers  
\(^8\) Building on business model definition from Citi (2016) combined with the authors own opinion and understanding of the given company’s business model  
\(^9\) Encompasses volumes in users, assets under management (AuM) and transaction volumes, most recent available numbers
<table>
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<tr>
<th>Company</th>
<th>Description</th>
<th>Services</th>
<th>Notes</th>
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| Amazon (US)  | Amazon Prime – Approx. 100 million in 2018 | Diversified online retailer | 1) Amazon Small Business Lending, 2011 (Amazon Capital Services)  
2) Amazon Cash, 2017  
3) Amazon online payment, 2013 (Pay with Amazon)  
4) Amazon Credit Card and Amazon Store Card, 2015 and 2017  
5) FinTech investments in companies such as Bank Bazaar, Capital Float, QwikCilver Solutions and Emvantage Payments | (Amazon, 2018)  
(CNBC, 2017c)  
(Tech Crunch, 2017)  
(Tech Crunch, 2016)  
(Money CNN, 2017)  
(Google, 2015)  
(Citi Bank, 2018)  
(Bloomberg, 2018b) |
| Rakuten (JPN) | Rakuten Service Group – Approx. 1 billion members | Diversified online retailer | 1) E-money, 2009 (Rakuten Edy)  
2) Credit cards, 2004 (Rakuten Cards)  
3) Mobile Payment, 2014 (Rpay)  
4) Security Company - including stock trading, investment trusts, FX and bonds, for retail clients, 2003 (Rakuten Securities)  
5) Insurance, 2012 (Rakuten Insurance) | (Rakuten, 2018a) |
| JD. COM (CH) | JD – Approx. 258 million active users | Diversified online retailer | 1) Credit risk profiling, 2015 (XiaoBai Xinyong)  
2) Consumer credit products, 2013 (JingBaoBei, JingXiaoDai & JD BaiTiao)  
3) JD Crowd Funding, 2014  
4) Wealth management, 2014 (XiaoJinKu & XiaoBai Finance)  
5) JD Insurance, 2014  
(Citi, 2018) |
| ICT and large tech companies | | | | |
| Google (US) | Gmail (1.2 billion), Chrome (2 billion), Maps, Search, YouTube (1.5 billion), Google Play Store and Android (2 billion) - All 7 platforms have above 1 billion users medium 2017 | Data monetization and search engine | 1) Android Pay, 2015 (renamed Google Pay in 2018)  
2) Google Wallet, 2011  
3) Google Tez M-wallet, 2017 (introduced on the Indian market, launched September 2017) | (Citi, 2016)  
(Citi, 2018) |
| | | | 1) 24 million users (end 2017)  
2) 20 million users (September 2014)  
3) 12 million users and >140mn transactions as of December 2017 | (Statista, 2018) |
<table>
<thead>
<tr>
<th>Company</th>
<th>Products/Services</th>
<th>Data, software and hardware</th>
<th>Monetization and Social Media</th>
<th>References</th>
</tr>
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<tbody>
<tr>
<td><strong>Apple (US)</strong></td>
<td>iTunes – Approx. 800 million users</td>
<td>1) Apple Pay, 2014</td>
<td></td>
<td>(Citi, 2016)</td>
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<td></td>
<td>Apple Music – Approx. 17 million users</td>
<td></td>
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<td>1) 86 million users in 30 countries (2017)</td>
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<td></td>
<td>Apple News – Approx. 70 million users</td>
<td></td>
<td></td>
<td>(Stastista, 2018)</td>
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<td></td>
<td>Baidu Tieba – Approx. 300 million active users</td>
<td></td>
<td>(Baidu Finance &amp; Bai Fa)</td>
<td>1) 100 million wallet accounts (end 2016)</td>
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<td></td>
<td></td>
<td></td>
<td>4) Online Lending, 2013 (Baidu Loan)</td>
<td>1) 34 million users (end 2017)</td>
</tr>
<tr>
<td><strong>Social Network companies</strong></td>
<td>Facebook – Approx. 2.13 billion active monthly users in start 2018</td>
<td>Data monetization and search engine</td>
<td></td>
<td>(DMR, 2018)</td>
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<td></td>
<td>Instagram – Approx. 800 million users end 2017</td>
<td></td>
<td>2) WhatsApp Payment, 2018 (launched in India)</td>
<td>2) Rolled out to 200 million users in India, total India payment market is estimated to USD 1 trillion</td>
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<td></td>
<td>WhatsApp – Approx. 1 billion active users medium 2017</td>
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<td>3) Consumer Credit, 2015 (Wi-Ild-ai)</td>
<td>(Bloomberg, 2018a)</td>
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<td></td>
<td>Facebook Messenger – Approx. 1.3 billion active users end 2017</td>
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<td>4) Tencent Credit Score, 2015 (Xinyong)</td>
<td>(Tech Crunch, 2018b)</td>
</tr>
<tr>
<td><strong>Tencent (CH)</strong></td>
<td>Wechat – Approx. 902 million average active users per day in start 2018</td>
<td>Data monetization and social media</td>
<td></td>
<td>(Wang, 2017)</td>
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<td></td>
<td>QQ (Social network) – Approx. 843 million monthly active users in end 2017</td>
<td></td>
<td>1) Mobile Payment, 2005 (Tenpay, Wexin pay &amp; WeChat Pay)</td>
<td>(Citi, 2016)</td>
</tr>
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<td></td>
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<td></td>
<td>2) Online/Mobile Bank, 2015 (WeBank)</td>
<td>1) 400 million users in 2017 and $0.8tn transactions in 2015</td>
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<td></td>
<td></td>
<td></td>
<td>3) Consumer Credit, 2015 (Wi-Ild-ai)</td>
<td>(Wang, 2017)</td>
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<td></td>
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<td></td>
<td>4) Tencent Credit Score, 2015 (Xinyong)</td>
<td>(Citi, 2016)</td>
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<td>5) Online Investment Platform, 2014 (Li-Chai-Tong)</td>
<td>(Wang, 2017)</td>
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<td></td>
<td></td>
<td></td>
<td>6) QQ Gongyi, 2015</td>
<td>(Wang, 2017)</td>
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Part conclusion of mapping and classification: It can be observed that (1) the players identified are centred in three main sectors, namely e-commerce, data aggregation/large technology companies and social media/networks, (2) they are following similar product offering patterns, by starting with payment products and then moving into adjacent financial services, (3) all companies have significant existing user bases, and (4) that the Chinese players entered financial services earlier and have gained significantly larger user bases and volumes in their services offered.

2.4 CHARACTERISTICS OF BIGTECH IN BANKING

This section will, first, introduce how industry practitioners and our interviewed industry experts have characterised BigTech in finance, and second, this characterisation will be cross-analysed and triangulated with above analysis to synthesise a working characterisation of BigTech in finance.

Oliver Wyman recently published its “state of the financial service industry 2018” where they argued that successful technology companies has gone from being perceived as irrelevant to baking to a situation where they are perceived as behemoths whose immediate threat to core financial services is contained largely by the hope that they do not want to be regulated which is further argued to be less and less likely (Oliver Wyman, 2018). In this report they define BigTech as the top-10 consumer facing brands by market value which implies: Alibaba, Amazon, Apple, Google, Microsoft, Netflix, Priceline, Samsung and Tencent (Oliver Wyman, 2018). They further characterise BigTech leaders as (1) companies that do not focus on products, they focus on big problems and a continuously improvement of the customer experience, (2) companies that leverage and build powerful algorithms which are capable of distilling patterns in data which they can use for providing simplified and personalised customer experiences, and (3) they solve their big problems with modern solutions while building powerful operating models that enable them to execute faster and do more (Oliver Wyman, 2018). This emphasis on the importance of rich user data is also shared by our interviewed industry experts, for instance exemplified by PA Consulting Partner Martin Tillisch (2018): “BigTech in financial services and insurance is a relevant consideration, because it is to a large extent a game of data, and data is incremental in predicting customer behaviour, customisation and risk management which is essential in these industries.”

In McKinsey & Co.’s (2017) annual global banking review they characterise these BigTechs and their threat to be centred on their platform strategies and ability to orchestrate ecosystems of partnerships and monetising data. In McKinsey’s view, it is the platform strategies in combination with their customer centricity, ability to leverage data and their central position in various customer journeys containing financial decisions that are the true challenge for incumbent banks. The repeated focus on customer
centricity and solving business problems for users were also shared by our interviewed industry experts, for instance exemplified by BCG Managing Partner Jesper Damm: “I believe that BigTechs’ move into banking is driven by their efforts in being customer centric and to solve challenges or a need around their platforms for their customers.” Also, Danske Bank EVP Frederik Vinten highlighted this: “BigTechs’ focus is on their customers. What do the customers need in all the touch-points with BigTechs and how can they make these interactions customer centric. This is where financial services come into play.”

Similar to Oliver Wyman, the World Economic Forum (2017) argues that the BigTechs and the threat they constitute are characterised by their capabilities in cloud computing, customer-facing artificial intelligence and big data customer analytics, which are believed to be future core capabilities for providing financial services, however not necessarily limited to banks.

BigTech in banking and their opportunity for entering the industry was also the focus of a recent Bain & Company (2017) study, where especially Amazons potential ability to provide financial services was highlighted. Bain defined BigTechs in this report in accordance to their competitive dimensions of having digital powers, large customer bases, ability to improve existing customer experiences and address increasing customer expectations for convenient digital channels partly fuelled by themselves. Bain & Company continued above research in early 2018 by again addressing Amazon’s and similar BigTechs’ ability to provide financial services in a report labelled “Banking’s Amazon Moment.”

Lastly, Citi (2016;2018) argues that four factors contributed to the success of Baidu, Alibaba and Tencent (BAT) in China; (1) early entry into the payments space, (2) synergies in their E-commerce ecosystems, (3) their large existing user bases, (4) relaxed regulatory environment in China, and (5) the strategic importance of finance to their business models facilitating e-commerce and being the core to their online-to-offline (O2O) strategy.

In this research, they stressed the threat from BigTechs were characterised by strong existing digital relationships, capabilities in artificial intelligence offerings such as voice assistants, agile nature and ability to move fast and enter markets before incumbents can respond and their massive data platforms which can be leveraged to continuously improve and personalise offers and communication. Above introduced definitions and descriptions are very aligned with the findings from our eight expert interviews.

Part conclusion of above characteristics: (1) It is evident that the identified BigTechs are companies with significant users bases both in counting consumers and business/retailers, (2) their core capabilities, offered products and business models are based on data monetisation capabilities, advanced data analytics, cloud computing, artificial intelligence and superior customer centricity and experiences, (3) their business models are focused on creating multi-sided platforms and diversified ecosystems of services and products, and (4) the strategic incentives for moving into finance have been to solve a business problem for its users.
By triangulating these insights with previous mapping and classification, we synthesise a working characterisation of BigTech players in finance as players being characterised by:

1. Significant number of existing users including both consumers and businesses
2. Advanced technological capabilities relevant for future financial service offerings
3. Focus on solving a strategic business problem for its platform users and being customer centric
4. Business models leveraging multi-sided platform and ecosystem strategies
5. A Chinese-first phenomenon emerging in the US and Europe

This working characterisation provides a more tangible context for our research and contributes with a concrete point of departure for identifying relevant theory for developing our conceptual framework. The identified relevant theory will be introduced in the next chapter.

3. Theory Introduction and Review

In this chapter, will the main components of Adomavicius et al.'s (2007) conceptual model of technology ecosystems be reviewed and explained. The section will include an introduction to (1) the relationship between our findings from previous section and our identified relevant theory, (2) the adaptation of an ecosystem view based on three streams of literature, (3) classification of technology roles, (4) identification of technology ecosystems, (5) paths of influence of technology innovation, (6) model synthesis and further research suggested, and (7) presentation of two later extensions of the model. This theoretical introduction and review will be used as an essential building block for our later presented conceptual framework for the analysis of Ant Financial and Amazon.

3.1 Theory Requirements for BigTech Analysis

It was highlighted in the previous chapter that the BigTechs who have entered financial services have relied heavily on advanced technological capabilities, such as cloud computing, customer-facing artificial intelligence and big data user analytics. Further, it was found that they relied on business models leveraging platform and ecosystem strategies creating network effects between their different affiliated business. Thus, based on these observed properties we will build our conceptual framework on a theoretical background encompassing the importance of technological evolution in an ecosystem perspective.

To accomplish this, we have chosen Adomavicius et al.’s (2007) model of technology ecosystems, which aims to understand technological evolution through interdependent relationships between multiple interacting technologies. Further, it also comprehends the ability to analyse surrounding business infrastructure relevant for capturing the ecosystems perspective found above. This theoretical model of technology ecosystem will be explained in the subsequent sections.
3.2 Technology Ecosystems: Setting the Stage

Adomavicius et al. (2007) proposed a supply-side conceptual model of technology roles and paths of influence in ecosystems of technology evolution. The aim of this conceptual model is to understand technological evolution through interdependent relationships between multiple interacting technologies. The conceptual model argues that technologies should be viewed as a dynamic ecosystem that counts a variety of interrelated technologies, instead of each technology in isolation.

The focus on technology interdependency in evolution leads Adomavicius et al. (2007) to identify three roles that technologies undertake within a given ecosystem. The roles were defined to be components, products and applications, and support and infrastructure. Different technologies within a given ecosystem will be interacting through these roles and thereby be impacting each other’s evolution. Nine different interactions were classified and termed paths of influence (Adomavicius et al., 2007). The theory and model were originally illustrated through examples of wireless networking technologies and a business case on the digital music industry. In this theory review, we will illustrate the theoretical concepts with application and examples evolving around the focal technology of mobile payments and the related technology ecosystem (Liu et al., 2015). This application is chosen due to its natural relationship to our outlined research question.

3.3 Technology Ecosystems: the Relevance

Technologies and digital business models are continuously evolving by the hand of shifting customer demands, competitive dynamics, social dynamics, and research and development. Corporates have a natural interest in understanding the dynamics of technological evolution, due to the direct impact on their business models and markets. By understanding technology evolution corporates can forecast, leverage investment opportunities and grow economic profits (Adomavicius et al., 2007).

This imperative has led to extensive research on the nature of technology evolution and innovation informing many perspectives on forecasting and understanding such evolution.


Building on these perspectives Adomavicius et al. (2007) proposed a new model, which highlights how linkages and interdependency of technological innovations form the evolution of technology ecosystems,
centred on a focal product, service or application. This conceptual model contributes with a tangible and systematic framework for representation and analysis of evolutionary pathways within a specific technology ecosystem.

3.4 ADOPTING AN ECOSYSTEM PERSPECTIVE

In this section, the adoption and use of the term *ecosystem*\(^{10}\) will be examined focusing on the application and definition by Adomavicius et al. (2007).

The concept of business ecosystems and technology ecosystems has been adopted from biological research to help understand symbiotic relationships and interactions between technologies, economic communities and organisations (Adomavicius et al., 2007). The ecosystem perspective has been adopted in numerous scientific domains such as business (Iansiti & Levien, 2004), technology (Messerschmitt & Szyperski, 2005), information (Moore, 1996) and payments (Hedman & Henningsson, 2015). The ecosystem view emphasises the need to consider multiple sources of influence (e.g. multiple companies and organisations) for strategic purposes. Adomavicius et al. (2007) build their model of technology ecosystems upon three streams of literature, which will be introduced below.

The population approach to technology evolution: Saviotti’s (1996) population perspective is based on evolutionary economics and other models of industrial and technology ecosystems, and it provides the perspective of viewing multiple interrelated technologies as a population whose characteristics and actors change over time. In addressing the actors and mechanisms of technological change, Saviotti (1996) focuses initially on changes in product technology and then examines the evolution of organisations and their use of information and knowledge. The view is that forecasting technological evolution is complex and difficult as several factors influence the development of technologies and it is nearly impossible to accurately capture the influence of them all. The population approach also focuses on the importance of recognising the differences in properties among members of a population (Saviotti & Metcalfe, 1991).

The Technology and product hierarchy approach: Rosenkopf and Nerkar’s (1999) hierarchical concept is applied to classify the structure of related technologies. They provide a comprehensive literature review on technological evolution within hierarchies, which identifies three levels within a technology hierarchy; components, products, and systems of use. Products consist of various components and are organised into systems of use. Complexity arises in the study of the technological evolution within hierarchies because interdependent technologies may co-evolve within each level of the hierarchy (as an ecosystem) and evolution in any area can influence evolution across other levels of the hierarchy. This is described as cross-level co-evolution and is more closely related to ideas in biology (Rosenkopf & Tushman, 1998).

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\(^{10}\) This application of the term *ecosystem* will be different from what this thesis coins as business ecosystems related to BigTech business models.
This is further studied by Huenteler et al. (2016) who analyse how a product’s technology hierarchy structures the concentration of innovation and the expansion of the underlying know-how, building on the complex-system perspective on technological evolution.

*Technology trajectories and patterns of innovation:* Dosi (1982) developed the technology trajectory to represent the changes in multidimensional trade-offs amongst the technological variables within a technology paradigm. These trade-offs represent a cluster of potential technological outcomes bounded by the technology paradigm. Other researchers have found general patterns of innovation to represent modes of technology evolution (Adomavicius et al., 2007). Sahal (1985) claims that one of the most important indications to the origin of innovations is to be found in the fact that the performance of every technology depends upon its size and structure. This means that as a technology is continuously developed in size, the relationship between its size and structural requirements changes, which in turn, limits the potential of its further evolution. Innovation processes are governed by a common system of evolution leading to the formation of specific patterns of innovation, which create other ‘technological avenues’ or technological trajectories.

### 3.5 Focal Technology and Context of Use

Depicting the ecosystem of all related technologies would be cumbersome due to complex and multiple interdependencies, constant evolution of technologies and the multiple roles of technologies in different applications. Podolny and Stuart (1995) introduced the term of *technological niches*, which includes a specific focal innovation in which several technologies are connected to in the given niche. Adomavicius et al. (2007) develop this by proposing a specific *ecosystem view* to identify similar and related technologies and their roles, which are incremental to the specific analysis. This implies that an investigator of a given technology will select a *focal technology* with an accompanying *context of use* for identifying the most relevant perspective on the given ecosystem. The *focal technology* is the technology that the investigator is most interested in analysing. The *context of use* is an individual application, use case or capability of the focal technology. It is possible to produce different ecosystem views based on the same focal technology if the context of use is not the same. Exemplifying this could be mobile payment technologies used for different purposes, such as retail payments or peer-to-peer payments. This would naturally imply different components, supporting and competing technologies.

By extrapolating above existing theories and frameworks and the developments by Adomavicius et al. (2007) one has a framework capable for identifying technologies with close proximity to the focal technology, within a given context of use, based on three roles that technologies can play in an ecosystem.
3.6 Technology Roles in Ecosystems

The chosen focal technology and the related context of use is the point of departure and scope for a given technology ecosystem view. Adomavicius et al. (2007) define three roles that technologies can take depending on their relationship with the focal technology and the context of use being analysed: (1) components, (2) product and applications, and (3) support and infrastructure. 

Product and applications include the chosen focal technology and other direct competing technologies in the same context of use. For example, if an analyst chose to analyse NFC-enabled mobile payments services as the focal technology in a payment context, the competing applications could be cloud-based mobile payments services or third-party mobile payments services (Liu et al., 2015).

The component role is defined as a technology, which is incremental for the product and application technologies to perform their value proposition in the specific context. Building on previous example from a mobile payment ecosystem, the incremental components could be NFC-enabled smartphones and other points for selling, 3G and 4G mobile networks, debit and credit cards, cloud computing storage and mobile apps (Liu et al., 2015).

The support and infrastructure role identifies technologies that provide additional value to the functionality and performance of the focal technology in the specific context. The typical distinction between support and infrastructure and the component role is that the latter forms part of the physical structure of the product and application technology, hence the components are incremental for the performance of the focal technology in a specific context. Support and infrastructure technologies provide additional value to the focal technology which they support. They do this by creating a system of use in a given technological cycle as described by (Rosenkopf & Nerkar, 1999). However, the value adding part of support and infrastructure technologies are not strictly necessary for the product and application technology to function. In our adopted example, such support and infrastructure technologies could be location-based services, trusted service management, mobile and online banking capabilities, and NFC enabled public infrastructure (Liu et al., 2015). In this view, Adomavicius et al. (2007) combine both enabling and peripheral technologies as support and infrastructure and emphasise that specific views of technology evolution should be based on the investigator’s perspectives.

3.7 Identification of Technology Ecosystems

Adomavicius et al. (2007) formulate a four-step approach to identify a given technology ecosystem consisting of various technologies related to the focal technology in a specific context.

Step 1 – Identification of the focal technology and its context of use: It is suggested that the investigator should select a focal technology, which will constitute the point of departure for mapping out the accompanying ecosystem and specific context of use for identifying related technologies. In the previous
adopted example this would be the analysed NFC-enabled mobile payments services with the context of use being electronic funds transfer service to retail customers (Liu et al., 2015).

Step 2 – Identification of competing technologies: The investigator should subsequently determine any other technologies that are competing with the focal technology in the specific context of use. Competing technologies for NFC-enabled mobile payment services could as previously mentioned be cloud-based mobile payments services or third-party mobile payment services (Liu et al., 2015).

Step 3 – Identification of component technologies: The investigator should next determine the various technologies or components, which are used by the focal technology and its competing technologies in the specific context of use. In the current example this includes NFC-enabled smartphones and other points for selling, 3G and 4G mobile networks, debit and credit cards, cloud computing storage and mobile apps (Liu et al., 2015).

Step 4 – Identification of support technologies and infrastructure technologies: Lastly, the investigator should identify the various supporting and infrastructure technologies providing additional value by forming a system of use for the focal technology and its competing technologies. This could be location-based services, trusted service management, mobile and online banking capabilities and NFC enabled public infrastructure (Liu et al., 2015).

The above explained steps collectively provide a view of a given technology ecosystem, which is structured around the focal technology analysed. Furthermore, by following above four steps the investigator will in a reliable manner create a perspective that identifies and classifies technologies into three roles and the key interactions between these technologies (Adomavicius et al., 2007).

Above analysis and technology ecosystem view can be further expanded to consider additional levels of analysis, for example incremental components for components to the focal technology and technologies which the product and application offering provides components or infrastructure for, Cf. figure 1 in the appendix for illustration of technology ecosystem for laptop wireless networking.

3.8 Classifying Technology Innovations with Paths of Influence

Previously we reviewed multiple perspectives on patterns of technological evolution including themes such as technology trajectories (Dierickx & Cool, 1989), (Dosi, 1982) and (Iansiti & Levien, 2004) technological avenues (Sahal, 1985) and various patterns of innovation (Baldwin & Clark, 2000) and (Saviotti, 1996). Adomavicius et al. (2007) build on these research directions to extend their analytical framework to integrate the temporal aspect of technology evolution.

To integrate time in the framework, interactions between technological roles are incorporated. By behaving in a given role, the different types of technologies influence the evolution of other technologies due to their relationships established by the very own structure of an ecosystem, Cf. figure 2 in the appendix for illustrations of temporal interactions among technology roles.
For example, a given component technology can evolve into an enhanced version, which can enable innovation of product and application technologies or deployment of new support and infrastructure (Adomavicius et al., 2007). The *paths of influence* in-between technologies and roles can emerge from technologies in the same role or across roles resulting in new technology evolution. For instance, the global diffusion of smartphones and their application platforms helped facilitate the emergence of FinTech and other mobile financial services innovations such as mobile banking and peer-to-peer money transfers.

3.9 Defining Nine Paths of Influence

Adomavicius et al. (2007) define nine paths of influence to represent the interdependent relationships, depicted in figure 3 and 4 in the appendix, within a specific technology ecosystem. They define a *path of influence* as the occurrence of influence between technology X and Y, hence if technology X influences the evolvement or development of technology Y.

The following section and figure 3 in the appendix will present the original classifications of nine paths of influence as presented by Adomavicius et al. (2007). The classification framework integrates and builds upon multiple prior research directions such as *downward causation* (D.T. Campbell, 1990), *leading components and core sub-systems* (Tushman & Rosenkopf, 1992), *whole-part co-evolutionary competition* (Campbell, 1994), *cross-level and within-level co-evolution* (Rosenkopf & Nerkar, 1999) and *operators of modularity* (Baldwin & Clark, 2000).

C, P and I denotes the current state of the three technology roles, components, product and application and support and infrastructure. The future state of each of these technology roles will be denoted C*, P* and I*. Adomavicius et al. (2007) structure the nine paths of influence into three sub-group classifications depending on their resulting innovation: (1) paths of influence from all current states and roles to a future state of the component roles (C*) are labelled *component-oriented paths of influence*. Using the same approach, paths of influences that ends with P* are *product-oriented paths of influence* and corresponding paths that end with I* are *infrastructure-oriented paths of influence*. These three sub-groups and their temporal relationships are depicted in figure 3 in the appendix.

Applying above structure and representation facilitates a systematic approach for classifying the temporal and mutual influence which technological evolvement has in the technology ecosystem.

**Component-oriented paths of influence**

*Component integration and evolution (C to C*):* Component technologies are incremental in product and application technologies, research and development resources are deployed in continuous development of these, hence a logic path of evolution. In line with Baldwin and Clark’s *operators of modularity* (2000), present-state components can develop into future-state component technologies through integration, split or argumentation of components. For instance, Moore’s law (1965) that describes a doubling pattern of processing power in integrated circuits is an intuitive example of evolution of component technology.
Corresponding, Gene’s law (1994) of an exponential decrease in power consumption of integrated circuits due to research and development investments is also a classical example of component evolution. The present state of this component often constitutes a strong indication of forthcoming innovations and component evolution in future state of the component. Hence, assuming the existence of this path of influence in the given ecosystem (Adomavicius et al., 2007).

Product driven component development (P to C*): Successful adoption and diffusion of products and subsequently increased functional performance often create demand for improved component technology performance. Such component improvements could be in form of decreased cost, decreased size, new interoperability or higher performance. Hence, component evolution can be driven by product and application success (Adomavicius et al., 2007).

Infrastructure driven component development (I to C*): An expansion or increase in performance of infrastructure and supporting technologies also exhibit the ability to facilitate component technology evolution. For instance, the performance enhancement of the Internet and WWW protocol led to developments in personal computer components such as network cards, HTML and XML support in browsers and various network and communication applications (Adomavicius et al., 2007).

Product-oriented paths of influence

Design and compilation (C to P*): Product and application technology evolution is often driven through a combination of component technologies and design processes (Adomavicius et al., 2007). For example, a product such as digital cameras is a combination of components such as storage capability, colour capture, battery technology and lenses. Product owners must realise the present component technology to design new product and applications.

Product integration and evolution (P to P*): In line with component technology integration and innovation, product and applications can also evolve into new products through integration, separation or augmentation to encompass new functionalities, benefits or designs (Adomavicius et al., 2007). For instance, software updates can contain inclusions of new benefits previously found in other applications without changing the core technologies dramatically.

Infrastructure-leveraging product development (I to P*): New or adjacent products and applications can use an existing support and infrastructure technology, once it is established. For example, the diffusion of wireless networks provides opportunities for creation of new product or services, or even connecting existing to a network (Adomavicius et al., 2007).

Infrastructure-oriented paths of influence

Standards and infrastructure development (C to I*): Evolution in component technologies can imply new technology standards by requiring the creation of new support and infrastructure technologies. For example, if a market leader such as Wal-Mart decides to apply a certain standard for RFID (Radio
Frequency Identification) and that its supplier and logistics network needs to accommodate this, it would force a new support and infrastructure technology to develop (Kaufman et al., 2017). Furthermore, business alliances or technology platforms might choose to promote a given component technology as an infrastructure or support technology standard to leverage its position as platform leader through network competition or improved supply chain efficiency (Adomavicius et al., 2007).

**Diffusion and adaptation (P to I*)**: Products and application technologies that experience significant market diffusion and adaptation can lead to new support and infrastructure technologies. A product with wide diffusion creates the foundation for development of supporting technologies. For instance, PCs have now become an essential part of both homes and corporates, and subsequently the Microsoft Office software package has become almost as diffused as the PC and works as a widespread support technology (Adomavicius et al., 2007).

**Support integration and evolution (I to I*)**: Innovation and evolution of infrastructure and support technologies majorly stems from market wide diffusion and adoption of product and application technologies, however incremental innovation and evolution also occurs similar to P to P* and C to C* paths of influence (Adomavicius et al., 2007). Correspondingly, this evolution can come from integration, splits and augmentation to create new forms based on current state technologies. The Internet is an example of a continuously developing and expanding support technology. This evolution is necessary for accommodating new users, applications and the corresponding need for improved performance.

### 3.10 Technology Ecosystems Suggested Future Research

Adomavicius et al. (2007) suggest that their model should be extended to encompass and address the following five other research fields.

1. **External environmental factors and their influence**: A comprehensive model of technology ecosystems should also account for external environmental factors and impact on technological evolution. Such external factors could include the social and governmental environment, technical forces and economic factors in which the technology ecosystem has its context of use.

   Adomavicius et al. (2007) argue that each of the external factors depicted might be influencing and discerning the individual impacts will be a difficult accomplishment. To account and capture external factors Adomavicius et al. (2007) update their conceptual model to include such external factors, and thereby notice the need for further research and understanding, Cf. figure 5 in the appendix.

2. **Definition of boundaries of an ecosystem**: Defining the boundaries of a technology ecosystem can prove difficult when considering the potential for expanding the analysis to capture, for instance, components of components of the focal technology. The very complexity of some technology ecosystems and technical fields might also complicate the task at hand or extend the analysis with multiple new relationships to map. Technology ecosystems might also overlap and share existence or path of influence,
which create rich opportunities for studying the application of the framework in different contexts and determine the usefulness (Adomavicius et al., 2007).

(3) Change of technology roles over time: As technology ecosystems evolve and the complexity increases, some product and application technologies might transform into components for other technologies or products. This will effectively make the classification of the technologies and their roles in an ecosystem more difficult. Adomavicius et al. (2007) suggest the development of new modelling elements in the conceptual model to represent temporal technology role shifts and extract meaning from them relative to other changes in technology evolution.

(4) The characteristics of the nine paths of influence: Adomavicius et al. (2007) hypothesise that some paths of influence might be dominant relative to others under certain circumstances. This could be the point of departure for further examination of the characteristics of the nine paths of influence and compare them both on the company and industry level. Second, Adomavicius et al. (2007) hypothesise that ecosystems and the technologies within behave differently pending on which industry context they are being analysed in. This calls for multiple case studies across industries to fully develop a generalised ecosystem model of technology evolution.

(5) How firms and economic agents and their roles are influencing the model: Lastly, Adomavicius et al. (2007) argue for the inclusion of firms and the agents behind the technologies in the conceptual model in order to represent their impact on technology evolution. Capturing such an extension would further advance and enhance the field of technology evolution and eventually be predictive for development of technology capabilities and forecasting of new product development.

3.11 Later Applications and Extensions of the Technology Ecosystem

In the spirit of Adomavicius et al.’s (2007) research and model of technology ecosystems, several scholars have built upon their work with different extensions of the model and applications in multiple industries. This section will review two later adoptations and extensions to enrich our theoretical and empirical background on which we seek to development our own conceptual framework. Both extensions have been selected because of their relevance for our context of financial services.

Kauffman et al. (2014): Innovation in financial IS and technology ecosystems

Kauffman et al. (2014) analysed and assessed technological innovation in the financial service industry with focus on high frequency trading in equity markets. They used this as foundation for empirically validating the proposed existence of patterns in the historical paths of technology evolution. In relation to this perspective, they consider the limitation of Adomavicius et al.’s (2007) model of only modelling the supply-side forces of components, products and infrastructure. They argue for an extension of the model to encompass demand-side forces, which are important in the setting of financial information systems. This is done by including a stakeholder analysis.
Kauffman et al. (2014) contribute with extensions in two distinct ways; first, a stakeholder analysis is added to Adomavicius et al.’s (2007) four-step technology ecosystem analysis. This is done with the purpose of understanding the influence of different stakeholder groups, such as regulators and financial service providers, in relation to high-frequency trading. Second, the empirical application of their historical analysis in the high frequency trading technology ecosystem illustrate the importance of including these stakeholder groups when analysing technology ecosystems within financial services.

Applying this stakeholder action perspective, it is found that different stakeholder actions might have either a positive or negative impact on the evolution of technology. Thus, it is critical to consider such stakeholder actions in relation to technology innovation and the mapping of paths of influence. Three different types of stakeholder actions are defined to incorporate this view in the approach: (1) push-forward, (2) pull-back, and (3) strategic alliances to speed or stall innovations.

The concept of ecosystems was also expanded to not only include IT and technology but also organisational, institutional, relational and the regulatory environment in a temporal setting. Similar to Adomavicius et al. (2007; 2008) Kauffman et al. (2014) argue that their approach will not be exhibiting strong abilities for future-oriented forecasting. This is due the multiple and complex relationships in-between various dynamic external factors, exclusion of such relevant factors will result in a loss of contextual fidelity and analytically richness, effectively decreasing the capability for future predictions of technological evolution.

**Liu et al. (2015): Understanding the evolution of the mobile payments technology ecosystem**

Liu et al. (2015) address two fundamental research questions based on Adomavicius et al.’s (2007) model. First, they seek to identify the most significant forces that facilitate evolution in technology based-innovations within financial services and use mobile payments as example. Second, they seek to identify what the impact of market competition, cooperation and regulation are in these technological transitions. The two key extensions are first the new proposed analysis approach on the technology ecosystems path of influence model, which is deemed especially relevant for the financial service industry. Second, the study of mobile payments is among the first to approach mobile payments from an evolutionary technology perspective and provide empirical analysis identifying various patterns in technology and innovation in this context.

Similar to Kauffman et al. (2014) they move beyond the technology ecosystem model and its paths of influence approach to incorporate demand-side factors that influence innovation in the context of financial services. More specifically, they extend the technology ecosystem model to incorporate demand-side competition, cooperation and regulation in-between stakeholders in the financial industry. They argue that these demand-side forces act as essential accelerators or decelerators of industry changes, as the financial ecosystem is influenced by various factors related to technology, market, society and institutions. To
capture this and supplement technology-driven paths of influence, the above-mentioned three forces are incorporated. In this context, there is distinguished between competitive forces that are either spurring or stalling innovation, and regulatory forces that are either driving or delaying innovation. These three forces collectively shape the development paths of financial technology innovations.

Liu et al. (2015) also identify five evolutionary patterns for mobile payments in ecosystems; services development, services and infrastructure alignment, feed-forward, feed-back and incremental development, Cf. appendix 6 for overview and explanations of patterns.

In line with Kauffman et al. (2014) they categorise innovations in three distinct levels; the technology component, the technology-based services and the technology-supported business infrastructure. These categories are slightly different in wording, however more or less similar to Adomavicius et al. (2007) in implication and definitions.

Liu et al. (2015) point out that one of the limitations of their research is that it is mainly for retrospective explanation and interpretation of technology evolution, and thereby likely not accurate for forecasting technology evolution.

4. FRAMEWORK DEVELOPMENT

In this chapter, we will use elements from our chapter on BigTech in finance and our theory review in previous chapter to develop our integrated conceptual framework. This framework will be relevant for analysing the recent phenomenon of BigTechs moving into finance and thereby help us answering our research question. We will use the framework for building and analysing the selected cases of Ant Financial and Amazon and how these two distinct companies have started to offer financial services for their users. The main objective of developing this framework is to create a relevant unit of analysis to guide our case study and analysis (Baxter & Jack, 2018). Two different perspectives will inform our proposed integrated framework:

1) First, we will use elements from Adomavicius et al.’s (2007) proposed conceptual supply-side model of technology roles and paths of influence in ecosystems of technology evolution. This will be further enriched with demand-side elements from Kauffman et al. (2014) and Liu et al. (2015) proposed adaptations and extensions to reflect our industry of financial services.

2) Second, we will be informed by our triangulation of a BigTech in finance characterisation from, first, the mapping and classification of BigTech in finance, and second, the characterisation of BigTech in finance by our interviewed industry experts and other practitioners. These variables will be shown to support elements from the theory of technology ecosystems and also a distinct new supply-side variable.

We will introduce the specific elements from each perspective in below sections and lastly consolidate them into the final conceptual framework.
4.1 Elements from Technology Ecosystems

We will adopt different elements from Adomavicius et al.’s (2007) ecosystem view for the identification of a focal technology with an accompanying context of use and similar and related technologies and their roles in technology evolution in the context of BigTech entering finance. Alipay from Ant Financial and Amazon SME Lending from Amazon are selected as focal technologies based on their reach and importance for each company. The context of use is an individual application, use case or capability of the focal technology being analysed, and it will thus be defined on an individual basis.

We will also use Adomavicius et al.’s (2007) three roles that technologies can take depending on their relationship with the focal technology and the context of use being analysed: (1) components, (2) product and applications, and (3) business infrastructure.

The paths of influence in-between technologies and roles will also be used as it serves to analyse the evolution of the focal technology, such as Alipay and the interdependent influence of technology components and business infrastructure.

Lastly, we will adopt Adomavicius et al.’s (2007) suggested inclusion of firms and economic agents behind technologies in the conceptual model in order to represent their impact on technology evolution. Exactly this extension allows us to use, for instance Alipay as a representation of the focal technology and thereby include the firm-specific context in the given technological evolution.

Furthermore, we will draw on inspiration from Kauffman et al. (2014) and Liu et al. (2015) who incorporate demand-side forces that influence innovation in financial services. More specifically, we will use Liu et al.’s (2015) focus on market-side competition and regulation in the given context. Extending, the ecosystem model with context specific variables was also suggested by Adomavicius et al. (2007).

We will include these demand-side forces because they are argued to be essential accelerators or decelerators of industry changes in financial services, as the financial ecosystem is influenced by various factors related to technology, market, society and institutions.

The above explained approach will provide a structured view of a given company-specific technology ecosystem, and how the focal technology has evolved within this ecosystem. This will help us explain how the two analysed BigTechs have provided and innovated financial services in their individual markets.

4.2 Elements from BigTech Mapping and Characterisation

Five defining characteristics of BigTech in finance were previously identified in the BigTech chapter. When comparing these to the elements of Adomavicius et al.’s (2007) model it can be argued that, first, the importance of advanced technological capabilities is captured by analysing component technologies in the model of technology ecosystems, and second, that the emphasis on multi-sided platforms and
ecosystem strategies to a large extend will be captured by the analysis of supporting business infrastructure combined with our decision to contextualise and make the framework company-specific. In addition, two further factors are considered relevant for our framework. First, it was highlighted in the introduction to BigTech in China, how significant opportunities existed due to large segments of underbanked and unbanked consumers and SMEs. This context relates to the importance of Liu et al.’s (2015) variable of competition and strength of incumbent financial institutions. Second, it was argued by Citi (2016) in our BigTech characterisation that the Chinese BigTechs had benefitted from a relaxed regulatory environment in China. This context relates to the importance of Liu et al.’s (2015) variable of regulation. However, what is not included is the explicit argued importance of business model importance of financial services towards the specific BigTech which have been highlighted by both our interviewed industry experts and through the characterisations from other industry practitioners (Vinten; Xiao; Damm; Tillisch; Weckesser; Citi, 2018). Incorporating such a strategic variable will also be helpful for analysing the why in our research question, since it refers to the implicit strategic motivation and incentives for BigTech to move into finance. Thus, we argue for the inclusion of this variable in our conceptual framework for the analysis for BigTech in finance.

Based on above we adopt the model variables of strength of incumbent financial sector and regulatory environment and lastly the strategic importance of finance to the given BigTech’s business model, which was highlighted by our expert interviews and other industry practitioners.

4.3 Final Integrated Framework

By integrating the theoretical model of technology ecosystems and our mapping and characterisation of BigTech, we achieve a strong theoretical component and a relevant practical research orientation in our framework. This combination fits well with our exploratory approach to a new and contemporary phenomenon, due to its theoretical depth and practical width encompassing what is suggested by our interviewed industry experts and other practitioners to be relevant for BigTech in finance. This leads us to developing a conceptual model consisting of below elements:

**Supply-side elements included in framework:** The supply-side elements will be the focal technology, competing solutions and the context of use. This will be the point of departure for our analysis of financial products from Ant Financial and Amazon. Second, we will assess how component, application and business infrastructure technologies have served as essential paths of influence in the development of the given focal technology. This part of the framework will follow the four-step approach as formulated by Adomavicius et al. (2007) to identify and analyse a given technology ecosystem consisting of various technologies related to the focal technology in a specific context. This ecosystem perspective will be made company specific following Adomavicius et al.’s (2007) suggested future research areas.
**Demand-side elements:** The demand-side elements will constitute of two variables. *First*, the regulatory environment in the given *use of context*, where the environment can be perceived as either accelerating or decelerating for a given BigTech. *Second*, market-side competition or strength of existing financial services offered by incumbent banks in the given market. This can either be perceived as accommodating or prohibitive.

**Business model importance:** Lastly, we have chosen to characterise the given *business model importance* as a separate variable. This is done because it is not directly related to the theory of technology ecosystem, however it still exhibits supply-side nature and centres on a company-specific ecosystem perspective. The variable is placed on a meso level in the visualisation of our model. We define this variable as the *strategic importance of financial services* in the given BigTech’s business model and ecosystem, which refers to the interdependence of existing ecosystem offerings and financial services. Above listed elements are combined constituting our conceptual framework for analysis of Ant Financial and Amazon in the context of BigTech moving into financial services, Cf. figure 1 below.

**Figure 1:** Integrated technology ecosystem framework with external forces: For analysis of BigTech in finance

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5. **Methodology**

In this chapter we will go through the methodology applied in this paper and explain why it is relevant for answering our research questions. The methodology review will give (1) a general introduction to the case study research methodology applied, (2) examine our chosen typology of case studies, (3) explain
our case identification and selection, (4) illustrate our case study research design, considerations and analysis, and (5) introduce our data collection and analysis methodology.

5.1 WHAT IS CASE STUDY RESEARCH AND WHY IS IT RELEVANT?

Case study research constitutes an important part of this paper. Hence, it is essential to understand how applying this methodology contributes to producing valid and reliable findings in the context of our research question.

Yin (2003) argues that the method of case studies has a distinct advantage when a how and/or why question is being asked about a contemporary set of events over which the investigator has little or no control. This is exactly what we have and what we are doing in our research question, as the underlying dynamics part of our research question intends to answer the how, and the strategic considerations part of our research question intends to answer the why. This is the main reason for choosing the case study method in this paper.

Yin (2012) defines a case study as an empirical inquiry that investigates a contemporary phenomenon in-depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident. This implies the case study approach is especially relevant when you aspire to understand and analyse a contemporary real-world case and assumes that such an understanding will drive investigation of essential contextual conditions applicable to your case (Yin, 2012).

Where the first part of Yin’s (2012) definition helps distinguish case study research from other methods, the second part of the definition arises because the given phenomenon and context most often are interchangeable. Therefore, other methodological considerations are also relevant for defining features of a case study; (1) a case study inquiry covers a research situation in which there will likely be more variables of interest than data points, and (2) resulting from previous point, case studies rely on multiple data sources of evidence with the need for data to converge in a triangulating manner (Yin, 2012).

Lijphart (1971) argues that the great advantage of case study research lies in the focus on only one or a few cases that enable a thorough and intense examination when the research resources at hand are somewhat limited. Lijphart (1971) continues with addressing the scientific status of case study research, which he states as somewhat ambiguous, because science constitutes a generalising discipline. Thus, case studies can neither be the basis for empirical and valid generalisation nor the ground for disproving already existing theories. However, case study research can contribute with important insights to the establishment of general propositions and theory building (Lijphart, 1971).

Dul and Hak (2008) build on Lijphart’s (1971) argumentation and consider the case study research especially useful when (1) the topic or research question at hand is broad and highly complex, (2) when the theoretical guidance is somewhat limited or not directly applicable, and (3) when the context of the case is very important.
The propositions from Yin (2012), Lijphart (1971), and Dul and Hak (2008) are all relevant for our research problem, as we have a broad and complex research question based on a contemporary phenomenon with limited applicable theoretical guidance. Furthermore, the main objective is to generate hypotheses to guide future research and not disproving existing theories or provide empirical and valid generalisation. Thus, we believe that the case study constitutes right research method for addressing this paper's research question.

5.2 EXPLORATORY AND HYPOTHESIS-GENERATING CASE STUDIES

This paper will draw on two typologies of case study research to guide our case study design and approach; the first is Lijphart’s (1971) Hypothesis generating case studies and second the exploratory approach, for instance, as presented by Yin (2003) and Dul and Hak (2008).

Hypothesis-generating case studies: The hypothesis-generating approach is starting out with a somewhat undefined notion of possible hypotheses and then aims to formulate more concrete hypotheses, which can be tested subsequently on multiple cases. This approach attempts to develop theoretical generalisations or propositions in research areas where no direct applicable theory exists.

Exploratory case studies: Yin (2003) argues that the exploratory case is well suited for generating hypotheses and theory building. Exploratory case studies can both be based on single case studies or multiple cases, and they are aiming at defining questions and hypotheses for subsequent investigation.

Dul and Hak (2008) use the concept of exploration for a creative approach of combining different real-life phenomenon’s and theoretical sources in order to formulate and reformulate propositions. They further argue that underlying most exploratory case studies is the critical assumption that nothing is known yet in relation to the relevant aspects of the object of study.

These typologies of hypothesis-generating and exploratory case studies fit well with our academic pursuit and investigation of a contemporary and unique phenomenon not previously researched in an academic setting, however with an evident need for guiding hypotheses and direction for future research.

5.3 CASE IDENTIFICATION AND SELECTION

The next logical step in our case study research design is the identification and selection of case(s) for analysis. In accordance with Dul and Hak (2008) we defined a universe of candidate cases from which we believe that the phenomenon of study is present. Two principles helped our identification of a smaller set of candidate cases. First, the convenience and availability of information. This is essential when pursuing exploratory research on a contemporary phenomenon where limited information might be available for representation and analysis. Second, maximise the probability that the believed relation between concept and phenomenon would be present in the examined cases.

In the before mentioned context of exploratory case studies, Levy (2008) first argues that the investigator should focus on cases with extreme values, defined in terms of variation from the mean or mode. This
argument is based on the logic that causality normally is clearest in cases with extreme values. Second, when applying a multiple case study design, it is often meaningful to look for cases that maximise variation across relevant variables for the phenomenon of study. This is based on the logic that comparison of deviating case studies in terms of context or behaviour stimulates the imagination which is useful for exploratory and hypothesis-generating case study research (Levy, 2008). These guidelines helped us select two cases from our identified and relevant universe, both the universe and the argumentation for selection Ant Financial and Amazon will be explained later in this review.

5.4 CASE RESEARCH DESIGN AND CONSIDERATIONS

In this paper we define and consider a research design as our logical plan for getting from here to there, where here is defined as our initial research question and inquiry of interest and there is the subsequent answers, findings and conclusion to our here (Yin, 2014).

We adopt a multiple-case study with one unit of analysis implying a holistic approach (Yin, 2014). The advantage of applying above design is that the evidence and findings from multiple cases are considered more valid and the overall design is perceived as more robust, compared to single case studies (Yin, 2014). The multiple-case study will also allow the researcher to analyse within each setting and across settings, which is incremental in cases with both Chinese and American origin. On the contrary, the conduction of multiple-case studies is also significantly more demanding in terms of resources and time.

Applying a multiple-case study design also allows for replication of research, the logic behind replication lies in the opportunity for uncovering findings in one case study and then cross-analyse this in the setting of other cases to understand the similarities and differences between the cases (Baxter & Jack, 2018).

Our replication approach in multiple-case studies is illustrated in figure 7 in the appendix, the first step in our approach is the development of our conceptual framework, which is guiding our case study research and analysis, Cf. next chapter. Each of the cases will be analysed on their individual merits and then subsequently used for cross-case analysis, conclusions and modifications for our framework.

Above described case study research design allows us to investigate the identified phenomenon in both a Chinese and American context and with two different organisations offering different financial services. We believe this is optimal in terms of both width and depth of our analysis and overall exploration of BigTechs moving into financial services. Table 2 below summarises the measures taken to ensure reliability and validity in our method and two case studies.

Table 2: Research reliability and validity

<table>
<thead>
<tr>
<th>Reliability</th>
<th>Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study protocols:</td>
<td>Multiple sources of data</td>
</tr>
<tr>
<td>• List of stakeholders</td>
<td>• Multiple data sources/triangulation (e.g. news articles, observations, expert interviews and documents)</td>
</tr>
<tr>
<td>• Interview guide for each stakeholder</td>
<td></td>
</tr>
</tbody>
</table>
5.5 REASONING FOR SELECTING ANT FINANCIAL AND AMAZON

Ant Financial and Amazon have been selected as the most relevant case studies for investigating the phenomenon of BigTech players entering financial services. These were chosen from an identified universe of nine potential eligible cases, all believed to be relevant cases, as described in chapter two of this paper, Cf. Definition and characteristics of Big Tech in banking and Classification of Big Tech players. The methodological considerations for choosing Ant financial and Amazon were introduced earlier in this methodology chapter and will now be enriched with phenomenon-specific argumentation which combined constitute our reasoning for selecting Ant Financial and Amazon as cases.

**Ant Financial:** In our opinion Ant Financial constitutes the most significant example of an existing BigTech moving into a broad set of financial services given its broad portfolio of financial products and volumes achieved in these, cf. Table 1 BigTech in finance overview and classification. According to our research it was the first of above listed companies to integrate financial services into its platform strategy, and it is the leading and most mature Chinese example of an Internet finance player in terms of number of financial services offered, volumes, users and AuM accumulated.

In a global context it is also the Internet finance or FinTech related company with the highest market valuation based on raised capital. Ant Financial raised $4.5 billion to a valuation of $60 billion in 2016 (Citi, 2017). It is currently rumoured that Ant Financial are about to raise capital to a market valuation of $120 billion ahead of their expected IPO (Financial Times, 2018a).

**Amazon:** Amazon is the second chosen example of a BigTech moving into financial services. We selected Amazon due to two main arguments supporting our research question. First, Amazon is the only identified US/European BigTech to offer multiple financial services beyond payments if excluding Google Wallet.

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11 If realising such a market valuation Ant Financial would be the world’s 11th largest bank by market capitalisation as of 12th of January 2018 (RelBanks, 2018)
Second, by selecting Amazon as the second case study we will obtain the opportunity examine BigTech in finance in two completely different settings and imperatives in terms of market environment and regulation. This further provides value under the assumption and initial observation of BigTech mainly being a Chinese phenomenon.

Furthermore, it is currently rumoured that Amazon is engaging in two new strategic moves in terms of financial services offered, which could be of significant importance. First, it was announced that Amazon SME Lending is partnering with Bank of America Merrill Lynch as it looks to expand its ‘LendTech’ programme for small business that sell on Amazon’s website (CNBC, 2018b). Second, it was reported from Bain and Company (2018) that Amazon seeks a bank for a cobranded, mobile-friendly checking-account-like product initially targeted to young adults in the US. CNBC (2018) later reported that Amazon is in early talks with financial institutions including JP Morgan Chase which they also have a cobranded credit card with. Two important factors also played a role in our choice of Amazon SME Lending; first, Citi (2018) predicts that in US and Europe 34% of disruption in banking will be within business-to-business (B2B). Second, Citi’s Ronit Ghose (2018) suggested that: “Developed markets are more concerned with B2B while emerging markets look mostly towards B2C.”

The two cases serve on an individual basis two of the most contemporary and interesting cases in relation to our investigated phenomenon, and combined they create a unique opportunity for a global exploration and analysis of our phenomenon at hand.

5.6 DATA COLLECTION AND ANALYSIS

Our research will leverage the methodological approach of triangulation towards data collection in the construction of the two later analysed cases (Yeung, 1997). The method of triangulation is inherently a multi-method with roots in social science and is based on the conviction that no inherent class between qualitative and quantitative methods of data exists.

The main advantage of triangulation towards data collection and analysis is the ability to improve the validity and reliability of the data collected. This logic builds on the assumption that different types of data complement each other in revealing causal mechanisms, impacts and facets of a complex world. When applying triangulation, it is necessary to compare and contrast different sources of findings if they are addressing the same phenomenon (Yeung, 1997).

Furthermore, triangulation will help address inadequacies found in one data source by enriching the data the with other complementary data sources. Inconsistencies in data are more easily identified and recognised, and data and information are supported by multiple sources and types of research which provides greater ability to detect patterns and draw conclusions (Write, 2018).

This method will be instrumental in the construction of our case studies as they rely on several different types of data illustrating different aspects of causal mechanism, relationships and the individual contexts
for each case. In this paper we will achieve data triangulation by using evidence and data from different sources such as expert interviews, industry whitepapers, analyst reports, annual reports, case studies, news articles, social media posts, public records and real-life observations.

Each data source used in this paper is treated as “one piece of the puzzle,” with each piece contributing to the researcher’s understanding of the whole phenomenon (Baxter & Jack, 2018). The two most important sources of data will be described in below sections with an accompanying introduction to application and contribution.

5.7 EXPERT INTERVIEWS AND ANALYSIS

Exploratory expert interviews have been an essential primary data source for the construction and exploration of our two case studies. When investigating such a contemporary phenomenon as this paper set out to do, it is incremental to gather data from industry practitioners and experts representing the universe and context. This methodology of identifying key informants representing a larger population increases validity and secures generalisable findings on behalf of each stakeholder group (Gubrium & Holstein, 2001). In order to achieve a generalisable universe of key informants we conducted preliminary research with the purpose of revealing key stakeholder groups. Based on this research we defined four categories of stakeholders to conduct interviews with; (1) incumbent banks potentially being faced by competition from our believed phenomenon, (2) academics with market specific knowledge, (3) FinTech stakeholders with knowledge of the FinTech industry, and (4) industry consultants with knowledge of the phenomenon and the financial industry. Unfortunately, it was not possible to interview any BigTechs in relation to their strategic intent for entering financial services. We contacted Ant Financial International, Amazon, Facebook and Google all of whom refused to be interviewed.

The interviews with above four stakeholder groups have been conducted with a semi-structured approach. We decided to use the semi-structured approach because of its flexibility to pursue themes of interest and leave space for unanticipated follow-up questions to explore sub-themes discovered to be relevant in an interview (Rugg & Marian, 2007). Each semi-structured questionnaire was adapted and customised for the individual stakeholder group to maximise the value and knowledge extracted from each interview. We recorded each interview and analysed them on their individual merit and then subsequently cross-analysed to reveal commonalities and divergence in points of view on the different sub-themes. These findings have been used to generate insights between themes, identify relations, build hypotheses and develop explanations towards our research problem (Audenhove, 2013). We synthesised the main arguments in each interview to get somewhat consensus on the most important aspects of answering our research question. Some quotes are included throughout the paper to support our findings and arguments.

The purpose for applying expert interviews as a key source of primary data has been twofold. First, interviews have been incremental for extracting data and knowledge for building our two exploratory case
studies. Second, we have used the interviews and the knowledge extracted to inform the formation of our conceptual framework based on key informant perspectives.

Our interviews have both been conducted in person and over Skype based on feasibility. The full interview guide and further interview considerations can be found in appendix 24 together with an extract of the most relevant quotes from each interview. Table 3 below illustrates our list of interviews divided on stakeholder group.

Table 3: Interview List

<table>
<thead>
<tr>
<th>Group</th>
<th>Expert/CV</th>
<th>Duration</th>
<th>Language</th>
<th>Location</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultant financial services</td>
<td>Senior Associate(^{12}), PhD in physics and expert in digitalisation</td>
<td>38 min</td>
<td>Danish</td>
<td>Coffee Collective</td>
<td>04-04-2018</td>
</tr>
<tr>
<td>Consultant financial services</td>
<td>Jesper Damm, Partner &amp; Managing Director at the Boston Consulting Group</td>
<td>30 min</td>
<td>Danish</td>
<td>Skype</td>
<td>05-04-2018</td>
</tr>
<tr>
<td>Consultant financial services</td>
<td>Martin Tillisch, Partner and Financial Sector Lead, PA Consulting</td>
<td>30 min</td>
<td>Danish</td>
<td>Skype</td>
<td>10-04-2018</td>
</tr>
<tr>
<td>Academics</td>
<td>Xiao Xiao, Adjunct at Copenhagen Business School with research interest in e-commerce in China and platforms</td>
<td>50 min</td>
<td>English</td>
<td>Skype</td>
<td>05-04-2018</td>
</tr>
<tr>
<td>FinTech sphere</td>
<td>Niklas Weckesser, Innovation Catalyst at Copenhagen Fintech</td>
<td>38 min</td>
<td>Danish</td>
<td>Copenhagen Fintech</td>
<td>05-04-2018</td>
</tr>
<tr>
<td>Incumbent bank</td>
<td>Ronit Ghos(^{13}), Managing Director, Head of European Banks Research and Global Sector Head for Banks</td>
<td></td>
<td>English</td>
<td>Copenhagen Fintech</td>
<td>23-03-2018</td>
</tr>
<tr>
<td>Incumbent bank</td>
<td>Morten Bigum, Head of Corporate Strategy at Nordea</td>
<td>30 min</td>
<td>Danish</td>
<td>Nordea Denmark HQ</td>
<td>16-04-2018</td>
</tr>
<tr>
<td>Incumbent bank</td>
<td>Frederik Vinten, Head of Group Strategy and EVP at Dansk Bank</td>
<td>30 min</td>
<td>Danish</td>
<td>Danske Bank HQ</td>
<td>30-04-2018</td>
</tr>
</tbody>
</table>

5.8 DOCUMENT ANALYSIS

With the purpose of mapping BigTech in finance characteristics, building our exploratory case studies and conducting preliminary research to gain understanding of BigTech in finance we applied extensive

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\(^{12}\) Anonymous due to company policy and compliance, the source is representing a top-tier consulting firm

\(^{13}\) Recording was not permitted due to company policies
Document analysis. Document analysis is defined as the systematic procedure of reviewing or evaluating documents (Bowen, 2009). Similar to other analytically methods in qualitative research, document analysis requires that the given data should be examined and interpreted to achieve and elicit meaning, gain understanding and develop empirical knowledge (Bowen, 2009). The analytical approach and procedure behind document analysis contains finding, selecting, appraising and synthesising data contained in various types of documents. Hence, document analysis entails data excerpts, quotations and passages which are organised into sub-themes, categories and case examples through analysis of the content (Labuschagne, 2003). Applying document analysis, as a research method is especially relevant for qualitative case studies, hence implying intense studies aiming at producing rich descriptions of a single phenomenon, events or organisations (Yin, 1994).

Similar to our approach for interviews, we aimed at creating a representative universe of documents created by all stakeholder groups as previously defined. This was done to produce as nuanced and qualified case studies as possible and still create credibility by having a holistic perspective effectively incorporating all stakeholders’ views on the cases. The documents were analysed on their individual merit and then subsequently cross-analysed to reveal commonalities and divergence in points of view on the different sub-themes. In below table 4 can an extract of the main documents analysed be seen, this list also highlights the contemporary nature of our research.

Table 4: Document list

<table>
<thead>
<tr>
<th>Year</th>
<th>Publisher</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>Deloitte &amp; Development Bank of Singapore</td>
<td>The Rise of FinTech in China</td>
</tr>
<tr>
<td>2016</td>
<td>Boston Consulting Group</td>
<td>Industry Stacks – the new blueprint for banking?</td>
</tr>
<tr>
<td>2016</td>
<td>Citi</td>
<td>Digital Disruption: How FinTech is Forcing Banking to a Tipping Point</td>
</tr>
<tr>
<td>2016</td>
<td>McKinsey &amp; Company</td>
<td>The Phoenix Rises: Remaking the Bank for a World of Ecosystems</td>
</tr>
<tr>
<td>2017</td>
<td>Iansiti &amp; Lakhani</td>
<td>Managing Our Hub Economy</td>
</tr>
<tr>
<td>2017</td>
<td>Bain &amp; Company</td>
<td>Evolving the Customer Experience in Banking: Alexa, move by bank account to…</td>
</tr>
<tr>
<td>2017</td>
<td>World Economic Forum</td>
<td>Beyond Fintech: A Pragmatic Assessment of Disruptive Potential in Financial Services</td>
</tr>
<tr>
<td>2017</td>
<td>Zhu et al.</td>
<td>Ant Financial</td>
</tr>
<tr>
<td>2018</td>
<td>Greeven &amp; Wei</td>
<td>Business Ecosystems in China: Alibaba and Competing Baidu, Tencent, Xiaomi and LeEco</td>
</tr>
<tr>
<td>2018</td>
<td>Citi</td>
<td>Bank of the Future: The ABC of Digital Disruption in Finance</td>
</tr>
</tbody>
</table>
6. CASE STUDY I: ANT FINANCIAL

This chapter will cover the case study of Ant Financial. The first part of the case study will be analysing and discussing Alibaba, Ant Financial, its strategy, technological capabilities and its ecosystem of products. Some parts will only be a brief summary where the full version can be found in appendix 25. The second part of the study will be centred on the selected focal technology of Alipay, and the analysis of Alipay will be based on our developed framework. This product offering has been chosen as focal technology because of its synergetic and integrated relationship with other Ant Financial products and the general importance for the development of Ant Financial and Alibaba/e-commerce in China. It is encouraged the that reader study the full case study to achieve the required understanding of Alibaba, Ant Financial, its business model and its capabilities in order to follow the discussion and conclusion presented later.

6.1 INTRODUCTION TO ALIBABA GROUP

In order to conduct a case study and analysis of Ant Financial it is essential to understand the single largest shareholder Alibaba, its diversified business ecosystem and its synergistic relationship to Ant Financial, Cf. exhibit 8 for an overview of the entire Alibaba business ecosystem, Cf. appendix 25 for full introduction to Alibaba and its business ecosystem.

Alibaba.com was launched in 1999 and is the flagship company of the Alibaba Group ecosystem. Today the Alibaba Group is a global leader in retail and wholesale marketplaces. In 2018 the major businesses include flowingly eight entities, excluding Ant Financial:

Taobao.com launched in 2003, the Taobao marketplace is the largest mobile commerce destination in China in terms of gross merchandise value\(^\text{14}\) (Alibaba Group, 2018). Taobao is a social marketplace that allows customers to engage with SMEs, where the platform leverages big data analytics to optimise and personalise the customer shopping experience.

TMALL.com launched in 2008, is the largest platform for third-party brands and retailers in terms of gross merchandise value in China. TMALL both carters for domestic and international branded goods through its premium shopping experience (Alibaba Group, 2018).

\(^{14}\) Gross merchandise value is the total value of merchandise sold over a given period of time through a customer-to-customer exchange site. It is a measure of the growth of the business, or use of the site to sell merchandise owned by others (Investopedia, 2018)
ALIEXPRESS.com launched in 2010, is a global retail/wholesale marketplace that enables consumers and SMEs to buy directly from Chinese manufacturers/distributors. It is the preferred platform in consumer markets such as Russia, USA, Brazil, Spain and UK (Alibaba Group, 2018).

Alibaba.com launched in 1999, was the first business of Alibaba group and is now a leading wholesale platform for global trade with buyers located in more than 200 countries. The buyers are typically trade agents, wholesalers, retailers, manufacturers and SMEs engaged in import and export. Furthermore, Alibaba.com offers integration with supply chain services such as customer clearance, VAT refund, trade financing and other logistics services (Alibaba Group, 2018).

1688.com launched in 1999, is a leading online wholesale marketplace that facilitates trade between buyers and sellers of general merchandise, apparel, electronics, raw materials, industrial components and agriculture projects in China. Further, it serves as a wholesale channel/sourcing channel for retailers conducting business on Alibaba’s retail platforms (Alibaba Group, 2018).

ALIMAMA.com launched in 2007, is a digital marketing technology platform that enables retailers and wholesalers to conduct marketing activities on Alibaba controlled platforms and on third-party properties (Alibaba Group, 2018).

Alibabacloud.com launched in 2009, is the cloud computing arm of the Alibaba Group and among the world’s top three Logging as a Service (LaaS) providers and the largest provider of public cloud services in China (Alibaba Group, 2018).

CAINIAO Network is part of The Alibaba Group which took operational control over CAINIAO in September 2017, which before was a joint venture between Chinese financial institutions and Alibaba. CAINIAO is a Chinese logistic company focusing on the online and mobile e-commerce sector with over 57 million deliveries per day (Forbes, 2017). The logistic platform leverages data insights and technology to improve efficiency across the logistics value chain (Alibaba Group, 2018).

6.2 INTRODUCTION TO ANT FINANCIAL AND BRIEF HISTORY

Ant Financial describes itself as a technology-first company that envisions bringing inclusive finance to the world (Ant Financial, 2018). It was officially founded in October 2014; however, it is effectively the amalgamation of Alibaba’s innovation efforts in financial technologies in over a decade starting with the creation of Alipay in 2004, cf. figure 9 for Ant Financial timeline (Greeven & Wei, 2018). Alipay, an online third-party payment platform15, was originally developed to facilitate transactions on the Alibaba e-commerce platform and is described as the missing piece in Chinese commerce (Ma, 2016).

15 Third-party payment platforms in China are authorized (licensed) non-bank organization that facilitates payment typically for e-commerce. The third-party payment companies are licensed by the People's Bank of China (PBoC). There are currently (2016) three types of licenses 1) online/mobile payment 2) point of sale license and 3) pre-paid card issuance (Citi Bank, 2016).
In 2010 it was announced from the Peoples Bank of China (PBoC) that non-bank payment providers would need to obtain a license to operate in China (Zhu et al., 2017). Although, Alipay was ready to comply with the regulation and submit its license application in early 2011, PBoC had not issued any application guidelines for foreign controlled payment entities (Alibaba Group Annual Report, 2016). This was a significant issue because Alibaba was incorporated offshore in the Cayman Islands. Thus, the Alibaba Group spun of Alipay to a legal separate entity that afterwards developed into Ant Financial, which was born in 2014 (Fortune, 2016). Several prominent Chinese investors invested in Ant financial with some of the largest shareholders being China’s national social security fund, China Investment Corporation and the China sovereign wealth fund (Zhu et al., 2017).

Alibaba, the largest shareholder in Ant Financial, chose in January 2018 to convert its profit sharing agreement with Ant Financial into a direct equity stake of 33%. This was done through an acquisition of newly issued equity from Ant Financial in exchange for intellectual property rights controlled by Alibaba, and hence a non-cash deal, cf. appendix 10 for new ownership structure, Cf. appendix 28 for full description Ant Financials history (Financial Times, 2018b).

6.3 ANT FINANCIAL BUSINESS MODEL DESCRIPTION

This part of the case study will, first, introduce and analyse the business model of inclusive finance in the Ant Financial ecosystem, and second, analyse the supporting technological capabilities from which Ant Financial successfully has created a competitive advantage, Cf. appendix 28 for full analysis.

Inclusive finance: Ant Financial promotes a purpose of bringing inclusive finance to the world. Ant Financial defines inclusive finance as providing equal access to financial services for individuals and businesses in need (Ant Financial, 2018). This also implies that the company wants to reduce the gap between rich and poor when it comes to access and quality of financial services (Finance Asia, 2017). The name “Ant” indicates the deliberate focus on previously underserved segments for financial products in China. Ant Financial seized the market that the incumbent Chinese banks were ignoring, such as young people and low-income individuals (Cheung Kong Graduate School of Business, 2016). These strategic objectives are also reflected in Ant Financial’s vision statement: “Bring small and beautiful changes to the world”. ‘Small’ and ‘Ant’ in the vision statement and the name refers to the myriad of entrepreneurs and merchants who are selling products and services through Alibaba platforms facilitated by Ant Financials payment products (Zhu et al. 2017).

Technological capabilities: Ant Financial has since its creation in 2004 focused on leveraging Internet technologies and data analytics to drive customer value and user experience (Ant Financial, 2018). Advances and financial innovations in four distinct areas of technology have been incremental for Ant

16 Ant Financial also describes Blockchain or Distributed Ledger Technology as an important and applied technology. However, this technology has been excluded from the analysis due to no transparency in how it has been applied from a
Financial to stay ahead of competition, make inferences and identify consumer trends, behaviours and preferences (Zhu et al. 2017). These four areas are:

**Big data**\(^{17}\) analytics: Data in Ant Financial has from the start been perceived as a resource that was real-time and multi-dimensional, and thus critical in their scenario-driven business model (Zhu et al. 2017). Ant Financial had in 2016 over 600 million unique users, through whom Ant Financial is capable of collecting useful data and then subsequently use it to create financial innovations with great impact on the internet finance sector (tmtpost, 2016).

**Cloud Computing Technology:** Ant Financial’s capabilities in advanced cloud computing\(^ {18}\) has been accumulated both in partnership with Alibaba and on its own. Cloud computing both serves as product for external banks through Ant Financial Cloud and as an enabler for other Ant Financial products such as Alipay (Fintech Ranking, 2016). Ant Financial Cloud services has achieved to limit the IT cost of a transaction to US$ 1.4 cent combined with the capacity to manage billions of daily transfers, allowing for a peak workload of 120,000 transactions per second with high availability and disaster recovery solutions (up to 99.99%) in place (Zhu et al. 2017).

**Risk Control Technology:** Effective risk management has been one of the top priorities for Ant Financial since its start in 2004 (Zhu et al. 2017). These big data-based fraud risk management capabilities have enabled Ant Financial to implement and achieve effective control measures and risk recognition in one tenth of a second (approximately 100 milliseconds) (Chen et al. 2015). For instance, approximately 80% of all risk related issues in the Ant Financial ecosystem can be handled and resolved through automated and intelligent risk control processes.

**Artificial Intelligence (AI) Technology:** Ant Financial applies AI technology widely across its products to create timely and intelligent customer service (Zhu et al. 2017). Automatic judgment and prediction of user questions are achieved through capabilities in data mining\(^ {19}\) and semantic\(^ {20}\) analysis technology, which give Ant Financial the possibility to resolve customer issues completely automatically (Ant Financial, 2018). Key people in Ant Financial is also suggesting that it will be the company’s AI research that will shape its future growth by optimising the business and generate new products based on AI and

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\(^{17}\) Big data can be defined as high-volume, high-velocity and/or high-variety information assets that demand cost-effective, innovative forms of information processing that enable enhanced insight, decision making, and process automation (Gartner, 2018).

\(^{18}\) Cloud computing is the delivery of computing services - servers, storage, databases, networking, software, analytics and more—over the Internet (“the cloud”). Cloud computing eliminates the capital expense of buying hardware and software and setting up and running on-site datacenters. Some cloud computing services are also designed to work with REST APIs and a command-line interface (CLI), giving developers multiple options (Microsoft Azure, 2018).

\(^{19}\) Data mining is a process and technology that turns large volumes of raw data from different sources into business insights by using software to look for patterns in large batches of structured and unstructured data (Zhu et al. 2017).

\(^{20}\) Semantic analysis is the process of relating syntactic structures, from the levels of phrases, clauses, sentences and paragraphs to the level of the writing as a whole (Zhu et al. 2017).
deep learning capabilities (MIT Technology Review, 2017a) Cf. the extended case study in the appendix for an in-depth analysis of each technology and its application/importance for Ant Financial.

6.4 INTRODUCTION TO FINANCIAL SERVICES OFFERED BY ANT FINANCIAL

Ant Financial has brought multiple Internet finance innovations to the Chinese financial sector since its inception in 2002. Below section will analyse and discuss the major financial products and how they fit into Alibaba’s business ecosystem, cf. table 14 in the appendix for overview of innovations. The analysis and discussion will cover the context of origin, application and provide quantitative data on adaptation if available. Ant Financial Cloud will not be covered in this section, as it was discussed as part of their technology capabilities, Cf. the extended case study in the appendix.

1) Chengxintong (2002): In the early 2000’s, the majority of China’s growing SMEs were not included in a credit rating system. However, such a system was incremental for B2B online business to create trust between vendors and transactions (Greeven & Wei, 2018). As a response to this and to facilitate B2B trade on 1688.com, Alibaba established Chengxintong as a credit rating system on the platform. The credit system applies third-party certification, activity records, member ratings and other data points to assess a vendor’s credit worthiness (Greeven & Wei, 2018).

The development and launch of such a credit system was the first in China and significantly improved the business ecosystem of Alibaba and e-commerce in general in China. For instance, it was found by Peking University that 92% of vendors active in Alibaba’s ecosystem would select transaction patterns based on the information from Chengxintong. Chengxintong has by 2016 successfully certified the credit status of more than one million SMEs with more than 30 million SMEs using the system to facilitate their business (Greeven & Wei, 2018).

2) Alipay (2004): Alipay is the world’s largest third-party mobile and online payment platform with approximately 520 million active monthly users (CNBC, 2017b). It was launched in 2004 as an online payment service, at this point in time debit and credit cards were extremely rare in China, because consumers usually paid in cash (Greeven & Wei, 2018).

By 2006 Alipay had formed partnerships with more than 40 major domestic financial institutions in China and created a collaboration with China Post that allowed Alipay access to their more 66,000 physical locations. The China post collaboration allowed Alipay users to fund their Alipay account without a debit or bank card and effectively helped Alipay and Taobao to gain access to China’s unbanked and underdeveloped regions (Greeven & Wei, 2018). In 2007 Alipay’s international payment service supporting transactions in 12 different currencies was launched. This allowed global merchants access to Chinese consumers and vice versa, which further gained Alibaba access to overseas markets. In 2011 after six years of experimental operations as a third-party payment provider, Alipay had still not received any
formal recognition or license to operate by the PBoC (Zhu et al. 2017). The license for operating a third-party payment business was obtained from the PBoC in 2011.

Mobile payments in China are currently far more accepted by consumers and retailers compared to especially US. This is partly because Chinese consumers have leapfrogged directly to mobile payments without ever adopting credit cards (Wall Street Journal, 2018).

Alipay has in 2018 evolved from only being an online wallet to now being a lifestyle enabler and the crucial glue in the larger Alibaba business ecosystem (Ant Financial, 2018). Alipay users have now access to advanced location-based services, such as connecting and booking appointments with doctors, hail taxis, pay utility bills, book hotels, top up mobile phones and much more. Furthermore, Alipay allows for directly integration with Ant Financial’s (1) Huabei, an online consumer loan entity that allows payment instalments to purchase on Taobao and Tmall, (2) use saved money in Alipay to buy money market funds or other wealth management products provided by Yu’e bao, and (3) Ant Fortune with instant redemption (Greeven & Wei, 2018). Alipay is also expanding its in-store offline payments domestically and internationally, which now supports 27 currencies, has partnerships with 200 domestic and 250 overseas financial institutions, and covers more than 36 countries (Ant Financial, 2018). Alipay, holds 54.5% market share in third-party mobile payments based on GMV in Q2 2017 and a 31.5% market share in third-party online payments in the same period, cf. figure 15 for breakdown of market shares (IResearch China, 2017). Besides Alipay, Ant Financial has similar investments in Paytm (a mobile payment company) in India with 200 million users, a strategic partnership forged with Ascent Money (a mobile payment company) in Thailand with 20 million users and a joint venture with Kakao Corp known as Kakao Pay (another mobile payment platform) in South Korea with 20 million users (Zhu et al., 2017).

3) AliLoan and MYbank (2007 & 2015): One of the largest challenges for SMEs in China has been access to bank loans for growing their business. To further promote Chinese SMEs to adopt and provide content to Alibaba’s platforms, Alibaba started to provide SME loans in 2007 (Greeven & Wei, 2018). Through a partnership with the Commercial Bank of China and China Construction Bank, Alibaba started to offer jointly backed loans. However, this collaboration was cancelled in 2010 due to limited experience and success from the banks in managing SME’s risk profile and behaviour. As a response to the failure of cross-guaranteed collateral free loans, Alibaba decided to create its own lending company. Zheijian Ali Small Loan Company was established in 2010 with a lending license provided by the Zhejiang Provincial Administration. This lending company provided SMEs with loans of less than 500,000 RMB. However, due to financial regulation Alibaba was only able to fund the loans with capital from its own cash reserves limiting the scalability (Greeven & Wei, 2018).

In March 2014, Ant Financial received regulatory approval to create an online Internet bank. MYbank was among the first five privately held banks to be granted approval by the China Banking Regulatory
Commission (Yale School of Management, 2017). MYbank which translates into “Internet Commerce Bank” in Chinese, provides loans with reduced rates or in some instances interest-free loans to SMEs to, for example, relieve working capital stress for SMEs active in the Alibaba business ecosystem (Zhu et al., 2017). MYbank focuses on providing inclusive finance to consumers, farmers and SMEs especially in the e-commerce sector. It offers direct integration with Alipay, Taobao, 1688 and Aliexpress (logistics) from which it also applies big data to offer competitive loans (Bloomberg, 2017a). By end of October 2017 MYbank has provided above 7 million SMEs with loans amounting to 441.3 billion RMD (approximately 71.221 billion US$) with an average loan size of 8.000 RMD (Reuters, 2018b). MYbank employs about 300 people, half of which are technology experts or technicians, and estimates it can deliver loans for up to 1,000 times less than it would cost a brick-and-mortar bank (Reuters, 2018b).

4) Zhongan insurance (2013): In a direct response to consumer demand Ant Financial created Zhongan insurance in a partnership with Tencent and Ping An Insurance, Zhongan insurance was the first online insurance company in China and was granted a license by China Insurance Regulatory Commission (Greeven & Wei, 2018). KPMG describes Zhongan in their 2017 Fintech Top 100 as an online property insurance platform, specialising in leveraging big data analytics to automate underwriting and claims processes, design and tailor products and create precision marketing campaigns (KPMG, 2017).

The insurance premium scale of Zhongan started out small after the launch in 2014, however during 2015 and 2016 Zhongan experienced a rapid growth and now have obtained premiums of 3.4 billion RMD by end 2016 (Approximately $0.55 billion) (Bloomberg, 2017c). Zhongan completed its IPO on September 28th 2017 through in which it raised $1.5 billion with a valuation of $12 billion which was 4.9X its book value (Seeking Alpha, 2017). With this valuation is Zhongan the worlds fourth most valuable Internet or Fintech company (Bloomberg, 2017b). The most important insurance products are connected to the Alibaba business ecosystem, which accounts for 89% of its premiums, among these a shipping return insurance linked to Taobao one of the key products contributing for almost half of all premiums (Bloomberg, 2017b). Zhongan Insurance reached 100 million cumulative users after 31 months (Ant Financial, 2016).


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21 Exchange rate as of 31.03.2018 (Bloomberg, 2018)
Yu’e bao was created as a response to Alipay’s inability to provide interest rate on users’ deposited funds like a commercial bank would do. This combined with an increasing need for wealth management products to the masses in China, drove Ant Financial to lunch the product Yu’e bao, that allowed its users to invest money deposited on Alipay into a money market fund managed by Tian Hong Asset Management (Greeven & Wei, 2018). The Yu’e bao money market solution is different from standard money market funds since it offers direct integration with a third-party payment service and that funds can be withdrawn immediately whenever the user needs the invested funds (Greeven & Wei, 2018). Yu’e bao became the world’s largest money market fund when it reached $165 billion in AuM in February 2017, overtaking JP Morgan’s US government money market fund. Through this process the fund has accrued approximately 370 million accountholders which make large-scale redemptions an unlikely event (Wall Street Journal, 2017). The fund reached $233 billion in AuM in December 2017, however due to the new money market fund regulation imposed by China’s security regulator, which became effective in October 2017, the further rate of expansion is expected to slow down (South China Morning Post, 2017b). Even though being the largest money market fund in the world, Yu’e bao is not used in a traditional way or solving the same “business issue” as other similar funds. The fund is used as a method for consumers to store funds to spend on Taobao while receiving interest. Thus, it can be argued that it works as micro saving tool in a mobile wallet that gives rural and unbanked Chinese consumers a saving product, as most Chinese consumers had nowhere to save money before (The Finanser, 2018).

6) Zhima Credit (2015): Zhima Credit or Sesame22 was born out of the need for individual Chinese consumers to obtain a credit rating to provide them access to credit-based services such as microloans (Ant Financial, 2018). The license to provide personal credit ratings was provided by PBoC in early 2015, where seven other companies also received this license (Zhu et al., 2017). To accomplish this, Ant Financial developed a credit rating system with scores ranging from 350 to 950 determined from five factors based on big data collected from reliable sources (Fintech News, 2016). The five factors were (1) credit history to reflect the user’s past payment history, where sources, for instance, counted the Alibaba e-commerce ecosystem, (2) behaviour and preferences to illustrate the user’s online behaviour for segmentation purposes, (3) fulfilment capacity to reflect the user’s ability of adhering to contracts such as financial products and loans, with sources counted other services in the Ant Financial ecosystem, (4) identity characteristics which rates the extent and accuracy of user’s personal information, and (5) social relationships which reveal the user’s influence within his/her network, his/her influence to the network and his/her friends’ credit scores (Fintech News, 2016). Zhima Credit is further an enabler

22 The direct translation of the Chinese characters for “Zhima” (i.e. “芝麻”) was “Sesame” (Zhu et al. 2017).
for Alipay and Ali Loan because consumers can access a host of privileges\textsuperscript{23} based on their credit score with integration between Zhima Credit and Alipay (CNBC, 2017d).

Because of the integration with other Ant Financial products and external wide-ranging sources, users with a certain score could get visas\textsuperscript{24} easier, book cars and hotels without paying reservation fees, borrow umbrellas and much more (Zhu et al., 2017). In essence, Zhima Credit facilitates the Ant Financial philosophy of “credit equals wealth” by allowing Ant Financial to provide tailored services to credit-worthy consumers and lowered the social transaction costs involved.

6.5 Integrated Technology Ecosystem Framework with External Forces

This part of the case study will analyse Ant Financial through our developed conceptual framework. The analysis of the case content will be divided into two parts; first, the supply-side focus on the technology ecosystem centred on the development of Alipay as a focal technology, and second, the demand-side focus centred on our two external variables and one strategic business model variable.

The first part of the analysis will follow the four-step approach as formulated by Adomavicius et al. (2007) to identify and analyse a given technology ecosystem, Cf. figure 2 following the cross-analysis for illustration of Alipay’s technology ecosystem as identified and visualised in this paper.

**Step 1 - Identification of the focal technology and its context of use: Alipay**

Alipay will be the focal technology and the centre of this analysis structured around our previously introduced framework. Thus, Alipay will also be the centre of the technology ecosystem analysed.

The functionality of Alipay has previously been introduced with the main functionalities being (1) peer-to-peer mobile-payments, (2) third-party online payments, and (3) in-store payments and cross-border in-store payments (Alipay Global, 2018). Alipay’s additional integration opportunities with other Ant Financial products or its function as life enabler or “Finlife”\textsuperscript{25} will be analysed under supporting business infrastructure later in this section (Zhu et al., 2017).

The context of use is more complex to define considering the multiple and significant scenarios of use in the Chinese economy and beyond. Alipay and Alibaba have been integral to each other’s success, but in this context, it has been Alipay’s ability to facilitate e-commerce in China which have had the largest impact (MIT Technology Review, 2015) Thus, we will define the context of use of Alipay as broadly as a trusted and transparent third-party payment facilitator in multiple consumptions scenarios for both

\textsuperscript{23} Conversely, low scores can result in algorithm-driven penalties enforced against consumers or organizations that have committed wrongdoings — like traffic violations or late bill payments. The ethical consequences will not be further investigated, however definitely interesting from a data analytics and discrimination point of view (CNBC, 2017).

\textsuperscript{24} Chinese Alipay users can apply for travel visa without providing any documentation proofs as long as they meet certain credit score criteria for instance 700 for Singapore visa, 750 for European Union visa (Fintech News, 2016)

\textsuperscript{25} “Finlife” encompassed a broad range of fintech-enabled lifestyle enhancements, including the ability to hail a taxi, book a hotel, pay utility bills, make doctor’s appointments, and buy movie tickets directly from various modules within the Alipay app (Zhu et al. 2017).
online and offline payments. Exactly this was the novel innovation and missing piece in the Chinese economy in 2004 when Alipay was launched. Hence, Alipay forms the core of Alibaba’s Internet finance and e-commerce ecosystem (Tech Asia, 2015).

**Step 2 – Identification of competing technologies: Alipay**

In 2004 when Alipay was launched, the existing alternatives or competing technologies were few. This was due to low credit card penetration rates, which also have continued to be low26 (EY & Development Bank of Singapore, 2016). This was also highlighted by Xiao Xiao, Adjunct at CBS: “China leapfrogged from cash to mobile payments and thereby skipped credit cards in a big scale”. Thus, before Alipay there was a situation where most transactions, especially for rural areas in China, were conducted in cash, often to significant disadvantage for consumers. The low diffusion of alternatives was due to low population density, coupled with a lack of sufficient usage frequency, which rendered traditional payment solutions unjustifiable (Zhu et al., 2017). Before the creation of Alipay, whenever a consumer had to pay, for example rent, the person had to go to her bank, queue, withdraw her rent as cash, walk it across the street to her landlord’s bank, take a number and queue, and then eventually deposit the money into the landlord’s account (Harvard Business School, 2016).

After the launch of Alipay Alibaba’s competitors were soon to follow Alipay’s success and started to offer their own similar third-party payments technologies. This led Tencent to launch Tenpay27 in 2005 and WeChat Pay/wallet in 2014, Baidu to launch Baidu Wallet in 2014, and JD.com to launch JD Payment and JD Wallet both in 2012 (Citi, 2018). This development has created a market situation where Alipay holds a 54.5% and 31.5% market share in mobile payments and online payments respectively, versus Tenpay/WeChat Pay 39.8% and 19.3% in the same segments as of Q2 2017, Cf. appendix 15 (IResearch China, 2017). The incumbent Chinese banks have also launched similar mobile payment apps, however not succeeded in attracting significant transaction volume compared to above introduced players, Cf. appendix 16 (Renmin University of China, 2017).

In terms of technology and functionality adopted Alipay and WeChat Pay are similar, as they both leverage E-wallet technology with a QR payment option. The main payment method is to scan customer or merchant QR codes or soundwave payments28. The funds available are tied to credit card account or pre-deposit money, and merchant needs to support the individual solution (Fung Global Retail & Technology Group, 2016). From a technology competition point of view, the competing technology of Near Frequency Connection (NFC) payments is still in its infancy in China, as only few providers are

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26 According to PBOC statistics, the country had only 0.29 cards per capita in circulation at the end of 2015, down from 0.34 a year ago and in stark contrast to an average of 3.3 credit cards per individual in Singapore (EY & Development Bank of Singapore, 2016)
27 WeChat Pay was also known as TenPay, this paper will use WeChat Pay moving forward (Zhu et al. 2017).
28 The sound wave payment system was introduced with the Alipay Wallet mobile app in January 2013 and uses white noise generated by a smartphone to carry digital information to another device e.g. a vendor machine in the Beijing MRT system. The technology was initially used for smartphone-to-smartphone transactions by Alipay (Techcrunch, 2013)
relying on this technology. For example, Apple Pay and Union QuickPass allow users of NFC-enabled smartphones to make payments by waving their devices at UnionPay point-of-sale (POS) terminals (Fung Global Retail & Technology Group, 2016). In total, NFC payments hold less than 10% of the entire Chinese mobile payments market, and for convenience shopping NFC payments holds 0% market share. This market structure is due to two factors. The first is that many Chinese consumers own cheaper smartphones from domestic brands priced below two thousand yuan, which do not typically ship with NFC chips. Second, a significant share of vendors, mostly local small businesses, are reluctant to support NFC contactless payments due to the underlying costs of owning a POS machine that supports contactless chip cards (Tech Node, 2018). QR codes are seen as a more convenient alternative to costly POS terminals, as you will only need to print a QR code to request funds on Alipay or WeChat.

The main difference between Alipay and WeChat Pay form a competitive perspective is the business ecosystem and mother company from which they have their origin; Alipay from e-commerce and WeChat Pay from social media (Tech Node, 2017). This implies that the average user-interaction with Tencent’s payment solution is higher because they control WeChat, which is an instant massage tool that has the status as the default platform for communication in China. Due to this, and in part to the innovation of the consumer-to-consumer electronic “red packet” feature, WeChat Pay has emerged as one of the main electronic payment applications (Zhu et al., 2017). Contrary, Alipay is an extension of Alibaba’s e-commerce ecosystem, and thereby it has a lower average user interaction (Tech Node, 2017). From above analysis, it can be argued that the payment competition in China is not about competing technologies in form of credit cards, QR codes or NFC payments, but more the underlying business ecosystem and strategy of the provider.

**Step 3 – Identification of component technologies: Alipay**

Several component technologies have been essential for Alipay in the previously defined context of use. The component technologies deemed most important will be analysed below with focus on the implications and applications for Alipay. The relevant path of influence will also be assessed for each component technology.

**Internet connectivity:** China will continue to leapfrog directly into a digital financial market place, this is partly due to a mature digital infrastructure (EY & Development Bank of Sigapore, 2016). For instance, China had 710 million internet users in June 2016 corresponding to 51.7% of the population, compared to only 1.8% in 2000 and 8.5% in 2005. At this growth rate the internet penetration rates of North America and Europe will be within reach in a few years, Cf. appendix 17 for graph of development (China Internet Network Information Center, 2017). The majority of these Internet users have access to 3G and 4G

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29 Facial recognition technology in the context of Alipay has been included because of its potential future importance for Alipay. An illustration of how facial recognition technology works in relation to Alipay can be seen on following link https://www.youtube.com/watch?v=f-NIAUhU2E0 (Alibaba Group, 2017)
networks through different devices making utilisation of sophisticated Internet finance products such as Alipay possible (Harvard Business School, 2016). Thus, the path of influence from connectivity through 3G and 4G has been mainly an external “feed-forward” influence where new product innovations become possible in the presence of a new component innovation i.e. 3G and 4G networks (Liu et al., 2015).

**Diffusion of mobile and smart devices:** Similar to the importance of connectivity the diffusion of smartphones has been important to the adaptation of Alipay. China’s utilisation ratio of mobile online payments stood at 57.7% in 2016, with more than 1-in-2 Chinese consumers using their smartphone to conduct financial transactions primarily through Alipay and WeChat pay (EY & Development Bank of Singapore, 2016). In 2016 695 million or 95.1% of Chinese Internet users were going online via a connected devices, Cf. appendix 18 for graph of development (China Internet Network Information Center, 2017). Through the diffusion of smartphones, the Chinese consumers also received access to mobile applications with endless functionalities, and especially these applications have been essential for Alipay, as Alipay works as a mobile application with integration into countless other applications implying a pull-push effect (BBVA, 2017). Thus, the path of influence from smartphone and mobile application has been mainly a “feed-forward” influence (Liu et al., 2015). The importance of smartphones was also highlighted by the interviewed management consultant (2018): “Chinese consumers have leapfrogged from cash to mobile payments enabled by the fast diffusion of smartphones, and they have never really experienced traditional bank transfers or products”.

**Cloud computing:** The development of cloud computing has as previously mentioned played an incremental role in the success of Alipay, cf. technology capability section in this chapter. First of all, the development of internal cloud capabilities has been essential to reduce operating cost of Alipay and make the cost per transaction competitive ($1.4 cent per transaction, combined with the capacity to manage billions of daily transfers) (Reuters, 2018a). Thus, in order to gain access to a future-proofed core-banking system for its financial products Ant Financial decided not to look for an external provider but to develop it by creating Ant Financial Cloud (Fintech Ranking, 2016). Alipay leverages cloud technology for their cloud-based Alipay Wallet which both allow for peer-to-peer and online e-commerce transactions. Furthermore, Alipay has released more than 60 APIs for third-party developers to build online storefronts integrating Alipay. By integrating Alipay into your storefront you also get access to cloud-based data analytic capabilities, for instance for personalising product recommendations (Kshetri, Fredriksson, & Torres, 2017). These data analytics are also an essential part of Alipay’s internationalisation strategy, and in order to attract merchants in Europe, Alipay is providing advanced analytics around Chinese consumers using its app, allowing the merchants to analyse spending patterns, preferences and seasonality of Chinese travellers (Forbes, 2016). Furthermore, Alipay’s cloud-based system processes Alipay’s core functions (e.g. accounting and payment) with peak processing
power reaching an average of 120,000\textsuperscript{30} transactions per second and a peak of 175,000 (a world record, previously held by Visa) during the 11.11 Festival in 2016 (Zhu et al., 2017). This illustrates the importance of cloud technology for Alipay and how it in general is the foundation for Ant Financial’s core products. This path of influence can be characterised as a “feed-back” influence, as the development and scaling of Alipay forced Ant Financial to develop the required cloud computing capabilities to enable scalability and new functionalities (Liu et al., 2015). It can be argued that cloud computing has constituted a modular and shared capability within Ant Financial with continuous development.

**QR Codes:** The technology of QR\textsuperscript{31} codes or Quick Response codes has also played an important role in the development of mobile and online payments in China, as 90% of all third-part mobile payments are controlled by Alipay and Tencent that both leverage QR codes for their payments products (Fung Global Retail & Technology Group, 2016). The price competitiveness of QR codes compared to POS terminals combined with adaptation by Alipay and Tencent have been the key drivers behind the popularity in China (The Asian Banker, 2014). This path of influence can as with Internet connectivity be characterised as a “feed-forward” influence, as the development of QR\textsuperscript{32} codes as a component influenced the evolution of Alipay.

**Data analytics and AI:** Big data and AI based fraud risk management capabilities have enabled Alipay and Ant Financial to implement and achieve effective control measures and risk recognition with one tenth of a second (approximately 100 milliseconds) (Chen et al., 2015). For instance, approximately 80% of all risk-related issues on Alipay can be handled and resolved through automated and intelligent risk control processes. As a consequence of above, the capital loss rate due to fraud at Alipay is lower than 0.001%, which is significantly lower than competitors (Zhu et al., 2017). Alipay also provides big data-based marketing advice to their retailers, for instance to enable more targeted omni-channel marketing strategies (RFI Group, 2017). Thus, the path of influence from data analytics and AI has been mainly a “feed-forward” influence where new product innovations and functionalities on Alipay have become possible in the presence of new component innovations. However, a “feed-back” influence can also be argued because it has been incremental for Alipay to develop these skills to scale the application, similar to path of influence from Ant Financial Cloud (Liu et al., 2015).

**Facial recognition:** One of the newest technologies being employed in Alipay to increase its functionality is facial recognition technology. The software analyses more than 600 facial features to make a match and uses a 3D camera and a "liveness" algorithm to avoid being tricked by a photo or video (CNN, 2017).

\textsuperscript{30} According to Alipay they reached 256,000 payments per second (Alipay stated this on Twitter) for the Alibaba Group on 11.11 Festival in 2017, which again is a new world record. In total Alipay reached 1.48 billion transactions (Enterprise Innovation, 2017)

\textsuperscript{31} A QR code consists of black and white squares arranged in a square grid on a white background, which can be read by an imaging device and processed. The necessary data is then extracted from patterns in the QR image (Global Alipay, 2018)

\textsuperscript{32} QR codes were first created back in 1994 by a Toyota subsidiary named Denso Wave whom developed the code in order to help in the manufacturing process, they aided in tracking vehicles and parts (Mobile QR, 2018)
Leveraging facial recognition technology is Alipay’s latest initiative to enhance security, convenience, user experience and effectively remove the last financial friction and cumbersome processes for transactions (Ant Financial, 2018). Alipay’s progress with and use of facial recognition technology for payments was recognised as one of 2017’s breakthrough technologies by MIT’s Technology Review (MIT Technology Review, 2017b). This path of influence can as with Internet connectivity be characterised as a “feed-forward” influence.

**Step 4 – Identification of support and business infrastructure technologies: Alipay**

Several innovations have added value to both the functionality and performance of the focal technology of Alipay, however the main contribution to the business infrastructure have been the development of additional services and products creating an embedded delivery platform of financial inclusion centred around Alipay (Oliver Wyman, 2017). This has been through internally developed additional business infrastructure and external *location-based services*. Both will be analysed below.

Alipay has been extremely successful in utilising its *online-to-offline* app as a gateway to create an embedded platform and thereby “cross-sell” or “cross-distribute” other financial products produced by Ant Financial such as financing, investment products and insurance offerings (Oliver Wyman, 2017). Examples of these Ant Financial ecosystem integrations are (1) direct integration with Yu’e Bao and its convenient cash management for the funds in the users Alipay account, Cf. Yu’e Bao analysis in previous section, (2) integration with Zhao Cai Bao which offers peer-to-peer lending to businesses and individuals, (3) integration with Hua Bei which offers online consumer loans/financing for purchases of goods and services on Taobao or Tmall, (4) integration to Jie Bei which offers cash loans with application being made through Alipay and funds being directly transferred to your Alipay account (Citi, 2018), and (5) integration with Zhima credit scores which both give privileges in the Ant Financial ecosystem and to external location based services which will be explained below (CNBC, 2017d).

Alipay has pursued this strategy of creating an embedded delivery platform by integrating external *location-based services* offering such as, connecting and booking appointments with doctors, hail taxis, buy cinema tickets, order take-away food, pay utility bills, book hotels, top up mobile phone, and much more only by opening the Alipay app (Greeven & Wei, 2018). Alipay has also pursued a strategy of enabling these location-based services for Chinese tourists going abroad by providing information on restaurants, tourist attractions and shopping destinations in Europe (Forbes, 2016). This strategy is part of the previously introduced agenda of using Alipay as a life enabler or “finlife” product, Cf. appendix 19 for an illustration of Alipay’s finlife ecosystem (Ant Financial, 2017).

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33 A location-based service (LBS) is a software application for a IP-capable mobile device that requires knowledge about where the mobile device is located. Location-based services can be query-based and provide the end user with useful information such as "Where is the nearest ATM?" or they can be push-based and deliver coupons or other marketing information to customers who are in a specific geographical area (Searchnetworking, 2018)
Lastly, the Alibaba ecosystem has also constituted essential enabling business infrastructure for Alipay, as Alipay has managed to gain significant scale by leveraging the existing large online user base by funnelling customers through Alibaba’s reputable ecosystem and specific platforms such as Taobao and Tmall (Oliver Wyman, 2017). This has served Alipay as an effective low-cost and high-reach strategy for reaching scale, Cf. appendix 20 for illustration of strategy with Ant Financial and Alibaba user bases. The paths of influence in relation to business infrastructure have both been “feed-forward” and “feedback”. Hence, the focal technology of Alipay has caused new innovation and development in the surrounding business infrastructure and the development of relevant infrastructure has motivated innovation and development of Alipay (Liu et al., 2015). Thus, a continuous enabling loop of technological evolution and co-development has been taking place, similar to the defining characteristics of a business ecosystem (Iansiti & Levien, 2004).

**Regulation in the specific context of use: Alipay**

In terms of the effect of regulation on Alipay from the relevant Chinese authorities it is fair to argue that it has been strongly accommodating and accelerating as previously described, as Alipay was allowed to operate for six years without requiring any license or be subject to any regulation (Zhu et al., 2017). It was found to be a common practice that the Chinese regulators allowed for certain experiments without government approval or explicitly disapproval (Greeven & Wei, 2018). Xiao Xiao (2018) also pointed at this factor: “especially in relation to the Internet sector, the Chinese authorities don’t want to regulate to early and limit innovation, they want to wait and see who the dominating players are and then work directly with these players regarding regulation. This was also the case with third-party payments and Alipay”.

As early as in 2013, the People’s Bank of China explicitly expressed its support for technology companies to promote Internet Finance. This has been done to encourage the healthy development of Internet banking and financial innovations, Cf. appendix 21 for public statements from Chinese officials (McKinsey & Co., 2016). This deliberate support from the Chinese authorities is therefore perceived to have been an accelerating force behind the development of Internet finance and BigTechs role in it in China. For instance, the regulation of third-party payment providers such as Alipay were without any Know Your Customer (KYC) requirements, reserve funds ratio requirements or transaction limits until 2015 where it was proposed by People’s Bank of China to impose such restrictions (Citi, 2016). The days when the Chinese authorities took a back seat to facilitate disruption of the entire payment industry is however coming to an end. For instance, (1) PBoC raised payment platforms reserve funds ratio from 20% to 50% 30 December 2017, (2) PBoC introduced caps on payment by QR codes pending on security measures and user credentials between 500 RMD (77$) and 5000 RMD (769$) late December
2017, and (3) lastly announced its intention to regulate how payment platforms use data collected from consumers (Forbes, 2018).

New potential regulation in China can also be impacting the preferred technology behind third-party payments. This is due to raising security concerns in relation to QR codes which have recently been exposed to fraud based on viruses and malware. Regulation in this area could have influence on the competition between NFC and QR codes, hence NFC payments are regarded as more secure (Fung Global Retail & Technology Group, 2016).

Lastly, the Chinese authorities also succeeded with shielding the Chinese Internet finance industry from external competition by not providing guidance for international third-party payment license applications. Niklas Weckesser (2018) elaborated this unique market environment: “The way China’s Government can structure and promote a market is very special, for example developing own companies and solutions by not opening up for e.g. western companies. This has been strongly contributing for these extreme “winner-takes-it-all” platforms to emerge, also in the fintech or Internet Finance space”. Thus, the overall regulatory environment surrounding Alipay has been assessed as highly accelerating for Alipay and Internet finance in China in general.

**Strength of incumbents: Alipay**

The strength of the incumbent Chinese financial sector and the quality/reach of financial products before the revolution of Internet finance, can best be described as inefficient and insufficient. Thereby, the existence of significant unmet financial needs from retail customers and SMEs in China was evident (EY & Development Bank of Sigapore, 2016). This is the case in relation to financial infrastructure such as commercial bank branches and ATMs, current retail loan penetration, SMEs access to bank-disbursed loans and diffusion of payment cards and other payment solutions (EY & Development Bank of Sigapore, 2016). The bank-driven indirect financing model in China has historically been structured around large and government-related corporates related to the state-owned Chinese banks (Oliver Wyman, 2017).

Especially, retail customers have been under-served by China’s under-developed consumer banking system, where the traditional banks are perceived to be offering homogeneous, uncompetitive and unimaginative financial services that are pushed out to consumers, rather than responding to existing needs, Cf. appendix 22 for reasons for using a non-bank rather than a traditional bank in China (EY & Development Bank of Sigapore, 2016).

This uncompetitive context for retail customers, especially for the lower middleclass, was due to strict regulation and lack of professionalism in the state-owned banks, which further had experienced a strong monopolisation without being subject to the market mechanisms (Xiao, 2018). This resulted in high profit margins and little innovation for most state-owned financial institutions and no focus on the private sector and individuals in China (Greeven & Wei, 2018). This historical protection and strict regulation created
a structural mismatch between supply and demand in the Chinese financial sector, and for many years the long tail or “grass roots” in China remained unbanked. These under-served Chinese customers have created an eager appetite for Internet finance to realise a truly inclusive financial system (McKinsey & Co., 2016). The state-owned Chinese banks also had (and continue to have) high overhead and personnel expenses, effectively making them focus on the segments with the highest margins. Hence, SMEs, micro-enterprises and the rural population were critical under-served or simply unbanked (Zhu et al., 2017).

In terms of innovation and digitalisation the commercial banks in China were also late to adapt to digital banking and online/mobile payments, allowing for third-party companies to offer convenient and cost competitive products as alternatives to cumbersome and costly bank payments (Citi, 2016). Niklas Weckesser (2018), however, hypothesised that the Chinese state-controlled banks actually did not seek to engage in this competitive battle: “The largest banks in China are all government-owned. Hence, the government has also influenced their efforts towards digitalisation and inclusive finance and thereby indirectly created opportunities for BigTechs providing financial services in China... I could imagine that the Chinese government had an incentive to promote a few big technology players in finance which they could influence and work with”.

This market situation effectively allowed Ant Financial and Alipay to enter banking without much competition. However, not to sought to disrupt traditional financial institutions, but rather aiming at serving the market segments that were underserved by large banks (Zhu et al., 2017). Thus, the strength of incumbents is assessed to be limited and a highly accelerating factor for Ant Financial.

**Business model problem addressed: Alipay**

Providing third-party online/mobile payments and another financial services have been of strategic importance for the Alibaba ecosystem due to the existing under-developed consumer banking system (Citi, 2016). Thus, payments are core to their online-to-offline strategy. Alipay was initially developed to facilitate transactions in Alibaba’s ecosystem of 439 million active buyers, 8.5 million active retailers and a C2C market share of 96.5% boosting a gross merchandise volume of RMB 837 billion in 2017 (USD 126 billion) (Zhu et al., 2017). The founder of Alibaba Jack Ma, expressed the importance of the development of Alipay in following way: “The lack of development in Chinese e-commerce was due to one missing piece — a mechanism that could facilitate trust between people. I believe that Alipay is the mechanism that can fulfil this gap. China values credibility but lack a system of trust. If Alipay wants to have value in China, it must establish a trust system” (Ma, 2016).

The forces behind this evident business model problem were not only the lack of efficient payment infrastructure, but also weak consumer protection laws coupled with deteriorating consumer confidence in C2C and B2C. This made Alipay’s escrow services incremental for Alibaba’s development, and the

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34 See previous explanation of Alipay escrow service and its impact
relationship between Alipay and Taobao was synergistic and mutually reinforcing (Zhu et al., 2017). One could argue that Alipay could not exist without Taobao, and Taobao could not be thriving without the effective and trustworthy payment solution of Alipay. This finding was also supported by Xiao Xiao: “Alipay was created at the same time of the Taobao platform, exactly to address the problem of trust through their escrow service. This also gave Alipay legitimacy to be used outside e-commerce and to provide other financial services, because of the trust build form the start”. Besides Xiao Xiao, all interviewed industry experts acknowledged this observation, Cf. appendix 24 for relevant quotes (Damm; Vinten; Tillisch; Weckesser; Bigum, 2018).

The above-analysed strategic importance addressed by Alipay in Alibaba’s ecosystem was essentially also a “strategic” problem for the general economy of China. Therefore, it is argued by MIT Technology Review that Alipay could ultimately have a bigger impact on the Chinese economy compared to Alibaba (MIT Technology Review, 2015).

6.6 Main Findings From the Alipay Case Study

The case study, the general analysis of Ant Financial and the subsequent analysis of the technology ecosystem of Alipay have brought forward several findings relevant for answering our research question in an Ant Financial perspective. More concrete, the case study has highlighted important and formative market and internal dynamics incremental for Alibaba’s and Ant Financial’s success in providing financial services and further identified some of the likely strategic consideration for Alibaba to move into financial services. The main findings from above case study and analysis will be presented below following the structure of our conceptual framework to ensure a logical coherence.

Focal technology and its context of use: The context of use of Alipay was defined broadly as a trusted and transparent third-party payment facilitator in multiple consumptions scenarios for both online and offline payments. Exactly this was the novel innovation and missing piece in the Chinese economy in 2004 when Alipay was launched.

Competing Technologies: The Chinese consumers leapfrogged directly from cash to mobile payments due to the inadequate existing financial infrastructure, the rapid diffusion of smartphones and the well-developed Internet connectivity. The current competing technologies in the specific context of use was found to be QR codes, credit cards and NFC payments, however the actual competition was in-between Alipay and WeChat Pay which both leverages QR codes. This competition was structured around the different business ecosystems and their different presence in user journeys.

Component Technologies: It was found how Alibaba’s and Ant Financials focus on developing component technologies such as modular and shared cloud computing, AI and big data capabilities were absolutely incremental in the development of Ant Financial and all subsequent product offerings. The paths of influences in-between component technologies and the focal technology were found to be
working in a continues enabling loop of technological evolvement and co-development with mutual network effects, similar to the defining characteristics of a business ecosystem.

**Business Infrastructure:** It was found how Alibaba and Ant Financial had been successful in developing internal (e.g. Yu’e bao & MYbank) and external (location-based services) business infrastructure around Alipay and thereby creating an embedded delivery platform or ecosystem of financial inclusion with strong network effects to the Alibaba platforms. Similar to the path of influences related to component technologies was the path of influences in-between business infrastructure and the focal technology found to be working in a continues enabling loop of technological evolvement and co-development with mutual network effects.

**Regulation:** It was shown that Alibaba and Ant Financial had experienced a highly accommodating regulatory environment, as they were not subject to any regulation in the beginning due to the “wait-and-see” approach from the Chinese authorities. Furthermore, the Chinese authorities did in general support the creation of Internet finance as a sector with a few dominating players. Lastly, the authorities effectively shielded the market from outside competition by not issuing any international guidance for applying for licenses to operate third-party financial services. One can argue that the development of Internet finance in China and BigTech’s dominance have been controlled by the Chinese government through their regulation and indirectly through their control of the incumbent Chinese banks. This environment was assessed to be highly accommodating and accelerating for Alipay.

**Strength of Incumbents:** It was found that the existing state-owned banks were not focusing on the low margin consumer and SME segments in the Chinese economy, and thus creating a significant segment of under-served and unbanked individuals and SMEs. This was hypothesised to be a deliberate choice by the Chinese regulators. Especially, retail customers have been under-served by China’s under-developed consumer banking system, where the traditional banks are perceived to be offering homogeneous, uncompetitive and unimaginative financial services that are pushed out to consumers, rather than responding to existing needs. This environment was assessed to be highly accommodating and accelerating for Alipay.

**Business Model Importance:** The case study analysis and the findings also provided indication on the strategic consideration for Alibaba’s to move into finance. It was discovered that the development of Alipay has been highly incremental for the success of Alibaba’s platforms, and hence, its description as the missing piece in Chinese e-commerce. This strategic importance and synergetic relationship to the Alibaba ecosystem was also highlighted in other Ant Financial products and in internally developed business infrastructure integrated in Alipay. It can be argued that Alibaba was not particular interested in providing financial services, however extremely focused on being customer centric by providing necessary solutions for all participants in their e-commerce ecosystem. Our interviewed management consultant also supported this finding: “The ‘Alibaba’s’ of the world did not intend to build ecosystems
or provide financial services from the start, however they focused on solving customer needs and how they could improve customer experiences, which led them to build ecosystems”. In general, all interviewed industry stakeholders argued this, Cf. appendix 24 for relevant quotes.

7. Case Study II: Amazon: Banking’s Amazon Moment

This chapter of the paper will cover the case study of Amazon. The first part of the case study will introduce the Amazon business and its strategy, technological capabilities and its financial services products offered.

The second part of the case study will be the analysis based on our developed framework on the identified and selected focal technology of Amazon Lending. This financial service has been chosen as the focal technology because of its synergetic and integrated relationship with the Amazon business model.

7.1 Introduction to Amazon

In order to conduct a case study and analysis of on Amazon’s financial services, it is essential to understand the underlying business model and ecosystem of Amazon, which will be presented below.

In 1994 in Seattle, Washington, Jeff Bezos founded the online bookstore Amazon.com that has since expanded to become a global leading e-commerce platform, a cloud computing giant, an electronic device manufacturer, grocery chain and a financial service provider among others. Initially, Bezos wanted to build an internet retailer, and since e-commerce was a new uncertain era for consumers, books were seen as the ideal commodity as they are identical products. The online shop set itself apart from other internet merchants by revolutionising one-click shopping, customer reviews, and order verification via e-mail.

Since then, Amazon has diversified both vertically and horizontally to become a big technology company employing 566,000 people divided in three ‘pillars’; the e-commerce marketplace, the Prime membership programme, and Amazon Web Services (AWS) (Harvard Business Review, 2017). This has made amazon the largest Internet retailer in the world measured by revenue and market capitalisation, and second largest after Alibaba Group in terms of total sales (Yahoo Finance, 2018). Amazon has expanded geographically too, with country-specific websites in the UK, Japan and India among others.

The e-commerce marketplace: The foundation of the Amazon business is the e-commerce platform that sells millions of products from Amazon.com. Amazon buys the products from merchants, stores them in its warehouses and resell and ship them when an order is placed. It also allows independent sellers to offer their products through the platform of which Amazon takes a percentage of the sale. Besides the huge network of merchants supplying products to the platform, Amazon sells its own products too. ‘Amazon Basics’ is the brand of its low-price electronic products like batteries, chargers and cables. Amazon also expanded into hardware development in 2007 with the release of the first-generation Kindle, which sold out in less than six hours. This was not surprising as Amazon sells its Kindle devices at or even below
The incentive for doing this is to penetrate the e-reader and tablet market and facilitate more consumption scenarios for e-book readers, and the losses from sales of computer hardware have been more than made up for by the sales of e-books, movies, and other digital content sold through the Kindle. In November 2014, Amazon introduced Echo, a new category of devices powered by artificial intelligence and controlled solely by voice commands. The speaker device connects to the owner’s Amazon account and allows purchases beyond Amazon to be made using voice commands. It uses AWS to constantly learn and add functionalities over time and are now Amazon’s best-selling hardware device. Overall, Amazon strives to ensure good customer service, vast selection of products, low prices, and fast delivery throughout the e-commerce marketplace (Harvard Business Review, 2017).

The Prime membership programme: Offering unlimited access to music and TV content streaming, Kindle e-books, unlimited photo storage, and free two-day shipping on most Amazon products are the main benefits of the Prime programme (Amazon, 2018). Amazon Prime is offered at $99 a year, and even though Amazon does not disclose its number of Prime members, it is estimated to be in the region of 100 million worldwide (Business Insider, 2018).

Amazon Web Services: Often referred to as ‘Amazon’s second decade’, Amazon Web Services (AWS) is Amazon’s comprehensive, cloud-based service that includes computing and storage capacity, content delivery, data management, software, networking, payment and billing systems, and other applications. Launched in 2006, the unit was created as Amazon struggled in the early 2000s with slow software development processes. To improve this, the company built a set of in-house infrastructure services that would allow its retail business to move more quickly. However, Amazon only needed its full capacity for about six weeks of the year, during each holiday season. Amazon was soon to realise that these on-demand web services and computing power would be valuable for other companies and thus formed a business around the infrastructure. Later, entities such as tech start-ups, government agencies (such as the CIA) and financial institutions have rented server space, storage, and cloud computing services from AWS. By 2016, AWS had the largest market share in this space with 31%, before Microsoft’s Azure (9%), IBM’s Cloud (7%), Google and Salesforce (each 4%), with the remaining market share held by other providers. In 2016, AWS revenue increased by 54% from previous year to $12 billion and providing $1 billion in profits (Harvard Business Review, 2017; Amazon, 2017). Relevant for this case, the AWS business offers many solutions tightly knitted for financial industry players. Their banking and payment solutions entails optimising, accelerating, and automating processes such as data analytics, customer service delivery, data-enabled risk management, and data-driven compliance models. JP Morgan and Capital One have started using the platform to increase efficiency, harness AI capabilities, and cutting 50% of its own data centres (World Economic Forum, 2017). In addition, the AWS cloud also provides access to the world’s largest ecosystem of consulting and technology partners (Amazon Web Services, 2018). The most recent addition
to AWS is “AWS Blockchain Templates as-a-service” which gives AWS users working on blockchain apps a faster way to set up Ethereum or Hyperledger Fabric networks (Tech Crunch, 2018a).

7.2 Amazon’s Strategy and Technological Capabilities

This part of the Amazon case study will introduce and analyse the business model and the supporting technological capabilities from which Amazon successfully has created a competitive advantage in its commerce ecosystem and further in financial services.

Strategy: Amazon employs a multi-level e-commerce/commerce strategy. To become this e-commerce tech giant that Amazon is today, Amazon has spent vast amounts on investments in technology, acquisitions, and partnerships since the 90’s. Amazon started by focusing on business-to-consumer relationships between itself and its customers and business-to-business relationships between itself and its suppliers and then moved to facilitate customer-to-customer with the Amazon marketplace, which acts as an intermediary to facilitate transactions. The company lets anyone sell nearly anything using its platform. In addition, there is now a programme which lets sellers build entire websites based on Amazon's platform. Based on Amazon’s vision ‘to become the world’s most customer-centric company’, the ability to innovate and expand into adjacent industries based on its customers’ needs is an integral part of the Amazon corporate strategy. Indeed, Amazon’s innovation and expansion into other lucrative areas of the technology industry has been part of a broader convergence of industries previously the sole domain of companies like Google, Microsoft, and Apple (Harvard Business Review, 2017).

Amazon strives to offer its customers the “Earth’s largest selection” of goods without leaving home on its Marketplace platform. To achieve this, Amazon has been quick to acknowledge the need for an ecosystem that facilitates its e-commerce business, as a lot of value its created through network effects from large consumer and seller bases (Marr, 2016).

Technological capabilities: As we have observed throughout this case study, Amazon’s technological capabilities are the foundation for its e-commerce ecosystem. Advances in four distinct areas of technology have been incremental for Amazon to stay ahead of competition. These four areas and their application will be assessed below:

Robotics: Amazon’s logistics infrastructure and scale is impressive, with over 70 distribution centres in the US and more than 150 worldwide. Increasingly operated by a variety of robotics and automated, mechanised processes, Amazon boasts one of the world’s most efficient logistics lines. Initiated in 2013, Amazon completed its first drone delivery in 2016 and it is expected to be able to pick up packages from distribution centres and deliver directly to the customer’s doorstep without human involvement. The efficiency and scale in the logistics space have seen Amazon offer logistic services too (Amazon, 2018; Harvard Business Review, 2017). Fulfilment by Amazon (FBA) is already a booming business that allows small businesses to tap into the scale of Amazon. Investing in logistics also improves the customer
experience, which is a key objective for Amazon (Business Insider, 2017). It will later be shown how Amazon’s logistics operations are relevant for its ‘LendTech’ programme.

**Big data analytics:** Amazon possesses rich data on both consumers and merchants. It uses predictive analytics for targeted marketing and ads to increase customer satisfaction and build company loyalty. It has developed a personal recommendation system that analyses each customer in what items previously purchased, what is in the online shopping cart or on the wish list, and what items were searched for the most. This information is used to recommend additional products that other customers purchased when buying those same items. The acquisition of Goodreads in 2013, enabled Amazon to integrate the social networking service of around 25 million users into Kindle functions. Kindle readers can highlight words and sentences and share them with others to discuss the book. Amazon data analytics reviews words highlighted in customers’ Kindle to determine what the customer is interested in learning about.

Big data analytics is also used for managing Amazon’s prices to attract more customers and increase profits. Prices are set according to individual customers’ activity on the website, competitors’ pricing, product availability, item preferences, order history, expected profit margin and other factors. Amazon’s patented Anticipatory Shipping Model uses big data for predicting what products customers are likely to purchase, when they may buy them and where they might need the products. Based on these factors, the items are sent to a local distribution centre or warehouse to be ready for shipping once ordered. Because Amazon wants to expedite orders quickly, it coordinates with merchants and tracks their inventory. Amazon then uses big data for choosing the warehouse best located between the vendor and the customer to reduce shipping costs (Marr, 2016).

**Cloud computing:** As of today, Amazon is the largest provider of infrastructure as a service (IaaS) through AWS. As mentioned earlier, Amazon had developed server space to handle its vast amount of customer data, but only needed full capacity for holiday seasons. Now, Amazon has created an ecosystem around its cloud computing. Amazon’s customer, merchant and logistics data is stored on these cloud servers. This enables all of Amazon’s businesses to both add data and use data from other parts of the platform. For example, Amazon Echo is powered by artificial intelligence which is stored on cloud servers to enable its use (Harvard Business Review, 2017). AWS constitutes one of the greatest examples of the development of a technology ecosystem. As the richness of data has increased, the development of artificial intelligence and other services provided through AWS have advanced and become useful in even more use cases. This is further emphasised by current projections that AWS is viewed as having the potential to eclipse Amazon’s retail business in revenue in the medium to long term (Bort, 2016).

**Artificial intelligence and machine learning:** The term artificial intelligence (AI) was coined in 1956, but AI has become more popular today thanks to increased data volumes, advanced algorithms, and improvements in computing power and cloud computing. AI (and machine learning) is the technology that you put on top of big data, cloud computing and robotics to add intelligence in decision-making (SAS,
Amazon started to include artificial intelligence and machine learning in its business plans in 2006, as the underlying technologies of big data, robotics and cloud computing were already in place. Because Amazon didn’t have the talent in-house, it used its cash to buy companies with expertise (Wired, 2018). As mentioned, the Amazon Echo device runs on the cloud and adapts to speech patterns, vocabulary, and the user’s preferences via AI. This product launch was the catalyst for building best-in-class AI competencies within Amazon (Harvard Business Review, 2017). As Amazon's ambition for its AI projects has grown, the complexity of its challenges has become a magnet for top talent. It has now developed powerful AI competencies, where AI innovations in one part of the company fuel the efforts of other parts, which in turn can build products or services to affect other parts of the company at large (Wired, 2018). Through the AWS business Amazon has now started to offer machine learning services with more than 10,000 clients already in place. AWS has meaningfully more reference customers for machine learning than any other provider, and much of it has to do with AWS’s unmatched array of services that enable a full stack machine learning experience. With AWS machine learning services, customers are building a wide variety of intelligent applications and solutions with the help of AWS (Amazon, 2018).

7.3 Introduction to Financial Services Offered by Amazon

This section of the case study will introduce and analyse the business model of Amazon’s financial services and the supporting technological capabilities from which Amazon provides its customer-centric financial offerings. As Amazon’s business ecosystem has expanded, so has its customer journeys and thus customers’ pain points. With the desire ‘to become the world’s most customer-centric company’, Amazon has expanded into adjacent industries, for which some (accidently) have been financial services. Furthermore, numerous surveys are telling us that consumers are ready to do their banking with BigTechs (e.g. Bain, 2018; Forbes 2017).

Amazon Cash (2017): “The fast, no fee way to use cash to shop Amazon. Get your barcode via text message or print-at-home. Bring this barcode into any participating store and show it to the cashier to add cash to your Amazon Balance.” This is all the text provided by Amazon on its landing page for Amazon Cash. This simple solution is targeting young adults and people without credit cards to become part of the Amazon e-commerce platform. Furthermore, it expands its ecosystem of merchants to more brick-and-mortar retailers that are not necessarily an active part of the e-commerce platform. Amazon Cash allows it users to deposit cash directly to their Amazon accounts from more than 10,000 retail locations throughout the US (Bain, 2018) This kind of checking and debit account components of banking are usually unprofitable, especially for a fee-free model aimed at younger customers who have little money to keep in their account. Most banks do not relish serving this part of the market, but Amazon has several good reasons to do so. Amazon has spotted a segment of customers that it can serve better, and the company does not need to worry about making money on each specific product, as synergies towards
its e-commerce platform is present in almost all of its activities. It is important to note that Amazon Cash cannot be withdrawn and is thus not classified as a deposit account (Federal Reserve, 2013). That being said, Amazon is in talks with big US banks like JP Morgan Chase and Capital One to expand this solution to a checking account type product (Citi, 2018). Overall, these initiatives make good sense in supporting the Amazon business model, and it is estimated that Amazon could save $250 million annually in credit card fees if customers buy from Amazon using their debit accounts (Bain, 2018).

**Pay with Amazon (2013):** Amazon is already moving further into the payments sphere with its Pay with Amazon. This function allows users to pay with whatever payment information already stored in their Amazon account. Its value proposition is to be the payment service available at other online merchants to make it simple for hundreds of millions of customers around the globe to pay using information already stored in their Amazon account. The customer experience is familiar and trusted. In just a few taps they can complete a transaction without leaving the merchant’s site. The merchant maintains branding and the ongoing customer relationship, and thus integrates the payment solution that is built on years of Amazon e-commerce innovation and trusted by merchants and buyers alike (Amazon, 2018). Nearly 30% of Amazon Pay transactions are for sellers who do not sell on Amazon and they grew almost 110% in 2017, closing the year with 33 million customers who paid for shopping on non-Amazon retailers (Citi, 2018). With millions of active users and 200% year-over-year growth in merchants adding the “Pay with Amazon” buy button to their online stores, Amazon is evidently moving into the payments sphere (Business Insider, 2016). However, the caveat is that despite high growth rates, Amazon’s biggest weakness is that it is perceived as a direct competitor by other online retailers (Hernæs, 2017). Across the globe, Amazon is ramping up its efforts in India to strengthen its financial service footprint. Amazon launched its semi-closed e-wallet in India in July 2017 that is capable of holding money and powering payments on other partnered sites. The company is also in talks with regulators and partner banks to join the UPI payments ecosystem. It has further acquired Emvantage Payments that offers an online payment gateway platform that is compatible with credit/debit cards and net banking. Additionally, Amazon is set up as a licensed payment service provider in India and is looking to provide instant lending at the point of sale through bank accounts. (Citi, 2018).

**Amazon co-branded credit cards (2015):** Amazon also has a co-branded credit card offered by Chase, and its value proposition is expanding. Amazon Prime customers can get the Amazon Prime Rewards credit card, which gives 5% back on all Amazon.com purchases, 2% back at restaurants, gas stations, and drugstores, and 1% back on everything else in order to increase usage (Amazon, 2018). Besides having lower credit card fees, Amazon encourages and facilitates customers to shop more within the Amazon ecosystem (Bain, 2018; Business Insider, 2016). Amazon is looking to take this further in India, where
Bank Bazaar, a financial services online marketplace, providing credit card customers with rate quotes on loans, mutual funds and insurance products, was acquired in 2015 (Citi, 2018).

**SME lending and working capital finance (2012):** Since 2012, Amazon has offered small business loans through their Amazon Lending programme and has recently partnered with Bank of America Merrill Lynch to expand their funding capacity even more (CNBC, 2018a). There are an estimated five million sellers on Amazon’s platform, and most of these are small and medium-sized businesses (SME) that eventually need financing for their operations as most companies do. However, and especially in the repercussions of the financial crisis, smaller businesses have struggled to get the necessary finance (Fundera, 2018). Furthermore, securing a commercial bank loan can be challenging and cumbersome for these types of businesses, and in 2017 there was an approval rate of only 25.4% for small business loans in the US (Forbes, 2018). This made Amazon come up with an answer for its own marketplace sellers who struggle to access the financing they need: Amazon Lending. Through its ‘invite-only’ lending programme, invited sellers receive a pre-populated invite through their Amazon Seller account. Sellers provide few additional information and the loan is completed same-day or next day in most cases (Bank Innovation, 2017). Amazon offers its merchants loans from $1,000 to $750,000 at interest rates between 6% and 16%, which is significantly lower than most cash advances provided by commercial banks (Fundera, 2018). Amazon holds another advantage to its commercial bank counterparts in providing these loans to its sellers, as Amazon knows its sellers’ stock capacity, peak sales periods, customer reviews, and current customer interest. It uses its real-time merchant data analytics and AI to predict if and when its sellers might need a loan, on how much, and the associated credit risk (and thereby interest rate charged). Amazon has also strived to make this financial service highly customer-centric. Amazon will automatically deduct the repayments as a fixed percentage of its sales from the seller’s Amazon Seller Account until the loan is repaid. Thereby, sellers never have to worry about making late payments due to lower unforeseen sales (Fundera, 2018). In India, Amazon has acquired Capital Float, an online SME lending platform, that offers short-term inventory purchase and cash flow loans (Citi, 2018). Amazon clearly provides a solution to a potential problem for one of its customer segments (the sellers) that will yield synergies and profits to the rest of Amazon’s business ecosystem.

### 7.4 Integrated Technology Ecosystem Framework with External Forces

This part of the case study will analyse Amazon through our developed framework based on technology ecosystems combined with external forces as previously introduced. The analysis of the case study will be divided into two parts; first, the supply side focus on the technology ecosystem centred on the development of Amazon Lending as a focal technology and second the demand side focus centred on our two external variables and one strategic business model variable.
The first part of the analysis will follow the four-step approach as formulated by Adomavicius et al. (2007) to identify and analyse a given technology ecosystem consisting of various technologies related to the focal technology in a specific context, Cf. figure 3 following the cross-analysis for illustration of Amazon Lending’s technology ecosystem.

**Step 1 - Identification of the focal technology and its context of use: Amazon Lending**
We will analyse Amazon Lending as the *focal technology* in our previously introduced technology ecosystem framework. The definition of Amazon Lending is to provide Amazon sellers (mainly in the US) with the necessary financing to either expand its engagement on the Amazon platform and/or as working capital finance (CNBC, 2018a). The *context of use* and synergies have previously been described with the main findings being (1) Amazon utilises its data to predict merchants’ potential financing needs and associated credit risk, (2) Amazon offers highly customer-centric loans to merchants based on needs and an explanation hereof, (3) if accepted, Amazon provides the required financing up to 24 hours after decision, (4) merchant uses the financing made available at their Amazon Sellers Account to enable more business volumes at the Amazon Marketplace by expanding business or get working capital finance, and (5) Amazon yields commissions from sales and interest income.

**Step 2 – Identification of competing technologies: Amazon Lending**
As Amazon provides a financial service to its sellers, we will look at other SME lending providers as *competing technologies*. As Amazon’s largest market is the US and this is where it is partnering up with Bank of America Merrill Lynch to provide extra funding capacity to its sellers, we will look at the SME lending market in the US. Banks are the traditional way for SMEs to get financing. However, due to banks’ stricter capital requirements only 25.4% of SME loan applications get approved (Forbes, 2018). Many SMEs face challenges when dealing with banks for financing, as most banks still focus on reactive traditional service and sales models, which are both strict and cumbersome. On average, SMEs spend more than 25 hours on loan request paperwork and have to wait for weeks or even months to get approved, and in many cases end up getting offered costly credit card products for low-value loans (Infosys, 2017). As a consequence, we have seen many FinTechs entering the market for SME lending in various forms. E-commerce lenders, such as PayPal and Square, are in a unique position to collect valuable sources of data that can be used to predict the ability of a small business to repay short-term loans (Deloitte, 2018). For example, PayPal offers small business loans and working capital loans for merchants selling over eBay with a PayPal business account. When making a lending decision, PayPal can review and verify all incoming payments made via PayPal to judge credit worthiness. And when collecting the debt, they can take payments directly from the incoming sales revenue (Deloitte, 2018). It uses WebBank as the balance

35 Amazon mainly provides its Amazon Lending to US sellers, but are now also increasing its footprint in Japan, the UK, Brazil and Canada (Forbes, 2017b).
sheet provider and boasts extremely fast credit decisions, often in a matter of minutes, because PayPal already knows the cash flow patterns of its potential borrowers. It also claims to be cheaper than banks, because there is no interest, just a small fee at initiation (PayPal, 2018; Financial Times, 2017). Even though PayPal has provided more than $3 billion in loans, the service has received mixed reviews online, with some users praising it for its simplicity, low cost and speed, and others saying they had been rejected after being invited to apply and criticising the borrowing limits and decision criteria (Financial Times, 2017a). Another type of SME loan provider is peer-to-peer (P2P) lenders. For example, Funding Circle offers individuals to lend directly to small businesses in the form of straightforward loans. The model has been modified again by the likes of MarketInvoice, where high-net-worth individuals can purchase a proportion of an SME’s outstanding invoices in order to free working capital (Deloitte, 2018). However, in a P2P lending study by Deloitte (2018), it is argued that the cost of capital and cost of acquisition for P2P lenders were (and will remain) at a level that makes it difficult for these lenders to price loans competitively in the long-term. Where Amazon sets itself out in the lending space is its proactive approach to its merchants. Because Amazon can collect data points and analyse these from its whole business ecosystem, as explained earlier, most of the offered loans can be priced below competing SME loan providers (Deloitte, 2018). Its customer journey will also distinguish itself because of the proactive nature, as SMEs will not have the hassle with filling out loan applications and waiting for approvals. Amazon’s technological and analytical capabilities will have done this already.

**Step 3 – Identification of component technologies: Amazon Lending**

Traditional lending is not particularly thought of as a technology but rather a product or service. However, in the case of Amazon Lending, the component technologies are incremental for the product and application technologies to perform their value proposition in the specific context (Adomavicius, et al., 2007). Several component technologies have been used by the focal technology in the previous defined context of use. The component technologies believed to be most important will be analysed in this section with focus on the implications and applications for Amazon Lending. The identified relevant component technologies in scope are big data analytics, cloud computing, and AI. It is also worth noting that these three component technologies are inter-dependent, and all serve a purpose in the Amazon Lending product.

**Big data analytics:** Amazon has several entry points of different sorts of data in its ecosystem. It holds consumer data on buying behaviour, interest areas from searches, price sensitivity, shopping baskets, and wish lists on the Marketplace and Prime activity. It holds merchant and logistics data on available stock and peak sales periods, and it uses all this data in real-time to identify merchants that might need financing now or in the near future (Fundera, 2018). According to an Amazon press release, Amazon Lending has provided loans to enable merchants to grow sales by an estimated $4 billion on the Marketplace (Amazon,
Thus, the path of influence from big data has mainly been a “feed-forward” influence where new product innovations become possible in the presence of a new component innovation (Liu et al., 2015). Amazon’s capabilities in big data analytics should be perceived as a modular and shared capability across its entire e-commerce ecosystem.

**Cloud computing:** When consumers and merchants interact with the Amazon business ecosystem, all these data points are stored in the cloud. Amazon’s customer, merchant and logistics data is stored on these cloud servers, which enable all of Amazon’s businesses to both add data and use data from other parts of the ecosystem in real time (Harvard Business Review, 2017). This is important for its lending, as the cloud servers act as a one-stop-shop for advanced data sets used to identify the merchants in need and financially sound to get offered the lending (Forbes, 2018). This too is a “feed-forward” path of influence that adds value and enables Amazon Lending to make fast and accurate decisions (Amazon, 2018; Liu et al., 2015). Again, this capability is modular and shared cross Amazon’s ecosystem.

**AI and machine learning:** AI and machine learning is a tool (algorithms) that analyses large sets of data points, usually stored in the cloud (SAS, 2018). For Amazon Lending, AI and machine learning are being used to determine creditworthiness of merchants, streamlining the loan process, and improve customer experience for merchants in the process. Amazon Lending has a machine learning model where loans are offered on an invite-only basis to sellers on Amazon who qualify based on various criteria, including account tenure, and meeting the highest levels of customer experience (Bank Innovation, 2017; Mills & McCarthy, 2016). Again, this technology act as a “feed-forward” path of influence to Amazon Lending.

**Step 4 – Identification of support and business infrastructure technologies: Amazon Lending**

The *support and infrastructure* role identifies technologies that provide additional value to the functionality and performance of the focal technology in the specific context (Adomavicius, et al., 2007). Based on this, we have identified the Amazon Marketplace, due to its network effects, and Amazon logistics due to its stock keeping services.

Amazon’s spearhead offering is still its e-commerce marketplace. It has been extremely successful in utilising the network effects from both consumers and sellers, and continuously adding additional value to all kinds of its customers (Harvard Business Review, 2017). Our focal technology of Amazon Lending is one such example. Amazon Lending is developed to add additional value to sellers on the marketplace.

But when analysing Amazon Lending as the focal technology, the marketplace and logistics provide additional value to the functionality and performance of Amazon Lending by providing the data necessary to the component technologies to identify loan needs, and thus act as a “feed-back” path of influence. What is interesting here is that we have a “feed-forward” path of influence from Amazon Lending to the marketplace and logistics, as Amazon Lending is facilitating additional trade (estimated $4 billion extra
sales) on the Marketplace. Thus, we can observe a continuous loop of added value between the focal technology and the infrastructure.

**Regulation in the specific context of use: Amazon Lending**

As we know, banks are under regulatory scrutiny in most aspects. Capital requirements to handle credit risk on the balance sheet make it a burden to be a bank. Conversely, FinTechs and other non-financial institutions have largely flown under the regulatory radar (McKinsey & Co., 2016). This is also the case for alternative lenders in the US. No US federal agency explicitly has the authority to regulate their activities, partly because these new lenders are not banks. Most of the authority given to regulators to protect borrowers explicitly refers to consumer loans, not SME loans, leaving these new initiatives, such as Amazon Lending, largely unregulated (Mills & McCarthy, 2016). This has given rise to a niche where Amazon Lending have built a customer-centric solution based on technology and its own cash holdings that provide alternatives to traditional bank lending. However, the SME lending area is gaining regulatory attention. Ever since these alternative lenders gained prominence in the space, there has been a debate raging on whether or not to grant FinTechs special light banking charters that will allow them to compete with banks in some areas nationwide (Lending Times, 2018). Furthermore, the Fed has recently indicated that it may engage in the online space with its conference titled, “Financial Innovation: Online Lending to Households and Small Businesses” (Federal Reserve, 2016).

So far, we can argue that the lack of regulation on the area has been innovation-driving in the sense of Liu et al.’s (2015) definition, as these new players have been allowed to grow in a small space that is tightly regulated for the traditional bank model (Mills & McCarthy, 2016). Conversely, the uncertainty and current debates related to whether these alternative lenders should be more regulated could also act as innovation-delaying (Liu, et al., 2015). Amazon Lending is still operating within a relatively small niche, given that Amazon provides its own cash and is based on an ‘invite-only’ basis for sellers on the Amazon Marketplace. To scale up, and potentially for mitigating future regulatory requirements, Amazon Lending has teamed up with Bank of America Merrill Lynch (CNBC, 2018a).

**Strength of incumbents: Amazon Lending**

The US market for SME lending is highly developed and congested by both commercial banks and FinTech companies (The Finanser, 2018). 89% of SMEs seeking financing did so via traditional banks with the remaining 11% through online lending providers (Mills & McCarthy, 2016). According to a recent survey by National Small Business Association (2017), 69% of small businesses in the US used financing in 2016 with the remaining 31% not able to obtain adequate financing. Of these, studied in another survey, 49% pointed to “Working Capital” as their most prominent reason for seeking SME financing, “Purchasing equipment” was the second most referenced reason at 42%, and 37% cited “Expansion” as their primary reason. What is interesting for the Amazon Lending case, is that 31% of
SMEs were not able to obtain adequate financing, and that 86% of SMEs wanted financing to support either working capital or expansion; the two options Amazon offers its sellers (Harvard Business Review, 2017). So, even though banks play a major role within the SME lending space, there is an obvious latent demand for small SME loans due to cumbersome and risk averse banks.

**Business model problem addressed: Amazon Lending**

Providing small loans to its Marketplace sellers has been a strategic move in line with its vision ‘to become the world’s most customer-centric company’. In this case, Amazon is solving a problem for its sellers by offering financing for them to expand or operate more efficiently within the Amazon Marketplace and ecosystem. This was also emphasised by a finance expert at a top-tier consultancy firm: “Amazon and its SME lending is centred to their multi-sided platform to empower SMEs and corporates with complementary and adjacent products”.

The main external forces behind is found to be twofold. (1) As we have seen with the demand factors of SME lending in the US and how cumbersome and difficult it can be, there is certainly a need for this (Associate, 2018)product. (2) The way Amazon has structured its loans means that it falls within the regulatory boundaries.

Amazon has identified a potential customer need, and it moved into the lending space backed with the technological capabilities to provide highly efficient loans with limited credit risk given the nature of the loans. Furthermore, Amazon could enter this financial service without building new customer relationships (Bain, 2018). Besides the fact that Amazon is creating a new type of profit pool for itself, it seems obvious that it also helps its merchants to sell more and earn more money. Amazon likely views its SME lending and other financial services not as an end in itself but as a tool to further enhance customer stickiness and activity within its ecosystem. When consumer and seller interactions increase within its ecosystem, Amazon can monetise via advertising, more e-commerce, or other services such as AWS (Citi, 2018).

**7.5 Main findings from the Amazon Lending case study**

This case study of Amazon and the subsequent analysis of the focal technology of Amazon Lending have highlighted numerous findings relevant for answering our defined research question. The case study has found internal and external underlying dynamics, as well as pointed to strategic considerations, which have been incremental for Amazon’s success in providing financial services. The main findings from above case study and analysis will be presented below following the structure of our conceptual framework to ensure a logical coherence.

**Focal technology and its context of use:** The context of use of Amazon Lending is to provide loans to sellers on the Amazon Marketplace. The loans are based on an invite-only where Amazon identifies sellers in need, either now or in the future, for working capital loans or expansion loans.
**Competing Technologies:** Amazon taps into a lending space dominated by traditional banks, but more recently also non-bank providers such as e-commerce lenders and P2P lenders have gained a foothold. However, these non-bank loan providers for SMEs are in the market but are usually more expensive solutions compared to banks. Where Amazon sets itself out in the lending space is its proactive approach to its sellers. Because Amazon can collect data points and analyse these from its whole business ecosystem, most of the offered loans can be priced below competing SME loan providers.

**Component Technologies:** It was underlined how Amazon’s focus on developing core capabilities within modular and shared component technologies such as big data analytics, cloud computing and AI were incremental for the development of Amazon Lending. Component technologies were found to create applicability for new services, such as Amazon Lending and thus constitute a product-oriented path of influence.

**Business Infrastructure:** We discovered that the development of the Amazon Marketplace provides additional value to Amazon Lending, and vice versa. The Marketplace and logistics (infrastructure) provide incentives to develop component technologies (component-oriented path of influence) through users and data. Component technologies then create applicability for new services, such as Amazon Lending (product-oriented path of influence). In turn, this new service increases diffusion and adoption of the Marketplace to become more developed (infrastructure-oriented path of influence). Theoretically, we explain this internal technology ecosystem by an empowering continuous loop where all three types of paths of influence are present.

**Regulation:** We learned that traditional bank loans are heavily regulated due to capital requirements, but that these non-bank loan providers have flown largely under the radar. This has given rise to a niche where Amazon Lending have built a customer-centric solution based on technology and its own cash holdings that provide alternatives to traditional bank lending.

**Strength of Incumbents:** Although the lending space is largely dominated by traditional banks, we observed a general latent demand for SME loans. In general, we have seen that (1) most SMEs use financing, of which most of these need small loans for working capital or expansions, (2) banks have for a long period after the financial crisis neglected the SME segment due to high credit risk, (3) banks’ credit model for granting loans is highly risk-averse with an acceptance rate of only 25.4%, and (4) applying for a bank loan requires a lot of resources as bank loan applications and processes are often prolonging and cumbersome.

**Business Model Importance:** Based on our framework for analysis, it was emphasised that the business model plays a large part for the development of services/technologies, and in this case Amazon Lending. Amazon clearly identified a pain-point for one of its customer segments that it could solve using its data and technological capabilities. Not only is Amazon solving a pain-point for its merchants, it also creates a new source of profits and dynamic network effects towards the core business of its Marketplace.
Amazon helps merchants sell more or become more efficient, and in turn, it generates more business activity on its platform and thereby more revenue for Amazon.

8. CROSS-CASE ANALYSIS: ANT FINANCIAL AND AMAZON

This chapter will cross-analyse the findings from each presented case study with the objective of ascertaining critical similarities and differences across the cases related to our conceptual framework. This cross-analysis will allow us to identify what can be generalised based on our two case studies and what is specific to each case study. The structure of this analysis will follow our conceptual framework to ensure a logical coherence. Our cross-analysis will not comprehend the definition of the focal technology and the context of use; thus, these will be different by definition. An illustration of the two technology ecosystems and their individual paths of influence can be seen in below figure 2 and 3.

**Competing technologies:** In terms of similarities it can be argued that both markets today are exhibiting competing technologies from incumbent banks, FinTech and BigTech. However, at the time of origin of Alipay, competing technologies were few and diffusion insignificant, which created a competitive vacuum for Alipay. Conversely, in the case of Amazon Lending, the current competing technologies were also present at the time of origin, but Amazon identified a niche where it could offer a more competitive product given its technological capabilities and focus on customer centricity.

**Component technologies:** It was found that both Ant Financial and Amazon’s focus on developing modular and shared core capabilities within advanced component technologies such as big data analytics, cloud computing and AI were incremental for the development of Alipay and Amazon Lending. Further, it was found that both cases exhibited similar paths of influence from the internal component technologies to the focal technology, as both encompassed feed-back and feed-forward influences for their technology evolution, often working in a simultaneous and continuous manner. The main difference was the importance of diffusion of external component technologies for Alipay, for instance 3G & 4G and internet connectivity which enabled Alipay and the Chinese economy to leapfrog directly into Internet finance.

**Business infrastructure:** Both case studies revealed the importance of integrating additional internal business infrastructure to further create value for the focal technology in the respective business ecosystem. The main difference was the extent to which the two companies have integrated additional internal and external business infrastructure. In this relation, Alipay and Ant Financial rely more on external business infrastructure in the form of various location-based services and “Finlife” integration, and they are in general further developed and display more synergetic relationships to the Alibaba platform, as more paths of influence were found in the Alipay study.

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36 PayPal could be characterised as a BigTech due to its size and its affiliation with eBay
**Strength of incumbents:** The strength of incumbents was significantly different, as no real alternatives to Alipay existed initially. However, to some extent it can be argued that both markets exhibited a latent demand from neglected segments for the specific services. This was however clearly more present in relation to Alipay. The strength of incumbents and the competitive environment was therefore also found to be highly accommodating and accelerating in the case of Alipay, however to a more limited extend in the case of Amazon Lending. The Chinese government was argued and hypothesised to have played an incremental role in structuring this highly accelerating competitive environment, Cf. Alipay case study.

**Regulation:** The differences in terms of the effect of regulation have been significant, as Alipay first recently has been subject to any form of regulation. This has created completely different opportunities for developing financial services in each market. Further, the somewhat unknown but highly empowering Chinese government factor, considering their control of incumbents, should also be highlighted here as a main difference in sphere of regulation and government influence. The regulatory environment was therefore also found to be highly accommodating and accelerating in the case of Alipay, however to a more limited extend in the case of Amazon Lending.

**Business model importance:** It was found that both Alipay and Amazon Lending were created to solve a strategic business problem for their respective platforms. It can further be argued that both Alibaba and Amazon were not particular interested in providing financial services, but extremely focused on being customer centric by providing necessary solutions for participants in their e-commerce ecosystem, both for consumers and SMEs considering that both companies have retail and SME customers in their portfolio. This observation has also been widely supported and acknowledged during our expert interviews with industry leaders and other stakeholders. The extent to which the two platforms have developed financial services and the direct importance is evidently different. This can be contributed to the circumstance that Alibaba simply was operating in an environment with more fundamental finance and transactional related issues to solve in its e-commerce ecosystem. Nevertheless, several other financial services could be relevant for Amazon to include in their ecosystem, and the success of Ant Financial could serve as an important roadmap for Amazon and other BigTechs to do it.

**Part conclusion:** To conclude on the cross-case analysis, it was evident that the two cases displayed similarities in, first, the importance of advanced modular and shared component technologies relevant for developing digital financial services, second, the importance of integrating additional internal business infrastructure, and third, the strategic considerations or incentives for providing financial services were identical. In extension to the discovered strategic consideration and incentives, it is also relevant to highlight the importance of leveraging existing platform users and network, which were incremental for both Ant Financial and Amazon.

The underlying external dynamics in terms of regulation, government role and strength of incumbent banks were highly different. Thus, this is also important for explaining the two different extents to which
each company have entered financial services. One could argue that we have analysed two similar BigTech e-commerce ecosystems, in two completely different contexts, behaving in similar patterns guided by the same strategic objectives and incentives in relation to financial services.

**Figure 2:** Alipay Technology Ecosystem and Paths of Influence

**Figure 3:** Amazon Lending Technology Ecosystem and Paths of Influence
9. Discussion

This chapter of the paper will first discuss the main findings contributed from the mapping and characterisation of BigTech in finance and the analysis of the two constructed case studies. These findings will be discussed in relation to Adomavicius et al.’s (2007) model of technology ecosystems and the later two extensions applied in this paper. Second, we will discuss the application, specific contributions and propose refinements to our developed conceptual framework in the context of BigTechs in finance and technology ecosystems in a broader context. Third, and lastly, we will discuss one practical finding, which in our opinion could be significant for the future of banking in the context of BigTechs.

9.1 Internal Technology Ecosystems

Adomavicius et al. (2007) argue that paths of influence can be multiple and simultaneous in a given technology ecosystem. This is in line with our findings from both cases and the cross-analysis. However, it was evident that especially the internally controlled parts of their technology ecosystems were important in the evolution of their financial products and the competition from the BigTechs in general. Furthermore, it was evident that paths of influence were often working in a continuous empowering loop due to their internal nature; something other researchers have not included in their research. For example, Adomavicius et al. (2007) propose to extend their model to understand how specific relationships between technologies within an ecosystem affect the outcome of technology evolution. We find that in our cases, the internal nature in all three levels create instant network effects from infrastructure to components and then back to product and infrastructure continuously for the entire business ecosystem. For example, in the Amazon Lending case, users and data from the Amazon Marketplace and logistics operations (infrastructure) provide opportunities to develop component technologies (component-oriented path of influence). Component technologies then create additional functionalities for new services, such as Amazon Lending (product-oriented path of influence). In turn, this new service increases diffusion and adoption of the Marketplace to become more developed (infrastructure-oriented path of influence). Lastly, when the Amazon Marketplace generates more activity and adoption for the ecosystem, the focal technology, the use of component technologies become more sophisticated and we observe this internal empowering continuous loop. This has been incremental for the development of many of these new financial services for our analysed BigTech’s.

The internality of the technology ecosystem together with understanding the strategic importance of these services provide our model with some predictability for which other financial services these BigTechs could potentially enter. For example, consumer lending for purchases on the Amazon Marketplace would be another financial service that could make sense for Amazon to enter (if we disregard regulation). Amazon would again utilise its component technologies and infrastructure network effects to add value
to the service and vice versa. Such a strategic play would be in accordance to the Ant Financial roadmap and its move into consumer lending.

The importance of the internal technology ecosystem comes from the nature of BigTechs, as they internally develop component technologies, services, and infrastructure, which create significant network assets and effects relating to their ecosystem business strategy and solving customer needs. The component technologies are the same around most products. For example, Ant Financial utilises its component technologies of big data analytics, cloud computing and AI in the majority of its financial services portfolio, for instance in Alipay, MYbank and Yu’e bao. These services further offer cross-integration and thereby create even stronger network effects and synergies to Alibaba’s ecosystem.

These technologies have been modular and inter-operable, which have created the foundation for this internal technology ecosystem. This point was also shared by the finance expert at a top-tier consultancy firm (2018): “In terms of internal capabilities and resources I see the large investments in technologies such as AI and cloud environment as incremental. Furthermore, BigTech’s capability in building modular technology systems and shared services across their ecosystem have made the backbone for these innovations”. Oliver Wyman (2018) also defined this capability of building powerful and modular operating models that enable BigTechs to execute faster and do more as a defining factor for their success in banking.

In accordance to World Economic Forum (2017), we find that component technologies such as big data analytics, cloud computing and AI have been highly important for the development of financial service technologies by the analysed BigTechs. This also confirms World Economic Forum’s (2017) view that these technologies are especially important for the future providers of financial services. Hence, it can be hypothesised that companies mastering such capabilities combined with a business model where financial services will have direct or indirect network effects to other parts of their business will be relevant for providing financial products.

The discovered formative influence of the BigTech’s internally controlled technology ecosystem can be contributed to our adaptation of a company-specific perspective as suggested by Adomavicius et al. (2007). Thus, this serves as new knowledge towards the theory of technological evolution and ecosystems. However, one should notice that this might be strongly connected to the size, resources and nature of the analysed BigTechs, and thereby a highly specific and contextualised finding.

9.2 FRAMEWORK APPLICATION AND REFINEMENTS

In this section, will our conceptual framework be discussed by evaluating its applicability and effectiveness in the analysis of BigTech in finance, its contribution to the ecosystem-based view on technology evolution, and lastly refinements based on our research will be proposed.
**Applicability in analysis:** Adomavicius et al.’s (2007) model offers a clearly defined process for identifying a technology ecosystem that leads to a structured view on how industry-centred technology innovations arise and evolve.

Based on this we proposed a new analysis approach by contextualising and extending the prior research for the company-specific analysis of BigTech’s recent move into finance. Our extension of the technology ecosystem model was focused on three elements; (1) we included the role of companies and economic agents to make the model company-specific and represent the impact on the evolution of the focal technology, (2) we integrated the two demand-side variables of regulation and strength of incumbents to assess how these forces had impacted the innovation driven by the BigTechs, and (3) we introduced the variable of strategic importance of financial services to the given technology ecosystem to help explain why the company had started to enter financial services. By pursuing these extensions, we provided a holistic perspective on the factors impacting the evolution in financial technology in a specific setting.

This application is the first instance of academic research that looks at the development of BigTechs in a financial context from an evolutionary point of view. Further, it is also the first study that have taken a company-specific perspective on Adomavicius et al.’s (2007) technology ecosystems and found existence of multiple paths of influence.

We adopted above theoretical perspective because of its ability to model for the BigTech’s identified advanced technological capabilities (i.e. their internal component technologies) and business models leveraging platform and ecosystem strategies (i.e. their internal and external business infrastructure).

Applying this theoretical lens, seen with the wisdom of hindsight, resulted in the identification of some of the most critical aspects explaining how and why BigTechs have been able to provide financial services. Thus, retrospectively adopting and extending this theory constituted a relevant and optimal choice.

The findings, produced by applying this extended conceptual model, identified both industry and company-specific patterns of innovation that have occurred and how these have been affected by regulation, competition and business model synergies. Thus, the framework demonstrated how the evolution of specific technology ecosystems has played out based on the analysis of paths of influence and the role of key technological innovations. This provided clear insights into how and why Alibaba and Amazon have developed financial services, and thereby answering our research question.

These findings and identified paths of influence also confirm the relevance of integrating regulation, competition and business model synergies, which jointly have been responsible for shaping the development paths of BigTech in financial services in two distinct and different settings.

Nevertheless, one should note that the observed paths of influence for technological innovation could have been affected by numerous different factors, and the approach that we have demonstrated might not be able to capture them all. Thus, there are multiple opportunities for extending our proposed framework.
to deepen its analytical rigor. This realisation is in accordance with the realisation of Adomavicius et al. (2007) and subsequent extensions by Kauffman et al. (2014) and Liu et al. (2015).

The practical research presented and incorporated in the model were mainly related to the development of BigTechs in China, however it turned out that the essence of these formative variables was still relevant and influencing when analysing in a US context with the case of Amazon. Thus, we will argue that our developed conceptual framework effectively moved our understanding of BigTechs in finance forward together with the research on technology ecosystems as proposed by Adomavicius et al. (2007).

To conclude, we will argue that the implied effectiveness of our conceptual framework is based on, first, its ability to encompass the dynamic and temporal identity of technology ecosystems in relation to BigTech in finance, and second, our framework provides a structure for analysis and understanding the interdependent dynamics in-between technologies in various roles in the analysed ecosystems.

**Contribution of framework:** The main contribution of our developed conceptual framework lies in its ability to analyse the technology evolution in a given BigTech’s technology ecosystem and the opportunity for it to enter financial services. By accomplishing this, we showed how Adomavicius et al.’s (2007) model of technology ecosystems could be contextualised to the analysis of a specific company and its surrounding technology ecosystem and still identify paths of influence. This effectively also help the investigator to scope the boundaries of the analysed technology ecosystem in a meaningful manner, something which was also highlighted by Adomavicius et al. (2007) as suggested future research.

Our framework also provided guidance relevant for forecasting which BigTechs that might move into financial services and which financial products they could choose to develop. This ability is based on the understanding of the BigTechs’ internal technology ecosystem (i.e. components and business infrastructure) combined with the potential strategic importance of finance for its business ecosystem. Thus, it can be argued that this framework to a limited extent has achieved what Adomavicius et al. (2007) aspired towards guidance in technology forecasting and product development in the specific context of BigTech in finance.

As a natural consequence of our contextualisation in terms of external environmental forces and strategy, it can be argued that obtaining above ability always will be highly context-specific and difficult to generalise towards a broader technology evolution. We also recognise this, as we only believe that our conceptual framework is relevant in above context. This can be contributed to, that these context-specific external forces are complex and ambiguous in shaping technological evolution. In fact, many different external forces might be present and impacting to a varying extent, depending on which company or industry-specific ecosystem is being analysed. To discern all relevant external forces and their specific effects might be impossible, and thus, limiting the number of predictive external constructs that are considered relevant involved a trade-off between complexity and tractability of the framework. However,
as shown in this paper, the model of technology ecosystems can be contextualised to a given context and thereby gain guiding capabilities in forecasting technology and product innovation.

**Refinements:** The application of our conceptual framework combined with our further research also revealed other supply and demand-side elements of interest, which retrospectively could have been included in our framework. We want to highlight three additional variables that could have increased the analytical capability in the specific context of BigTech moving into finance:

1) **Modelling for consumer trust:** It was highlighted during several of our expert interviews that consumer/societal trust towards BigTechs was essential for their ability to provide financial services. Trust was also specified as the incumbent banks’ best defence towards competition from BigTechs. For example, this was highlighted by Xiao Xiao (2018) in relation to Ant Financial in China: “In general do Chinese consumers have high trust in BigTechs and their services provided, and it comes naturally to use new products provided by these players”. This variable was also addressed by Jesper Damm (2018) with following quote: “More consumers would be comfortable with having BigTechs providing banking services compared to FinTechs because of the general trust they have from consumers”. From an incumbent bank perspective supporting above point Morten Bigum (2018) stated: “What we as a bank can do to fight these BigTechs, is very much related regulation, customer relationship and trust, and full product portfolios. You need customer trust in all aspects to be able to compete in financial services”. The context-specific importance for modelling for trust in relation to BigTech in finance was also further underpinned by recent research which showed that US and UK consumers ranked PayPal and Amazon nearly as high as banks for trust with their money, Cf. appendix 23 for survey results (Bain & Company, 2018). Further this research argued that exactly this high consumer trust in BigTech could be incremental in the competition towards incumbent banks and Fintech start-ups. It was also argued that consumer trust towards BigTech was highly market specific. Hence, this could provide a predictive measure for the potential success of a BigTech in a given market.

The general importance for modelling for such social shaping factors was also highlighted by Adomavicius et al. (2007). Thus, it would be a natural part of future research to extend the technology ecosystem model to encompass social/societal forces and the impact on innovation.

If future research would integrate such as variable, our framework would increase its ability to predict which BigTechs that would have a relative advantage in offering financial services in a given market.

2) **Modelling for customer dependencies:** Our conceptual framework did model for one company-specific strategic dimension. However, other strategic considerations could also have been brought into the analysis for how and why these BigTechs have started to offer financial services.

Martin Tillisch from PA Consulting (2008) argued, that BigTech’s existing customer bases could be a prohibitive factor and create conflict of interests for BigTech’s possibilities for offering financial services. Martin Tillisch argued following: “By moving into financial services some of these BigTechs will also
attack some of their existing customers and revenue streams, which might be enough reason for not doing it”. This implies that it is not enough for financial services to be of importance for the given BigTech’s ecosystem, it also requires compatibility with existing revenue streams and customer segments. Integrating such a strategic consideration with a potential prohibitive or accelerating influence would provide extra predictive capability for our developed framework, especially when analysing BigTechs coming from other industries such as Tencent and Facebook, which come from Social Media and rely heavily on adds.

In the context of Adomavicius et al.’s (2007) original model, it again raises the importance of considering the role that companies and other economic agents play in technology evolution, as these could act as decelerators through defensive or retaliating behaviour.

3) Modelling for governmental forces and pressures: Adomavicius et al. (2007) argued that future research should consider governmental forces and pressures that shape technological innovation. This was partly accomplished by integrating the regulatory environment in the specific market in our framework as a demand-side variable. This environment could either be accelerating or decelerating for BigTechs and their efforts of providing financial services. However, it quickly became evident that this analysis was not nuanced enough to assess and understand Ant Financial and its Chinese context. This special Chinese context was suggested by several of our interviewed experts to have influence on the creation of BigTech in finance in a unique manner. This particularly accelerating Chinese context was a combination of deliberate non-existing regulation, an effective government empowered shield towards non-Chinese competition, and close collaboration with Chinese authorities and state-owned incumbent banks (Xiao; Weckesser; Damm, 2018).

Modelling for such government-related variables might currently be specific to the evolution of BigTech and Internet finance in China. However, one could also imagine that such unique interdependencies between government and innovation could be present in other emerging markets, for instance India where many of the previously introduced BigTechs currently are competing for market share in financial services (Citi, 2018). If future research could integrate such variables in our proposed framework it would increase its ability to analyse how likely BigTech-led innovation would be in financial services.

9.3 PRACTICAL IMPLICATIONS - REMAKING BANKING FOR A WORLD OF BIGTECH ECOSYSTEMS

It was apparent in both case studies that the strategic considerations and incentives for moving into finance were not motivated by potential lucrative profit pools, however because of financial services being of strategic importance to their ecosystems. Thus, it was about being customer centric and solving business problems for their platforms and their existing consumers and retailers.
One could argue by extrapolating this previous identified strategy of e-commerce related BigTechs and their presence in financial services, that all financial services relevant to commerce and their user bases could be in scope for them to offer. Such an extrapolation would be true if back-testing this hypothesis for the cases of Alibaba and Ant Financial. Thus, Alibaba aspired to solve all transaction barriers and problems for its users, and therefore moved into financial services. Applying this lens on Amazon and their financial offerings yields the same findings, as they have both developed solutions for consumers and retailers with the purpose of facilitating their interactions and transactions on the Amazon platform, however to a much less extent compared to Alibaba.

This implication was discovered through the integration of the strategic importance variable in our conceptual framework, by following above logic and extrapolation it can also be argued that this observation could guide predictions and forecasting for future financial product innovations in the BigTech’s internal technology ecosystem.

This understanding serves as potential important knowledge for financial service industry leaders who could be on verge to face competition from BigTech ecosystems for other specific financial services. Depending on where these services would originate, they could threaten to disintermediate banks from their customers, or potentially herald a new kind for bank offerings, based not on individual products, but on multiple product relationships orchestrated around a broader set of capabilities, some of which would be developed internally and some from partnering companies. Thus, this could create a new source of value for customers, a “specific digital ecosystem containing relevant financial offerings”. To further understand this finding, it would be of much interest to explore this in the context of other BigTechs which recently have moved into financial services and their motivation for doing it, Cf. table 1 for mapping of BigTechs in finance.

If extrapolating this observation in a broader context, it also implies that BigTechs could have an incentive to move into all adjacent industries were existing consumers could benefit from reduced friction or an integrated one-stop shop solution. Such a world, where sector boundaries are blurring into digital ecosystems and where customers could enjoy end-to-end experiences for a wide range of products and services through a single digital access gateway have recently been predicted by several practitioners and scholars such as McKinsey & Co. (2018), Bain (2018) and Iansiti & Lakhani (2017).

10. LIMITATIONS

We chose to adopt two holistic case studies different in context, but similar in the industry and ecosystem affiliation. Therefore, our findings are limited in its generalisability to other industry affiliations. As a result, we have only answered our research question in relation towards above mentioned BigTechs. However, aligned with our hypothesis-generating case study method, we generated context-specific
hypotheses which can now be tested in future research. These hypotheses will serve as important guidance for future research in this sphere.

Similar to Adomavicius et al. (2007), Kauffman et al. (2014) and Liu et al. (2015) our conceptual framework has, for now at least, not been able to accomplish strong power for future-oriented forecasting. We believe it can serve as guidance towards forecasting which BigTechs will have the greatest incentives for moving into financial services and by which products they would do it. Nonetheless, in a broader context there are too many complex relationships among various dynamic factors, such as technology, competition, government policy, financial stakeholders, and market regulation to achieve predictive capabilities for forecasting how BigTechs will impact technology innovation in financial services. Excluding such relevant factors and forces may result in a loss of contextual fidelity and analytical richness, diminishing the capability for our framework to render useful predictions for future technological innovations in relation to BigTech.

11. FUTURE RESEARCH

One of our objectives was to guide future research based on the hypotheses generated from our findings. Thus, to further increase the generalisability of our findings, we suggest that two types of additional case studies related to BigTech in finance should be conducted. First, it would be purposeful to analyse one more e-commerce related BigTech to see if our findings are present in one more additional settings. In this relation, we propose that Japanese Rakuten could be subject of such a study, Cf. our mapping of BigTechs in finance for information on Rakuten’s financial services. Second, it would be essential to test our generated findings and hypotheses towards BigTechs coming from other affiliated industries. For instance, this could be a dual and holistic study of Tencent and Facebook and their financial offerings based on their presence in Social Media. In addition, one could also propose a similar study of Baidu and Google both related to data aggregation and being search engines.

It was suggested that China’s status as an emerging market and the rapid diffusion of specific component technologies were partly responsible for its 10x development in Internet finance (Citi, 2018). Similar to China, in size and previous development of financial infrastructure, India could be the next billion people market up for disruption by the world’s leading BigTechs. Thus, it can now be observed that the majority of the identified BigTechs currently are ramping up their presence in India in financial products (Citi, 2018).

Lastly, in a European perspective it could also be of value to research how the new regulation of PSD2 and GDPR will impact BigTech’s opportunities for offering financial products. Opportunities related to new regulation was highlighted by both Jesper Damm (2018) and Ronit Ghose (2018) for BigTechs in a European context.


12. CONCLUSION

We sat out to explore the recently observed phenomenon of BigTechs moving into banking. Despite being a fascinating and contemporary phenomenon, BigTech in banking is under-researched in academia. To address this perceived knowledge gap, we sought to answer the following research question: What are the underlying dynamics and strategic considerations behind BigTech’s recent move into banking?

Based on, first, our mapping an classification of BigTech in finance, and second, insights from expert interviews with thought industry leaders and white papers from leading industry practitioners, we synthesised a working characterisation of BigTechs in finance as players having (1) a significant amount of existing users including both consumers and businesses, (2) advanced technological capabilities relevant for future financial service offerings, in particular big data analytics, cloud computing and AI, (3) focus on solving a strategic business problem for its platform users and being customer centric, (4) business models leveraging multi-sided platform and ecosystem strategies, and, (5) a Chinese first phenomenon now emerging in the US and Europe.

Informed by this working characterisation of BigTechs, we developed a conceptual framework to serve as a relevant unit of analysis to guide our two holistic and exploratory case studies. This conceptual framework was based on the hypothesis that these financial offerings have their origin in the BigTechs’ technological capabilities, and their purpose of solving customer issues in a business ecosystem. Hence, we adopted Adomavicius et al.’s (2007) theory of technology ecosystems as our theoretical backbone in our framework. To contextualise our framework to BigTech in finance, we adopted later applications of this theory (Kauffman et al., 2014; Liu et al., 2015) and industry practitioner research to include the external variables of strength of incumbent financial sector, regulatory environment, and strategic importance of finance in these BigTechs’ business models. Besides this integration of variables, we also took an unprecedented company-specific point of departure in our analysis.

Applying this framework, we built and analysed two case studies of Ant Financial and Amazon with focus on the focal technologies of Alipay and Amazon Lending.

Based on these case studies, we found two similar internal underlying dynamics. First, the focus on developing modular core capabilities within component technologies such as big data analytics, cloud computing and AI were incremental for the development of Alipay and Amazon Lending. Second, the importance of integrating additional internal business infrastructure to further create value for the focal technology in their respective business ecosystems was revealed.

We further found one similar external underlying dynamic between Alipay and Amazon Lending in the form of both markets exhibited a latent demand from neglected segments for the specific services. However, this was clearly more present and to a larger scale in relation to Alipay. What turned out to be
highly different in the two cases was the evident regulatory benefits that Alipay has experienced from the Chinese government. In agreement with industry practitioners and scholars, we hypothesised that this factor had constituted a significant role in the evolution of BigTech and Internet finance in China (Xiao; Weckesser, 2018).

To answer what strategic considerations played a role, we analysed the synergies to Alibaba’s and Amazon’s business models from providing these financial services. The analysis found that both Alipay and Amazon Lending were highly customer-centric solutions, that solved a strategic business problem by facilitating activity for their respective e-commerce platform and business ecosystem.

Based on these findings we proceeded with three steps. First, we discussed the continuous connection and synergies between the internal levels of the individual BigTechs’ technology ecosystems. Specifically, we found that the internally controlled parts of their technology ecosystems were particularly important in the evolution and the competition from the BigTechs. We argued that the reason for this was that the paths of influence were working in a continuous empowering loop. These properties have not previously been captured by other research related to technology ecosystems. This was found because we adapted the theory of technology ecosystem to a company-specific setting and thereby extended prior research. We hypothesised that above understanding is likely to give our framework some degree of predictive capability towards which BigTechs have best opportunities and incentives to move into finance. However, it is too soon to conclude on that given the contemporality of this phenomenon.

Second, the application of our conceptual framework revealed three potential refinements; consumer trust, government forces, and BigTech’s customer dependencies. By modelling for these additions, it is our belief that one could improve the analytical feasibility of the framework towards BigTech in finance. Third and last, we discussed the ramifications of extrapolating the strategy of e-commerce related BigTechs and their presence in financial services. In this connection, we hypothesised that banking could be on the verge of being re-imagined for a world of digital ecosystems.

Future research was suggested to increase the generalisability of our findings. First, by analysing one more e-commerce related BigTech, we proposed that Japanese Rakuten could be subject of such a study. Second, by analysing BigTechs coming from other affiliated industries, we proposed Tencent and Facebook and their financial offerings based on their presence in Social Media for such a study. By conducting such future research, the findings from this study could move beyond only being applicable for e-commerce related BigTechs and thereby mitigate this paper’s main limitation.
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APPENDIX

Figure 1: Specific technology ecosystem view for laptop wireless networking

Source: Liu et al. (2015)

Figure 2: Temporal interactions among technology roles

Source: (Adomavicius, Bockstedt, Gupta, & Kaufman, 2007)

Figure 3: Nine paths of influence between technology roles in a technology ecosystem and their classification
Figure 4: 9 paths of influence and technology roles: a conceptual diagram

Source: (Adomavicius, Bockstedt, Gupta, & Kauffman, 2007)

Figure 5: The technology ecosystem including external factors

Source: (Adomavicius, Bockstedt, Gupta, & Kauffman, 2007)
**Figure 6**: Five evolutionary patterns for the m-payments technology ecosystem

<table>
<thead>
<tr>
<th>Name</th>
<th>Pattern</th>
<th>Definitions and comments</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Services development</td>
<td><img src="Pattern1.png" alt="Pattern" /></td>
<td>All of the technology innovations observed are clustered at the component and service levels; technologies at the component and service levels are refined and gain greater attention over time</td>
<td>Emergence of m-payments and mobile banking; continuous development of new m-payments services; the further adoption of smartphones</td>
</tr>
<tr>
<td>2. Service and infrastructure alignment</td>
<td><img src="Pattern2.png" alt="Pattern" /></td>
<td>The observed innovations occur at the levels of service and business infrastructure</td>
<td>Innovation-spurring competition by PayPal, Google Wallet, and Apple; eBay’s acquisition of PayPal</td>
</tr>
<tr>
<td>3. Feed-forward</td>
<td><img src="Pattern3.png" alt="Pattern" /></td>
<td>Involves new services that make innovations become possible in the presence of a new component innovation, or a new infrastructure innovation that is desirable to have because of already-developed components and services</td>
<td>Introduction of 3G networks, cloud computing and Square; the wide adoption of Internet and mobile banking</td>
</tr>
<tr>
<td>4. Feed-back</td>
<td><img src="Pattern4.png" alt="Pattern" /></td>
<td>Involves new services motivated by the development of a new business infrastructure that enables them, or a new component that will be possible due to the development of business infrastructure and services</td>
<td>Introduction of NFC standards, smartphones, and smartphones that support NFC as new components and business infrastructures</td>
</tr>
<tr>
<td>5. Incremental</td>
<td><img src="Pattern5.png" alt="Pattern" /></td>
<td>New component innovations make it possible for subsequent component innovations; new services beget subsequent service innovations; and the same for business infrastructures</td>
<td>Development of 4G networks and the NFC platform; carrier-backed m-payments emerged; launch of Apple Pay, and iPhone 6 and iPhone 6 Plus</td>
</tr>
</tbody>
</table>

Source: (Liu, Kauffmann, & Ma, 2015)
**Figure 7:** Case study research design

Source: (Yin, 2014)

**Figure 8:** The Alibaba Ecosystem

Source: (International Society for Business and Industrial Statistics (ISBIS), 2017)

**Figure 9:** Ant Financial Development Timeline (2004-2016)
Source: (Zhu, Zhang, Palepu, Woo, & Dai, 2017)

**Figure 10:** Ant Financial Ownership Structure

**Figure 11:** User engagement across Ant Financial expanding ecosystem
Figure 12: Ant Financial user structure by # of active scenarios

Source: (Ant Financial, 2016)

Figure 13: More powerful platform effects when introducing new products

Source: (EY & Development Bank of Singapore, 2016)
Table 14: Ant Financial’s products and innovations

<table>
<thead>
<tr>
<th>Company/Product</th>
<th>Year</th>
<th>Innovations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chengxintong</td>
<td>2002</td>
<td>First online credit system</td>
</tr>
<tr>
<td>Alipay</td>
<td>2004</td>
<td>Revolutionizing online and mobile payments</td>
</tr>
<tr>
<td>AliLoan</td>
<td>2007</td>
<td>New and challenging SME loans</td>
</tr>
<tr>
<td>Zhongan Insurance</td>
<td>2013</td>
<td>First Internet insurance company</td>
</tr>
<tr>
<td>Yu’ebao / Ant Fortune</td>
<td>2013</td>
<td>Pioneering online wealth management</td>
</tr>
<tr>
<td>Ant Financial</td>
<td>2014</td>
<td>Integrating online financial services</td>
</tr>
<tr>
<td>MYBank</td>
<td>2015</td>
<td>First Internet bank promoting the vision of Inclusive Finance</td>
</tr>
<tr>
<td>Zhima Credit</td>
<td>2015</td>
<td>Individual credit ratings based on big data from multiple sources</td>
</tr>
<tr>
<td>Ant Financial Cloud</td>
<td>2015</td>
<td>First implementation of “Bank in a cloud” as a Services architecture</td>
</tr>
<tr>
<td>Antsdaq Crowd Funding</td>
<td>2015</td>
<td>Internet based crowd funding platform</td>
</tr>
</tbody>
</table>

Source: (Greeven & Wei, 2018) and (Zhu, Zhang, Palepu, Woo, & Dai, 2017)

Figure 15: Alipay market shares in mobile payments and online payments in China Q2 2017.

37 Not included in product ecosystem analysis, because of limited available information and not found strategic importance to Ant Financial and Alibaba in general
Source: (IResearch China, 2017) and (IResearch China, 2017)

Figure 16: The development of cashless payments in China 2013 to 2016
Figure 17: Seize of Chinese Internet user and Internet penetration rate

Figure 18: Size of Mobile Internet Users in China and Its Proportion in Internet Users
Figure 19: Alipay’s Finlife ecosystem

Source: (Ant Financial, 2017)

Figure 20: Alipay and Alibaba user sharing strategy

Source: (China Internet Network Information Center, 2017)
**Figure 21:** Open, inclusive regulatory environment supports innovation of Internet finance

Open, inclusive regulatory environment supports innovation of Internet finance

**Government encouragement**

*We will encourage Internet finance to seek a healthy development road under the backing of proper regulatory coordination and supervisory mechanism*, “Internet finance rose swiftly to prominence, “We will work to see that Internet finance develops in line with regulations”

- Chinese Premier Li Keqiang, Government Work Report 2014/15/16

*Support the development of Internet finance, will not forbid Yu’ebao or other similar products .. but still need to improve the related regulation”

- Zhou Xiaochuan, Governor of China’s central bank

**Regulatory inclusiveness:**

- Encourage large-sized financial institutions to pursue Internet finance innovation
- Unveil policies to promote the healthy development of Internet finance

Source: (McKinsey & Co., 2016)

**Figure 22:** Reasons for using a non-bank rather than traditional bank
Figure 23: Bain & Co research in consumer trust in BigTech’s
Appendix 24: Interview guide and quotes

Interview Guide
This appendix contains 1) our interview guide for this paper’s qualitative interviews, 2) pre-send interview material and list of questions, and 3) quotes from each interview deemed especially relevant for this paper and the general opinion of the interviewee (only few all quotes have been used in the paper). Recordings of all interviews have been attached on USB pins.

Interview guide introduction
This interview guide will introduce the general considerations for why and how we have been conducting expert interviews in this paper.

Expert Definition
In this paper we have defined “experts” as person who is responsible for the development, implementation or control of solutions/strategies/policies and persons who have privileged access to information about groups, markets, companies of interest in relation to our research area (Audenhove, 2013). We have not perceived expert knowledge as natural, as a consequence of this we interviewed industry experts representing the entire universe around our investigated phenomenon.

1. Purpose of expert interviews:
The purpose of applying expert interviews as a key source of primary data in this paper has been twofold. First, interviews have been incremental for extracting data and knowledge for building our two exploratory case studies. Second, we have used the interviews and the knowledge extracted to inform the formation of our conceptual framework based on key informants perspectives influencing identification of external factors in our framework.

These two purposes collectively created an empowering circle of primary data and its application in this paper. We have interviewed key informants representing a larger population (around this phenomenon) to increase validity and secure generalizable findings on behalf of each stakeholder group (Gubrium & Holstein, 2001).

1.1 Interview methodology:
The interviews with our four stakeholder groups have been conducted with a semi-structured approach. We decided to use the semi-structured approach because of its flexibility to pursue themes of interest and leave space for unanticipated follow up questions to explore sub-themes discovered to be relevant in an interview (Rugg & Marian, 2007). This semi-structured approach also allowed us to make choices on which lines of questions to explore further and which to discard. This was also evident in our creation of
a topic guide in our interviews question, which we could use then deviating from the initial order of questions (Easterby-Smith, Thorpe, & Jackson, 2015).

1.2 Interview questions and considerations
The individual questions and themes were informed both from our preliminary research, our proposed conceptual framework and our theory and literature review. Each semi-structured questionnaire was adapted and customized for the individual stakeholder group to maximize the value and knowledge extracted from each interview. In terms of language and structure of questions we aimed at phrasing all questions, so they were clear, unambiguous, meaningful to the respondent and without framing or direction, Cf. section 2 of this appendix for actually questions divided into themes.

Besides above introduction to our interview questions we considered following points essential for conducting a successful interview (Harvard, 2018):

- Give structure to the interview – this was accomplished by sending out context before interview and following up on this in the beginning for the interview. Further we asked if the interviewee had questions before starting
- We aimed to be clear in our questions, hence we preferred to ask simple, easy understandable, and short questions
- We aspired to be gentle by letting people finish, give them time to think and tolerated pauses in the interview
- We were critical and prepared to challenge what was being said, for instance, dealing with inconsistencies in replies
- We sought to interpret, clarify and extend meanings from replies, however without imposing meaning on them

1.3 Interview risks and considerations
Above interview method also has some clear disadvantage or potential problems, which requires anticipation and mitigation. For instance, if you structure your topics and questions around literature you will likely get results framed within the same structure, hence not corresponding to reality (Rugg & Marian, 2007). To mitigate this, we minimized potential framing and direction of questions if the experts discussed new and interesting themes. This was partly based on a soft-wired interview technique where we aimed to guide the overall structure, hence we did not specify questions and topics to firmly. Furthermore, we aimed at avoiding closed questions with the obvious risk of steering respondents towards limited set of options with no relation to reality, hence we mainly used open questions (Rugg & Marian, 2007).

1.4 Interview technique and practicalities
All interviews possible was recorded and computer assisted, this served two purposes 1) continuous improvement and reflection of our interview technique, and 2) to secure validity and reliability by providing one source of truth for documentation, hence quotes and insights could not be challenged or disputed. Our interviews have both been conducted in person face to face and over Skype, due to stakeholders being abroad or in other ways unreachable. All quotes included in the paper have been validated and improved by the given expert. One expert wished to be anonymous due to corporate policies from the top-tier consulting company he represented.

2. Interview questions and context send to expert

1. Introduction: Our thesis is an explorative enquiry into the recent phenomenon of big technology companies, such as Alibaba, Tencent and Amazon, moving into financial services.

Our observation is that fintechs in general have failed to live up to the expectation of potential disruption. Many fintechs came into existence with the goal of overtaking part of banks’ value chain by targeting selected layers of financial services. However, many of these fintechs have now shifted strategy to instead enter partnerships or to seek acquisition by banks, as they struggle with scale, trust and ability to acquire costumers.

Because of this, the competitive focus has shifted once again and the new perceived threat for banks is now tech giants, which bring millions of existing users to their services.

This phenomenon is already widely supported with evidence from especially China, where large tech platforms have entered financial services with significant impact.

Our paper seeks to explore this phenomenon by describing and analyzing it to find the underlying dynamics and discuss the potential ramification in the near future.

2.1 Interview considerations: The aim of the interview is to explore the phenomenon of BigTech in finance and how you perceive it as an industry stakeholder. We have formulated below questions as open as possible with the objective of not influencing the direction or content of any responses. We have formulated hypotheses and opinions to all questions, which we are happy to discuss subsequently.

2.2 Topic area: Big Tech in China:

1. We have seen that large technology companies from China (e.g. Alibaba, Tencent and Baidu) have been extremely successful in providing financial products to Chinese consumers – what do you think have been external contributing/facilitating factors to their success?

2. Which internal capabilities/resources do you think have been incremental for the Chinese big techs’ (e.g. Alibaba, Tencent and Baidu) success with providing financial services?

3. From a strategy/business model point of view, do you see any common characteristics between the behaviors of the big techs in their efforts to provide financial services?
4. Do you believe that the big techs have the potential to succeed with providing financial services beyond emerging markets, i.e. in US and Europe?

2.3 Topic area: Big Tech in US/Europe:

1. How do you see this phenomenon in an US/European context – do e.g. Amazon, Facebook, Google and Apple have the same opportunities to provide financial services as their Chinese counterparts?
2. Which US/European big tech do you consider as the most likely player to capture market share in financial services and why (e.g. specific capabilities or strategic considerations)?
3. Which bank products do you perceive as the most likely for big techs to successfully target in an US/European context? Does this relate to the individual big tech/platform?
4. Could ecosystems be a winning new business model in banking?

2.4 Topic area: Incumbents vs. Fintech/Big Tech:

1. Where do you see the incumbent banks are struggling in terms of capabilities/resources compared to big techs and vice versa?
2. How do you see fintech vs. big tech – who will have the greatest ability to disrupt incumbent banks and why?
3. Future state of incumbent banks, how do you perceive incumbent banks in the future (5-10 years) e.g. as commodity providers to digital platforms, digital champions, open platforms, disintegrated or other?

3. Key quotes from expert interviews

*Interview Quotes, Xiao Xiao Adjunct from Copenhagen Business School Department of Digitalization:*

- Three factors have been important for fintech in China, the first is the widespread use of mobile technology and smartphone, which have leapfrogged PC’s due to affordability and availability of Smartphones, also in rural China. From a Fintech perspective this has helped a lot, for instance in relation to payments… 2) the economic part, in China the financial products and financial infrastructure are not that developed, for instance the credit card system is not big in China, before mobile payment people just used cash. Again China leapfrogged from cash to mobile payment and thereby skipped credit cards in a big scale… the third factor is the consumer factor which prefer platforms whom can provide everything, and they don’t see this as a problem in terms of security, privacy or monopoly. For them is normal that big techs that are occupying one part of their life also extend to other parts of their lifes, they see this as highly convenient.
• This missing development of financial services and products provided by banks in China created a vacuum for big tech to come in and fill this out.

• All the banks are owned by the government in China, hence they have not been very innovative and progressive in developing financial services

• I general do Chinese have high trust in big techs and the services provided, hence it comes normal to use new products provided by these players. Now these big techs are institutions, however the trust has been accumulated over time.

• Alipay was created at the same time of the Taobao platform, exactly to address the problem of trust through their escrow service, this also gave Alipay legitimacy to be used outside e-commerce or to be provide other financial services, because of the trust build form the start.

• Chinese consumers are not very concerned about big techs have access to vast amount for personal data, they take that for granted to due cultural aspects. However, they are much more concerned about fraudulent use of data that could cause a financial lose.

• I think Alipay/Alibaba, may have an advantage due to their both online and offline, where Tencent and Wechat Pay are mainly in online in relation to their own platform.

• These big techs are powerhouses of innovation in multiple services and also in financial services, further they have the financial capabilities to buy start-ups and innovation externally

• Payments and Alipay is one of the most important gateways for Alibaba to their e-commerce platforms.

• Everything Alibaba does is centered around facilitating trade and making it easier for sellers and consumers to trade, this also encompasses providing financial services to this context.

• Everything is surrounding e-commerce, and all spin-offs of Alibaba are directly or indirectly related to e-commerce/commerce either from a consumer or seller point of view.

• E-commerce is in the end about transactions and, Alibaba wants to do everything around this.

• The Chinese authorities are always behind then it comes to regulation, they have a “watch and see first” approach, this also create great uncertainty for the big techs providing financial services if regulation changes unfavorable.

• Countries political systems are support are very important for the financial sector and can have great influence of how big techs can impact banking

• Especially in relation to the Internet sector, the Chinese Authorities don’t want regulate to early and limit innovation, the want to wait and see who is the dominating player and then work directly with that player regarding coming up with regulation. This was also the case with Alipay and payments.

Interview quotes, Nicklas Weckesser, Innovation Catalyst in Copenhagen Fintech
The way China’s Government can structure and promote a market is very special, for instance developing own companies and solutions by not opening up for e.g. western companies. This has been predictive for these extreme “winner-takes-it-all” platforms, also in the fintech or Internet Finance space.

The largest banks in China are all government owned, hence the government has also influenced their efforts towards digitalization and inclusive finance and thereby indirectly created opportunities for big techs providing financial services in China.

I could imagine that the Chinese government had an incentive to promote a few big technology players in Finance which they could influence. Hence, I do not believe that the Chinese banks have been much worse in terms of digitalization compared to US and European players, however that Alipay and Wechat Pay have somehow been supported and influenced by the Chinese authorities.

For instance, if Amazon and other GAFA’s would had been allowed to develop financial services without any regulation, I would expect their presence to be much larger in this space.

Zhima credit for instance, also work on a government mandate to provide credit scores, however this could also be with the agenda of providing comprehensive data on Chinese citizens for and to the government.

Big techs vast amounts of consumer data are also much more accepted in China due to trust, culture and limited choice.

In terms of internal capabilities for the big techs I believe it comes down to their tech savviness and their large development efforts, further is the available Chinese talent in coding, computer science and so on also immensely important.

Alipay will internationalize with Chinese tourists going abroad, hence local merchants have strong incentive to facilitate payments with Alipay. This will give some market share and some income; however, I don’t see them take significantly market share beyond emerging markets.

What Ant Financial have been able to do in terms of data and regulation would not have been possible in a US and European context.

In 2015 we were talking about Fintech vs Banking, in 2017 we were talking about Fintech and banking collaborating and now in 2018 talk about competition against big tech or GAFA.

I don’t believe we will see GAFA move much further into banking besides payments, simple because they don’t want to touch the compliance of banking, hence this is the banks greatest advantage for banks vs. fintech and big tech.

I see Fintech and Banks collaborating in order to be able to compete against big tech.
• I do not believe in for example a Facebook bank, because the don’t want to become balance sheet owners and compliance is not a capability for them, they will much rather focus on tech developments and the margins there
• I could see co-branded banks e.g. an Amazon bank, however this would be in collaboration with the banks and also be profitable for the existing banks
• Amazon is in my opinion the GAFA player most capable and likely to move further into financial services, this is partly because they have an internal capability in moving into adjacent industries and second the use cases in their e-commerce business model
• I see social media platforms opportunity for providing financial services as more limited, because there is a strong temporal trends and preference aspect of what is “in” in social media, its difficult to build a bank around social media. Amazon and e-commerce is less a trend and combine with their constant inflow of transactions, I could see a consumer need in having everything in Amazon related to transactions

Interview Quotes, Managing Consultant, Expert in payments and technology

• One important external factor is that Chinese consumers has leapfrogged from cash to mobile payments enabled by the fast diffusion of smartphones, hence they have never experienced traditional bank transfers or products. You became mobile first before anything else
• The Chinese market has also been more protected effectively shielding the big techs from outside competition
• In terms of internal capabilities and resources I see the large investment in technology e.g. having the right backbone, cloud environment as incremental. Furthermore, their capability in building modular technology systems and shared services across their ecosystem, this could for instance be their cloud environment or AI engine. These shared services and technologies can be used across their product and service offerings
• Alibaba’s willingness to M&A and investing in companies with specific technologies has also been important
• In terms of digital capabilities, I see customer centricity, build and test environment and so on as important.
• The Alibaba’s of the worlds did not intend to build ecosystems or provide financial services from the start, however they focused on solving customer needs and how they could improve customer experiences, this led them to build ecosystems.
• In the Chinese context it was also easier for Alipay to target both consumers and SME’s because of the lacking payment infrastructure, this improve the value proposition significantly
• Alibaba’s ability to provide everything around e-commerce and transaction have been of significant competitive importance in driving SME adaptation and utilization
• I believe GAFA have many of the same opportunities for providing financial services as Alibaba, because the success factors of investing in modular technology, being flexible and agile, getting access to the right talent and ability to go to market are universal
• The strategic plays from Alibaba to GAFA will be different, for instance Amazon and their SME lending is centered to their multi-sided platform, however to empower SME’s and corporates with complementary and adjacent products
• I see especially two major differences between big techs and incumbent banks skill set, first the big techs do not have to battle old legacy systems, and second, they have a completely different culture in terms of being agile, customer centric and flexible.
• The big techs also need scale in their solutions, I could need see them developing a solution for e.g. Scandinavia, its simply to small, however I could see the enter collaborations with local banks to offer co-branded solutions
• I see in general that platforms and ecosystems will be important in the years to come; you need to have complete solutions in your company or through your collaborations in your ecosystem.
• I think banking in the future will be a open banking scenario with open API’s

Interview quotes, Jesper Damm, Partner at the Boston Consulting Group
• I believe that 2-3 years ago the main focus was on fintech, however this is changing and now the focus is more on Big Tech as potential disruptive force for incumbent banks, I also believe that Big Tech is more of a threat than fintech
• What do you get if you give a FinTech start-up a billion users, access to technological superpowers and the deepest funding pockets in the industry? You get a BigTech moving into banking
• I believe that fintech was the catalyst behind that the incumbent banks and Big Tech have started with new digital initiatives
• Big tech compared to fintech have a competitive advantage in their vast user bases and the trust they have from consumers to an varying extend (Facebook scandal red).
• More consumers would be comfortable with having big tech providing banking services compared to Fintechs because of their general trust
• PSD2 and access to accounts could also be a catalyst for big techs in providing financial services, because big techs are better positioned and have the muscles to do it
• We have seen that China has been well advanced in financial services, for instance Chinese players have been successful in building ecosystems or universes with access to a large range of products orchestrated around their platforms or ecosystems
• I believe big tech in banking will come to Europe as well, however China has been leading, this is also because it is much easier to reach scale in China for the big techs
• I think that the recent wave of fintechs actually have been a help for the incumbent banks, because it have forced them to be competitive and digitalize, also in the context for big tech
• I believe that big techs have moved into banking is driven by their efforts in being customer centric, hence to solve challenges or a need around their platforms for their customers
• Big techs take their point of departure in use cases, they do see themselves as limited to certain industries, hence they are blurring the boundaries between industries
• I also believe that big techs and fintechs companies in general have a great ability to get things done, they simply execute faster and move under the radar
• I believe that the primary motivation for big techs move into financial services is to deliver a seamless experiences to the customer, hence solving a need for the customers without looking at industry boundaries as a limiting factor
• This can also be a predictive factor for how far the big techs will move into financial services
• Trust will be absolute key factor for big techs ability to move into financial services, some players already have this trust to a larger extend than others
• I do not see big techs becoming balance sheet owners in the near future, however co-branded solutions could be a option, this is mainly because compliance and regulation is not a current core capability for them
• The big techs competitive advantage are in creating seamless customer experiences and making value-adding collaborations to the benefit of the consumers
• I believe these changes will be slower than expected, however the final impact will more significant than expected, I believe this could be the case for big tech in finance as well
• The things that big techs can do in terms of AI, cloud and data analytics is also the things that the incumbents bank are looking for, however the big techs have a clear advantage here

Interview quotes, Martin Tillisch, Managing partner at PA Consulting
• BigTech in financial services and insurance is a relevant consideration, this is because it is to large extend a game of data, data is incremental in predicting customer behavior, customization and risk management which is essential in these industries.
• Second, these BigTech’s will be capable to deliver a better customer experience compared to incumbent banks, they have a completely different history and culture of thinking customer experience. In this game they will be superior compared to incumbent banks

• I think basically all industries could be disrupted by these BigTech’s then it comes to customer experience and leveraging data

• One prohibiting factor for BigTech’s moving into finance could be retaliation from existing customers in their existing revenue streams, hence that they could loose existing customers in other product segments. This was the case with Google when they moved into car insurance a couple of years ago.

• By moving into financial services some of these BigTech’s will also attack some of their existing customers and revenue streams, this might be enough reason for not doing it

• Second, by moving into financial services they will be subject to extensive regulation, this could also influence other of their industries, hence this could also be holding them back.

• I am sure if they decide to move into financial services they will be able to perform fantastic, however it will come with a price in terms of regulation and retaliation from existing customers.

• I don’t believe that Fintech’s have been able to disrupt anything or directly pressure the incumbent banks, because of their missing customer bases and relations. If this should happen it will take much longer time

• On the contrary I believe that the winning banks will be the banks that collaborate the best with Fintechs, hence they can acquire part of their innovation and business development through the Fintechs

• The high performance of developing countries in technologies and Internet finance are partly due to that they did not have anything before, hence no legacy systems to replace

• I think we will see and continue to see the GAFA’s be focusing on payments, simply because its less regulated and it is a extremely attractive product segment

• I don’t believe that the incumbent banks are capable or ready to compete against the BigTech’s if they decide to double-down on payments or other services. Nobody can compete against the BigTech’s in terms of customer experience and what they do in data, lastly they will also be more cost effective

• I really don’t see anything that the incumbent banks could win one in direct competition with the BigTech’s

• Regulators also play a crucial role in this context, they could decide that banks play a systemic role and should not be exposed to competition from BigTech’s for one or another reason
• Banking in the future will be a platform game, hence there will be to positions for banks either being the platform and continue to control the customer interface or be white label provider. However, this platform game will not accommodate that many players controlling the interface
• BigTech’s do not move into adjacent industries to disrupt, they do it to solve customer problems around their platforms
• I do very much believe in a world of business ecosystems, however predicting how this will play out, also in banking, is extremely difficult
• Banks normally think their products based on what they already can do, they don’t think in the underlying customer needs, journeys or experiences
• This customer centricity is extremely difficult for the incumbent banks due to their long history and culture, for instance banks promote a culture of no mistakes, on the contrary the BigTech’s promotes a culture of failing fast and moving on, hence an ability to move fast
• In order to change and start behave like the BigTech’s the incumbent banks needs a burning platform not just on an intellectual level, I am not sure they have arrived at this point yet
• I think that the fintechs have been important for the banks in terms of thinking digital, innovating and think new products, the fintechs have shown that it can be done.

Interview quotes, Morten Bigum, Head of Corporate Strategy Nordea
• We don’t see the 1000 fintech startups that didn’t make it
• Many Fintechs are very grateful to even get a meeting with a bank, but when they start working together, many of the fintechs loose the drive
• My worry is much more big techs rather than fintechs. For example, Amazon looks at a tail of products that no one else want to look at, but somehow, they can transform this into a viable business solution
• They can do this because they are effective in everything they do, they have huge user bases, and they are great at making customer interfaces
• Amazon can think all processes digitally and start where the profit pools are
• What we as a bank can do to fight these big techs, is very much regulation, customer relationship and trust, and full product portfolios
• You need customer trust in all aspects to be able to compete about financial services
• Amazon looks at their data to explore new business opportunities
• Banks have an advantage in relation to bundling. Banks only need to earn money one place
• The hypothesis: through data, you can understand customer behaviour and that is valuable
• I don’t believe banks would become balance sheet providers for these big techs. Because, we don’t make money on lending, we make money on everything else.
• We struggle with an infrastructure where data is collected one place.
• If we (banks) get a shared center of data internally, banks would be able to make the same predictive analytics (ja right som om)
• To predict whether big techs would go fully into finance, we need to look at the business case; would they make money, and would there be other alternatives that would be more attractive
• Partnerships could be a possibility, but it would require big techs to deliver a very good value proposition to the bank and vice versa
• Ant Financial had the advantage that they didn’t really have any competition or regulation
• You can make a model that is scalable because of the large population
• I believe the customer interface plays an important role. A lot of focus from banks is to keep the customer interface and thereby the relationship with the customers
• I don’t believe trust towards the banks will disappear, as you buy safety in relation to your money
• I believe that biggest competitive threat comes from other banks and the race to change how things are done internally with processes and skills
• I believe there are things you should worry from big techs and I believe there are things you can learn from them, for example customer centricity, but bottom-line is that we’re in a position protected by regulation and high customer trust

Interview quotes, Ronit Ghose, Head of Bank Research at Citi Group

• “we need banking, not banks”
• “banks got shut down from innovating because of the financial crisis”
• “Fintech is re-imagining financial services”
• “Developed markets are more concerned with B2B while EM B2C” – Amazon SME lending argument
• “Big Techs can scale up in finance in unprecedented pace because of their userbase”
• 34% of disruption will be within SME lending in Europe and US
• “Regulators are really important in regards to how much can be done”
• “European banks are focused on ‘surviving’ regulation while US banks are more concerned with tech”
• “AI is the most use case of new technologies, e.g. in GDPR and general compliance”
• “First, Fintechs wanted to ‘eat banks’ lunch’, now they are more concerned with partnering or being acquired by banks”
• “AliPay is not a threat in the Nordics”
“banks move slow because of regulation and culture, but that’s also how to get customers’ trust”
“Banks should not worry about FinTech start-ups, the real threat is coming from the BigTechs. They have the user bases and can scale up and move much faster, which is what we can see in China right now”

**Interview Quotes, Frederik Vinten, Executive Vice President and Head of Group Strategy, Danske Bank**

- Many of the big techs are newer companies that do not have the same old legacy IT systems as banks have, which is obviously to their advantage
- Many of the services provided by FinTechs are niche services for the whole customer experience, and I think that is one of the main challenges that both FinTechs and BigTechs have if they want to enter a full set of financial services
- Amazon’s focus is on its customers. What do the customers need in all the touch-points with Amazon and how can it make these interactions customer centric. And this is where financial services come into play
- I believe banks can be challenged if they only stay within financial services, meaning that there are many customer journeys surrounding financial services that banks can and probably should tap into
- I also believe that the trend in banking is making better customer journeys
- What Amazon is basically trying to do is to make a global bank, and we don’t see any global banks today because each market is very different from each other
- Financial products need to be adapted to each market
- The strength of Amazon and other big techs is that they have vast amounts of customer data
- I think banks will look radically different in 5-10 years with more open API banking

**Appendix 25: Full length Ant Financial case study**

**Ant Financial: From Payments to a Personal Finance One-Stop Shop**
This section of the paper will cover the case study of Ant Financial and follow the structure introduced in the case study research methodology section. The first part of the case study will be analyzing and discussing Alibaba, Ant Financial, its strategy, technological capabilities and its ecosystem of products. The second part of the study will be centered on the identified and selected focal technology of Alipay, the analysis of Alipay will be based on our developed framework. This product offering have been chosen
as focal technology because of its synergetic and integrated relationship with other Ant Financial products and the general importance for the development of Ant Financial and Alibaba/e-commerce in China.

**Introduction to Alibaba Group**

In order to conduct a case study and analysis of Ant Financial it is essential to understand the single largest shareholder Alibaba and its diversified business ecosystem, Cf. exhibit 8 for an overview of the Alibaba ecosystem.

Alibaba.com was launched in 1999 and is the flagship company of the Alibaba Group ecosystem, a global leader in wholesale and retail marketplaces (Greeven & Wei, 2018).

The Alibaba Group was founded by 18 people led by the current executive chairman Jack Ma, a former English teacher from Hangzhou. From the beginning, the Alibaba founders shared a common belief and vision that the diffusion of the Internet would change the existing competitive imperative by enabling small enterprises to leverage innovation, technology and data to grow and compete more effectively in the domestic and global marketplace (Alibaba Group, 2018). Since launching its first website enabling small and medium sized Chinese exporters, manufacturers and entrepreneurs to compete globally, the Alibaba Group has developed into a global leading force in online and mobile E-commerce. In 2018 operates the Alibaba Group and its affiliated companies leading wholesale and retail online marketplaces as well as businesses in cloud computing, digital media and entertainment, financial services, innovation initiatives and many others (Alibaba Group, 2018).

In 2018 the major business’s of the Alibaba Group includes flowingly eight entities, excluding Ant Financial:

**Taobao.com:** Launched in 2003, the Taobao marketplace is the largest mobile commerce destination in China in terms of gross merchandize value (Alibaba Group, 2018). Taobao is a social marketplace that allows customers to engage with merchants which are a primarily individuals and small business, the platform leverages big data analytics to optimize and personalize the customer shopping experience.

**TMALL.com:** Launched in 2008, is the largest platform for third-party brands and retailers in terms of gross merchandize value in China. TMALL, both carters for domestic and international branded goods through its premium shopping experience (Alibaba Group, 2018).

**ALIEXPRESS.com:** Launched in 2010, is an international retail/wholesale marketplace that enables consumers and SME’s to buy directly Chinese manufacturers and distributors. ALIEXPRESS is the preferred platform in consumers markets such as Russia, USA, Brazil, Spain, France and UK (Alibaba Group, 2018).

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38 Gross merchandise value is the total value of merchandise sold over a given period of time through a customer-to-customer exchange site. It is a measure of the growth of the business, or use of the site to sell merchandise owned by others (Investopedia, 2018)
**Alibaba.com:** Launched in 1999, was the first business of Alibaba group and is now a leading wholesale platform for global trade with buyers located in more than 200 countries. The buyers are typically trade agents, wholesalers, retailers, manufacturers and SME’s engaged in import and export. Furthermore, Alibaba.com offers supply chain services such as customer clearance, VAT refund, trade financing and other logistics services (Alibaba Group, 2018).

**1688.com:** Launched in 1999, is a leading online wholesale marketplace that facilitates trade between buyers and sellers of general merchandize, apparel, electronics, raw materials, industrial components and agriculture projects in China. Further, it serves as a wholesale channel/sourcing channel for retailers conducting business on Alibaba’s retail platforms (Alibaba Group, 2018).

**ALIMAMA.com:** Launched in 2007, is a digital marketing technology platform that enables retailers and wholesalers to conduct marketing activities on Alibaba controlled platforms and on third-party properties (Alibaba Group, 2018).

**Alibabacloud.com:** Launched in 2009, is the cloud computing arm of the Alibaba Group and among the worlds top three Logging as a Services (LaaS) providers in the world and the largest provider of public cloud services in China (Alibaba Group, 2018).

**CAINIAO Network:** The Alibaba Group took operational control over CAINIAO in September 2017, which before was a joint venture between Chinese financial institutions and Alibaba. CAINIAO is a Chinese logistic company focusing on the online and mobile e-commerce sector with over 57 million deliveries per day (Forbes, 2017). The logistic platform leverages data insights and technology to improve efficiency across the logistics value chain (Alibaba Group, 2018).

Besides above entities the Alibaba ecosystem contains of 55 affiliates across various industries according to Greeven and Wei (2018).

Greeven and Wei (2018) further characterize the business ecosystem of Alibaba by five features which all have been incremental to its success: 1) Digital driven: the use of advanced information and communication technologies which have empowered a superior experience. 2) Interdependence of businesses: the use of cross-selling and cross-marketing of ecosystem participants products and service offerings. Thus, the Alibaba businesses are strategically synergistic and provides economic of scale for shared services such as online payment (Alipay), data services (Alibaba Cloud) and smart logistic (CAINIAO). 3) Focal platform: mutual dependence on a focal platform around which supply and demand is orchestrated while allowing for a wide range of innovation experiments and dynamics. 4) Co-evolution of the ecosystem with the business context: The Alibaba business ecosystem has been co-evolving within its context and thereby opening up new markets, exploring new technologies and niches such as internet finance and digital healthcare. 5) Cross industry diversification: The business ecosystem has not only diversified its core business in e-commerce from B2B to C2C markets or internationalizing with cross
boarder e-commerce, instead it has diversified with disruptive strategies beyond e-commerce. (Greeven & Wei, 2018)

**Introduction to Ant Financial and brief history**

Ant Financial describes itself as a technology first company that envisions bringing inclusive finance to the world (Ant Financial, 2018). It was officially founded in October 2014, however it is effectively the amalgamation of Alibaba’s innovation efforts in financial technologies in over a decade starting with the creation of AliPay in 2004, cf. figure 9 for Ant Financial timeline (Greeven & Wei, 2018).

AliPay, an online third-party payment platform, was originally developed to facilitate transactions on the Alibaba e-commerce platform. In similarity to American PayPal were users able to register and link their bank accounts to Alipay online and thereby start to make online purchase on the Alibaba platforms (Zhu et al. 2017). To make these transactions secure and increase transparency would AliPay not immediately transfer the customer funds directly to the seller’s accounts. The funds would be kept in escrow until the delivery of the associated products or services was made, implying that AliPay would only release the money upon confirmation of the receipt of the products or services (Zhu et al. 2017). Jack Ma, founder and executive chairman of Alibaba, expressed the importance of AliPay in this imperative at the 2016 Honour International Symposium in Singapore:

“The lack of development in Chinese e-commerce was due to one missing piece — a mechanism that could facilitate trust between people. I believe that Alipay is the mechanism that can fulfill this gap. Chinese values credibility but lack a system of trust. If Alipay wants to have value in China, it must establish a trust system... Users provide reviews, Alipay facilitates transactions, and all the actions taken on our platform is data. Only with this system would it be possible for users to send strangers money and merchandise solely based on a picture and a few sentences posted online” (Ma, 2016).

Above statement from Jack Ma illustrates the strategic importance of AliPay to the Alibaba ecosystem in a Chinese context. This strategic importance was partly due to inadequate existing payment infrastructure, relatively weak and inefficient consumer protection laws and low consumer confidence and trust to C2C and B2C product quality control (Zhu et al. 2017). This context and solution made AliPay synergistic and mutual reinforcing with Taobao and other Alibaba marketplaces.

In 2010 it was announced from the Peoples Bank of China (PBoC) that non-bank payment providers would need to obtain a license to gain legitimacy to operate in China (Zhu et al. 2017). Although, AliPay was ready to comply with the regulation and submit its license application in early 2011 PBOC had not issued any application guidelines applicable for foreign-invested and controlled payment entities (Alibaba

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39 Third-party payment platforms in China are authorized (licensed) non-bank organization that facilitates payment typically for e-commerce. The third-party payment companies are licensed by the People's Bank of China (PBoC). There are currently (2016) three types of licenses 1) online/mobile payment 2) point of sale license and 3) pre-paid card issuance (Citi Bank, 2016).
Group Annual Report, 2016). This was a significant issue because Alibaba was incorporated offshore in the Cayman Islands, the solution to this was a restructuring of Alipay to secure the necessary business license for its activities in China (Zhu et al. 2017). Thus, the Alibaba Group spun off Alipay to a legal separate entity that afterwards developed into Ant Financial, which was born in 2014 (Fortune, 2016).

Several prominent Chinese investors invested in Ant Financial with some of the largest shareholders being China’s national social security fund, China Investment Corporation and the China sovereign wealth fund (Zhu et al. 2017). The existing shareholder structure before January 2018 was that management and employees held 76.4% and domestic Chinese investors controlled 23.6%, however the former included cross grants in form of convertible shares to the Alibaba Group, cf. appendix 10 for illustration of ownership structure (Zhu et al. 2017). Alibaba chose to convert its profit sharing agreement into a direct equity stake of 33% in January 2018, this was done through an acquisition of newly issued equity from Ant Financial in exchange for intellectual property rights controlled by Alibaba, hence a non-cash deal, cf. appendix 10 for new ownership structure (Financial Times, 2018b). This deal was further motivated by the consideration that the ownership of a US listed company (Alibaba Group) would increase the chances for acquisition approval from US regulators of US payment companies40.

**Ant Financial business model description**

This section of the case study will introduce and analyze the business model of inclusive finance in the Ant financial ecosystem, and the supporting technological capabilities from which Ant Financial successfully has created a competitive advantage in Internet Finance.

**Inclusive finance:** Ant Financial promotes a purpose of bringing inclusive finance to the world. Ant Financial defines inclusive finance as providing equal access to financial services for individuals and business in need (Ant Financial, 2018). This also implies that the company wants to reduce the gap between rich and poor when it comes to access to availability and quality of financial services (Finance Asia, 2017).

The name “Ant” indicates the deliberate focus on previously underserved segments of financial products in China, hence Ant Financial seized the market that the incumbent Chinese banks was ignoring such as young people and low income individuals (Cheung Kong Graduate School of Business, 2016).

This objective is achieved by providing Internet financial services to the Chinese consumers through the help of big data analytics, cloud computing and other technologies which allows customers equal access to financial services.

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40 The Committee on Foreign Investment in the United States did not approve Ant Financials acquisition of US MoneyGram in early 2018. Instead, Alibaba and MoneyGram announced their intentions to form a "new strategic business cooperation" to expand their remittance and digital payments services internationally (CNBC, 2018)
In China is financial professionals referring to Internet finance instead of Fintech due to translation difficulties, hence this will be used interchangeable in the case study of Ant Financial depending on the sources used (Greeven & Wei, 2018). It can further be argued that Ant Financial always have been a ‘tech-fin’ company due to its strong focus on using technology to enhance the quality and efficiency then providing financial services to the masses (Zhu et al. 2017). Thus, the focus of Ant Financial and its Internet finance has not been to disrupt traditional financial services, however to make it inclusive and diffuse it to the masses.

These strategic objectives are also reflected in Ant Financials vision statement “Bring small and beautiful changes to the world”. ‘Small’ and ‘Ant’ in the vision statement and the name refers to the myriad of entrepreneurs and merchants who are selling products and services through the different Alibaba platforms facilitated by Ant Financials payment products (Zhu et al. 2017). These products, which both are targeting consumers and small and micro-entrepreneurs were traditional markets segments, which was underserved by the incumbent banks in China. This was also visual in the casual strategic importance incumbent Chinese banks had to the e-payment sector before the rise of Alipay and Ant Financial. Only 5% of Chinese bank income was derived from payment services versus a quarter in western banks and the majority in Japanese banks, hence the state-owned Chinese banks did not perceive Internet payment services as an attractive market segment (Zhu et al. 2017).

The last major strategic objective for Ant Financial is to create an all-encompassing digital platform targeting the entire value chain for financial services, Cf. appendix 11 for user engagement across the Ant Financials ecosystem. Ant Financial, for instance, seeks to embed its services into all aspects of customers’ daily life to raise the percentage of users engaging with multiple product or consumption scenarios, in the process boosting customer stickiness and generating even more complete customer data sets, Cf. appendix 12 for development in scenario engagement. This strategy has already gained initial successes, as quantified by speed of customer acquisition, with the period for a financial product within the Ant ecosystem to reach 100 million users reducing from 31 months for Ant insurance, down to 20 months for Yu’e Bao and then 11 months for Sesame Credit (EY & Development Bank of Sigapore, 2016). This is partly due to powerful platform effects when introducing new financial products, Cf. appendix 13 for product/user development (Ant Financial, 2016)

**Technological capabilities:** Ant Financial has since its creation in 2004 focused on leveraging Internet technologies and data analytics to drive customer value and user experience (Ant Financial, 2018). This strategy is similar to the common deployed strategies of Fintech start-ups, hence utilizing technology to provide customer centric and improved financial services (Bain & Company, 2018).
Advances and financial innovations in four distinct areas of technology has been incremental for Ant Financial to stay ahead of competition, make inferences and identify consumer trends, behaviors and preferences (Zhu et al. 2017). These four areas and their application in Ant Financial will be assessed below:

**Big data** technology: Data (big) in Ant Financial has from the start been perceived as a resource that was real-time and multi-dimensional, hence critical in their scenario-driven business model (Zhu et al. 2017). For instance, has Ant Financial’s MYbank applied big data models to provide the concept of “3-2-1” online lending. The “3-2-1” online lending is a service standard characterized by a three minute long online application process, a one minute loan granting process and zero human intervention, hence everything automatized (Ant Financial, 2018). This online lending service or “lendtec” is based on a comprehensive risk assessment process drawing on risk models, customer data from the Alibaba ecosystem and other relevant third-party data (Ant Financial, 2018).

Big data technology also serves as the backbone for Ant Financial’s credit scoring arm Zhima Credit that provides third-party credit scorings within the Ant Financial ecosystem (Financial Times, 2017b). Zhima Credit is built on assessing vast amount of data related to five dimensions of ammonized user credit history, behavioral preferences, contractual fulfillment capacity, identity characteristics and social connections (CNBC, 2017c). Zhima is further leveraging data from the Alibaba e-commerce ecosystems as well as data from other Ant Financial entities.

Ant Financial had in 2016 over 600 million unique users, through whom Ant Financial is capable of collecting useful big data and then subsequently use it to create financial innovations with great impact on the internet finance sector (tmtpost, 2016).

The use of big data analytics has been a key enabler for Ant Financial to create new and innovative financial services to credit-worthy consumers and effectively lowered the social transaction cost, hence facilitating the philosophy of “credit equals wealth” (Zhu et al. 2017).

**Cloud Computing Technology:** Ant Financials capabilities in advanced cloud computing has been accumulated both in partnership with Alibaba and on its own. Cloud computing both serve as product for external banks through Ant Financial Cloud and as an enabler for other Ant Financial products such as Alipay (Fintech Ranking, 2016). Ant Financials external cloud architecture product is effectively the first

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41 Ant Financial also describes Blockchain or Distributed Ledger Technology as an important and applied technology. However, this technology has been included from the analysis due to no transparency in how it has been applied from a technical point of view. Ant Financial claims to have above 350 blockchain enabled projects, facilitated more than 200 million donations with blockchain with a value of 976 million RMD (Ant Financial, 2017).

42 Big data can bed defined as high-volume, high-velocity and/or high-variety information assets that demand cost-effective, innovative forms of information processing that enable enhanced insight, decision making, and process automation (Gartner, 2018).

43 Cloud computing is the delivery of computing services - servers, storage, databases, networking, software, analytics and more—over the Internet (“the cloud”). Cloud computing eliminates the capital expense of buying hardware and software and setting up and running on-site datacenters. Some cloud computing services are also designed to work with REST APIs and a command-line interface (CLI), giving developers multiple options (Microsoft Azure, 2018).
implementation of the concept of “Bank in a cloud”, hence the platform functionality encompasses elements such as risk management, security, basic core banking system, lending, deposits, mobile app, Infrastructure as a Services, Platform as a Service and KYC (Fintech Ranking, 2016).

Ant Financial Cloud services has achieved to limit the IT cost of a transaction to US$ 1.4 cent combined with the capacity to manage billions of daily transfers, allowing for a peak workload of 120,000 transactions per second with high availability and disaster recovery solutions (up to 99.99%) in place (Zhu et al. 2017).

Ant Financials cloud architecture and products have several key advantages compared to other existing solutions 1) High concurrent processing capability, the cloud computing excellence for instance helped Alipay’s core functions of accounting and payment reach a world record of transactions per second during the “11.11” Festival in 2016 2) the cloud architecture applies low-cost PC server clusters to replicate the performance of traditional database serves and thereby significantly decreasing the hardware cost 3) the elasticity of the architecture allows for system performance and capacity to be adjusted on-demand hence making close to 100% system utilization possible at all time, and 4) by having multiple synchronized data replications on multiple accessible servers in multiple locations, the cloud computing services managed to have a 99.99% uptime (Zhu et al. 2017).

Zhu et al. (2017) argues that this ability to facilitate large real-time transaction volumes through sophisticated cloud computing capabilities and the subsequent cost reduction of providing financial services are some of the core strategic strengths of Ant Financial.

Risk Control Technology: Effective risk management has been one of the top priorities for Ant Financial since its start in 2004 (Zhu et al. 2017). This deliberate focus supported by 1500 employees assigned to risk management has lead to several innovations in risk management treatment, analysis, monitoring of risk and intelligent risk control (tmtpost, 2016). These big data based fraud risk management capabilities has enabled Ant Financial to implement and achieve effective control measures and risk recognition with one tenth of a second (approximately 100 milliseconds) (Chen et al. 2015). For instance, approximately 80% of all risk related issues in the Ant Financial ecosystem can be handled and resolved through automated and intelligent risk control processes. Further, the capital loss rate due to fraud at Alipay is lower than 0.001%, which is significant lower than competitors (Zhu et al. 2017).

Ant Financial has also extended their risk prevention ability and tools to external customers, Ant Buckler is a big data based fraud prevention product than aims to identify and prevent all flavors of malicious behaviors with flexibility and intelligence for online merchants and banks (Chen et al. 2015). Ant Buckler applies a proprietary score engine to quantify risk levels of users or transactions for fraud prevention. It also has a user-friendly visualization User-Interface (UI) with risk scores, top reasons and fraud connections (Chen et al. 2015).
Artificial Intelligence (AI) Technology: Ant Financial applies AI technology widely across its products to create timely and intelligent customer service (Zhu et al. 2017). Automatic judgment and prediction of user questions are achieved through capabilities in data mining and semantic analysis technology, this give Ant Financial the possibility resolve customer issues completely automatic (Ant Financial, 2018). For instance, on the “11.11” shopping day in 2015 95% of customer inquires were answered through big data based artificial intelligence (Zhu et al. 2017). When having customer conversation, “My Customer Service” the service element of MYbank collects key information and selects applicable answers based on semantic analysis (Ant Financial, 2018). Ant Financials “smart customer services” which was established in 2015 for intelligent automatic customer calls has also recently surpassed human performance in terms of customer satisfaction effectively giving Ant Financial a competitive advantage in cost and scalability (China Daily, 2016).

Key people in Ant Financial is also suggesting that it will be the company’s AI research that will shape its future growth by optimizing the business and generate new products based on AI and deep learning capabilities (MIT Technology Review, 2017a)

Introduction to financial services offered by Ant Financial

Ant Financial has brought multiple Internet finance innovations to the Chinese financial sector since its inception in 2002, below section will analyze and discuss Ant Financials major financial products and how they fit into its business ecosystem, cf. figure 14 in the appendix for overview of innovations and products. The analysis and discussion will cover the context of origin, application and provide quantitative data on adaptation if available. Ant Financial Cloud will not be covered in this section, hence it was discussed as part of their technology capabilities.

1) Chengxintong (2002): In the early 2000’s the majority of China’s growing SME’s were not included in a credit rating system, however such a system was incremental for B2B online business to create trust between vendors and transactions (Greeven & Wei, 2018). As a response to this and to facilitate B2B trade on 1688.com, Alibaba established Chengxintong as a credit rating system on the platform. The credit system applies third-party certification, activity records, member ratings and other data points to assess a vendor’s credit worthiness (Greeven & Wei, 2018).

The development and launch of such a credit systems was the first in China and significantly improved the business ecosystem of Alibaba and e-commerce in general in China. For instance, it was found by Peking University that 92% of vendors active in Alibaba’s ecosystem would select transaction patterns

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44 Data mining is a process and technology that turns large volumes of raw data from different sources into business insights by using software to look for patterns in large batches of structured and unstructured data (Zhu et al. 2017).

45 Semantic analysis is the process of relating syntactic structures, from the levels of phrases, clauses, sentences and paragraphs to the level of the writing as a whole (Zhu et al. 2017).
based on the information from Chengxintong. Chengxintong has by 2016 successfully certified the credit status of more than one million SME’s with more than 30 million SME’s using the system to facilitate the their business (Greeven & Wei, 2018).

2) Alipay (2004): Alipay is the world’s largest third-party mobile and online payment platform with approximately 520 million active monthly users (CNBC, 2017b). It was launched in 2004 as an online payment service, at this point in time debit and credit cards were extremely rare in China, hence consumers usually paid in Cash (Greeven & Wei, 2018). As previously described in this case study was Alipay’s escrow service the missing link that reduced transactional risk for online consumers and thereby enabled e-commerce in China on large scale.

By 2006 had Alipay formed partnerships with more than 40 major domestic financial institutions in China and created a collaboration with China Post that allowed Alipay access to their more 66,000 physical locations. The China post collaboration allowed Alipay users to fund their Alipay account without a debit or bankcard and effectively helped Alipay and Taobao to gain access to China’s unbanked and underdeveloped regions (Greeven & Wei, 2018). In 2007 was Alipay’s international payment service, supporting transactions in 12 different currencies launched, this allowed global merchants access to Chinese consumers and vice versa, this further gained Alibaba access to overseas markets.

In 2011 after 6 years of experimental operations as a third-party payment provider, Alipay had still not received any formal recognition or license to operate by the PBoC (Zhu et al. 2017). The license for operating a third-party payment business was obtained from the PBoC in 2011. However, it is considered normal that regulation in many cases follows the development of technology and market in China, hence quietly allowing certain experiments without government approval or explicitly disapproval (Greeven & Wei, 2018).

Mobile payments in China is currently far more accepted by consumers and retailers compared to especially US, this has partly been due to that consumers has leapfrogged directly to mobile payments without every adopting credit cards (Wall Street Journal, 2018).

Alipay has in 2018 evolved from only being an online wallet to now being a lifestyle enabler and the crucial glue in the larger Alibaba business ecosystem (Ant Financial, 2018). Alipay users have now access to advanced location based services, for instance connecting and booking appointments with doctors, hail taxis, pay utility bills, book hotels, top up mobile phone and much more. Furthermore, Alipay allows for directly integration with Ant Financial’s Huabei, an online consumer loan entity that allows installments payments to purchases on Taobao and Tmall and use saved money in Alipay to buy money market funds or other wealth management products provided by Yu’ebao and Ant Fortune with instant redemption (Greeven & Wei, 2018). Alipay is also expanding its in-store offline payments domestically and international, further it supports now 27 currencies, have partnerships with 200 domestic and 250
overseas financial institutions, and covers more than 36 countries (Ant Financial, 2018). Alipay, holds 54.5% market share in third-party mobile payments based on GMV in Q2 2017 and a 31.5% market share in third-party online payments in the same period, cf. figure 15 for breakdown of market shares (IResearch China, 2017).

3) AliLoan and MYbank (2007 & 2015): One of the largest challenges for SME’s in China has been access to bank loans for growing their business. Because of this context and to further promote Chinese SME’s to adopt and provide content to Alibaba’s platforms, Alibaba started to provide SME loans in 2007 (Greeven & Wei, 2018). Through a partnership with the Commercial Bank of China and China Construction Bank Alibaba started to offer jointly backed loans. Alibaba connected three or more SME’s in a jointly accountable structure to request loan grants from banks without any collateral, Alibaba further provided the loan issuing banks with credit records and other data from the entire Alibaba ecosystem (Greeven & Wei, 2018). However, this collaboration was canceled in 2010 due to limited experience and success from the banks in managing SME’s risk profile and behavior. As a response to the failure of cross-guaranteed collateral free loans Alibaba decided to create its own lending company. Zheijian Ali Small Loan Company was established in 2010 with a lending license provided by the Zhejiang Provincial Administration. This lending company provided SME’s with loans of less than 500.000 RMB, however due to financial regulation Alibaba was only able to found the loans with capital from its own reserves limiting the scalability (Greeven & Wei, 2018).

In March 2014, now Ant Financial, received regulatory approval to create a online Internet bank, MYbank was among the first five privately held banks to be granted approval by the China Banking Regulatory Commission (Yale School of Management, 2017). MYbank which translate into “Internet Commerce Bank,” in china provides loans with reduced rates or in some instances interest-free loans to SME’s, for instance to relieve working capital stress for SME’s active in the Alibaba’s business ecosystem (Zhu et al. 2017). MYbank focuses on providing inclusive finance to consumers, farmers and SME’s especially in the e-commerce sector, and offers directly integration with Alipay, Taobao, 1688 and Aliexpress (logistics) from which it also applies big data extracted to offer competitive loans (Bloomberg, 2017a).

By end October 2017 Mybank has provided above 7 million SME’s with loans amounting to 441.3 billion RMD (approximately 71.246 billion US$) with an average loan size of 8.000 RMD (Reuters, 2018b). MYbank employs about 300 people, half of whom are technology experts or technicians, and estimates it can deliver loans for up to a 1.000 times less than it would cost a brick-and-mortar bank (Reuters, 2018b). Furthermore, it was MYbank whom created the previously explained “3-2-1” online loan (Zhu et al. 2017).

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46 Exchange rate as of 31.03.2018 (Bloomberg, 2018)
Internet based banks and private banks are in general still in its infancy in China, however they carry the duty of innovation in certain areas and therefore often subject to special regulatory and beneficial guidance from authorities as previously hinted (Reuters, 2018b).

4) Zhongan insurance (2013): In a direct response to consumer demand Ant Financial created Zhongan insurance in a partnership with Tencent and Ping An Insurance, Zhongan insurance was the first online insurance company in China and was granted a license by China Insurance Regulatory Commission (Greeven & Wei, 2018).

KPMG describes Zhongan in their 2017 Fintech Top 100 as an online property insurance platform, specializing in the leveraging big data analytics to automate underwriting and claims processes, design and tailor products, and create precision marketing campaigns and risk management strategies (KPMG, 2017).

The insurance premium scale of Zhongan started out small after the launch in 2014, however during 2015 and 2016 Zhongan experienced a rapid growth and now have obtained premiums of 3.4 billion RMD by end 2016 (Approximately 0.55 billion US$) (Bloomberg, 2017c). Zhongan completed its IPO September 28th 2017 through in which it raised 1.5 billion US$ with a valuation of 12 billion US$ which was 4.9X its book value (Seeking Alpha, 2017). With this valuation is Zhongan the worlds 4th most valuable Internet or Fintech company (Bloomberg, 2017b).

Zhongan has currently launched more than 300 different insurance products, some of which are considered to be quite innovative products such as its health insurance which provide the opportunity to connect consumers smart wearable’s step counting to their insurance premium, hence the healthier a lifestyle the less consumers need to pay (Greeven & Wei, 2018). The most important insurance products are connected to the Alibaba business ecosystem, which accounts for 89% of its premiums, among these a shipping return insurance linked to Taobao one of the key products contributing for almost half of all premiums (Bloomberg, 2017b). Zhongan Insurance reached 100 million cumulative users after 31 months according to Ant Financial (Ant Financial, 2016).

5) Yu’e bao/Ant Fortune (2013): Yu’e bao launched in 2013 and Ant Fortune launched in August 2015, they offer comprehensive wealth management products through its mobile platform that allow users to manage funds through a mobile app. Further the app integrates financial newsfeeds, updates on stock movements, investor community and personalized investment recommendations (Ant Financial, 2018).


Yu’e bao was created as response to Alipay’s inability to provide interest rate on users deposited funds like a commercial bank would do. This combined with an increasing need for wealth management products to the masses in China, drove Ant Financial lunch the product Yu’e bao, that allowed its users
to invest money deposited on Alipay into a money market fund managed by Tian Hong Asset Management (Greeven & Wei, 2018). The Yu’e bao money market solution is different from standard money market funds since it offers direct integration with a third-party payment service and that funds can be withdrawn immediately whenever the user needs the invested funds (Greeven & Wei, 2018). Yu’e bao became the world’s largest money market fund then it reached 165 billion US$ in AUM in February 2017 overtaking JP Morgan’s US government money market fund, through this process the fund has accrued approximately 370 million accountholders which make large-scale redemptions an unlikely event (Wall Street Journal, 2017). The fund reached 233 billion US$ in AuM in December 2017, however the due to new money market fund regulation imposed by Chinas security regulator which became effective in October 2017 is the further rate of expansion expected to slow down (South China Morning Post, 2017b). Even though being the largest money market fund in the world Yu’e bao, it is not being used in a traditional way or solving the same “business issue” as other similar funds. The fund is used as a method for consumers to store funds to spend on Taobao while receiving interest. Thus, it can be argued that it works as micro saving tool in a mobile wallet that gives rural and unbanked Chinese consumers a saving product, thus most Chinese consumers had nowhere to save money before (The Finanser, 2018). This also fits well with Ant Financials strategy of inclusive finance and serving the unbanked consumers in China and beyond. 

6) Zhima Credit (2015): Zhima Credit or Sesame47 was born out of the need for individual Chinese consumers obtain a credit rating for giving them access to credit based services such as microloans (Ant Financial, 2018). The license to provide personal credit ratings was provided by PBoC in early 2015, 7 other companies also received this license (Zhu et al. 2017). To accomplish this Ant Financial developed a credit rating system with scores ranging from 350 to 950 determined from five factors based on big data collected from reliable sources (Fintech News, 2016). The five factors were 1) Credit history to reflect the users past payment history, the sources for instance counted the Alibaba e-commerce ecosystem, 2) Behavior and preferences to illustrate the users online behavior for segmentation purposes, 3) Fulfillment capacity reflects the user’s ability of adhering to contracts such as financial products and loans, the sources for instance counted other services in the Ant Financial ecosystem, 4) Identity characteristics which rates the extent and accuracy of user’s personal information, and 5) Social relationships which reveals the user’s influence within his/her network, his/her influence to the network and his/her friends’ credit scores (Fintech News, 2016).

47 The direct translation of the Chinese characters for “Zhima” (i.e. “芝麻”) was “Sesame” (Zhu et al. 2017).
Zhima Credit is further an enabler for Alipay and Ant Credit Play because consumers can access a host of privileges based on their credit score with integration in-between Zhima Credit and Alipay (CNBC, 2017d). Because of the integration with other Ant Financial products and external wide-ranging acceptance users with a certain score could get visas easier, book cars and hotels without paying reservation fees, borrow umbrellas and much more (Zhu et al. 2017). In essence Zhima Credit facilitates the Ant Financial philosophy of “credit equals wealth” by allowing Ant Financial to provide tailored services to credit-worthy consumers and lowered the social transaction costs involved.

**Integrated technology ecosystem framework with external forces**

This part of the case study will analyze Ant Financial through our developed conceptual framework based on the theory of technology ecosystems combined with external forces as previously introduced. The analysis of the case content will be divided into two parts, first the supply side focus on the technology ecosystem centered on the development of Alipay as a focal technology and second the demand side focus centered on our two external variables and one strategic business model variable.

The first part of the analysis will follow the four step approach as formulated by Adomavicius et al. (2007) to identify and analyze a given technology ecosystem consisting of various technologies related to the focal technology in a specific context, Cf. figure 2 following the cross analysis for illustration of Alipay’s technology ecosystem.

**Step 1 - Identification of the focal technology and its context of use: Alipay**

Alipay will be the focal technology and therefore the center of this analysis structured around our previously introduced framework. Thus, Alipay will also be the center of the technology ecosystem. Alipay is the world’s largest third-party mobile and online payment platform with approximately 520 million active monthly users (CNBC, 2017b).

The functionality of Alipay has previously been analyzed and discussed with the main functionalities being 1) Peer-to-peer mobile-payments, 2) third-party online payments, and 3) In-store payments and cross-boarder in-store payments, Cf. previous section for in-depth analysis of Alipay (Alipay Global, 2018). Alipay’s additional integration opportunities with other Ant Financial products or its function as

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48 Conversely, low scores can result in algorithm-driven penalties enforced against consumers or organizations that have committed wrongdoings — like traffic violations or late bill payments. The ethical consequences will not be further investigated, however definitely interesting from a data analytics and discrimination point of view (CNBC, 2017).

49 Chinese Alipay users can apply for travel visa without providing any documentation proofs as long as they meet certain credit score criteria for instance 700 for Singapore visa, 750 for European Union visa (Fintech News, 2016)
life enabler or “Finlife” will be analyzed under supporting business infrastructure later in this section (Zhu et al. 2017).

The context of use is more complex to define considering the multiple and significant scenarios of use in the Chinese economy and beyond. Alipay and Alibaba has been integral to each others success, in this context it has been Alipay’s ability to facilitate e-commerce in China which have had the largest impact (MIT Technology Review, 2015) Thus, we will define the context of use of Alipay as broadly as a trusted and transparent third-party payment facilitator in multiple consumptions scenarios for both online and offline payments. Exactly this was the novel innovation and missing piece in the Chinese economy in 2004 then Alipay was launched, hence Alipay is the origin and forms the core of Alibaba’s Internet finance and e-commerce ecosystem (Tech Asia, 2015).

Step 2 – Identification of competing technologies: Alipay

In 2004 then Alipay was launched were the existing alternatives or competing technologies few. This was due to low credit card penetration rates, which also have continued to be low (EY & Development Bank of Singapore, 2016). This was also highlighted by Xiao Xiao Adjunct at CBS “China leapfrogged from cash to mobile payment and thereby skipped credit cards in a big scale”. Thus, before Alipay there was a situation where most transactions, especially for rural areas in China, were conducted in cash, often to significant disadvantage for consumers. The low diffusion of alternatives was due to low population density, coupled with a lack of sufficient usage frequency, which rendered traditional payment solutions unjustifiable (Zhu et al. 2017). Before the creation of Alipay, whenever a consumer had to pay for instance rent, the person had to go to her bank, queue, withdraw her rent as cash, walk it across the street to her landlord’s bank, take a number and queue, and then eventually deposit the money into the landlord’s account (Harvard Business School, 2016).

After the launch of Alipay was Alibaba’s competitors soon to follow Alipay’s success and started to offer their own similar third-party payments technologies, this led to Tencent launching Tenpay in 2005 and WeChat Pay/wallet in 2014, Baidu to launch Baidu Wallet in 2014 and JD.com to launch JD Payment and JD Wallet both in 2012 (Citi, 2018). This development has created an market situation where Alipay holds a 54.5% and 31.5% market share in mobile and online payments versus Tenpay/WeChat Pay 39.8% and 19.3% in the same segments as of Q2 2017, Cf. appendix 15 (IResearch China, 2017). The incumbent Chinese banks have also launched similar mobile payment apps, however not succeeded in attracting

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50 “Finlife” encompassed a broad range of fintech- enabled lifestyle enhancements, including the ability to hail a taxi, book a hotel, pay utility bills, make doctor’s appointments, and buy movie tickets directly from various modules within the Alipay app (Zhu et al. 2017).

51 According to PBOC statistics, the country had only 0.29 cards per capita in circulation at the end of 2015, down from 0.34 a year ago and in stark contrast to an average of 3.3 credit cards per individual in Singapore (EY & Development Bank of Singapore, 2016)

52 WeChat Pay was also known as TenPhy, this paper will use WeChat Pay moving forward (Zhu et al. 2017).
significant transaction volume compared to above introduced players, Cf. appendix 16 (Renmin University of China, 2017).

In terms of technology and functionality adopted are Alipay and WeChat Pay similar, hence they both leverage E-wallet technology with a QR payment option, the main payment method is to scan customer or merchant QR codes or soundwave payments\(^{53}\), the funds available is tied to credit card account or pre-deposit money and merchant needs to support the individual solution (Fung Global Retail & Technology Group, 2016).

From a technology competition point of view the competing technology of Near Frequency Connection (NFC) payments is still in its infancy in China, only few providers are relaying on this technology in China, such as Apple Pay and Union QuickPass that allows users of NFC-enabled smartphones to make payments by waving their devices at UnionPay point-of-sale (POS) terminals (Fung Global Retail & Technology Group, 2016). In total holds NFC payments less than 10% of the entire Chinese mobile payments market, and for convenience shopping holds NFC payments 0% market share. This market structure is due to two factors, the first that many Chinese consumers own cheaper smartphones from domestic brands priced below two thousand yuan – also known as qianyuanji (千元机), these phones does not typically ship with NFC chips. Second, a significant shares of vendors, mostly local small businesses, are reluctant to support NFC contactless payments due to the underlying costs of owning a POS machine that supports contactless chip cards (Tech Node, 2018).

QR codes are seen as a more convenient alternative to costly POS terminals, hence you will only need to print a QR code to request funds on Alipay or WeChat.

The main difference between Alipay and WeChat Pay form a competitive perspective is the business ecosystem and mother company from which they have their origin, Alipay from e-commerce and WeChat Pay from social media (Tech Node, 2017). This implies that the average user-interaction with Tencent’s payment solution is likely higher because they control WeChat, which is an instant massage tool for the largest social network in China. Due to this has WeChat Pay emerged as one of the main electronic payment applications, hence of WeChat’s status as the default platform for communication in China and thanks in part to the innovation of consumer-to-consumer electronic “red packet” feature (Zhu et al. 2017). Alipay is on the contrary an extension of Alibaba’s e-commerce ecosystem, hence it have lower average user interaction (Tech Node, 2017).

From above analysis it can be argued that the payment competition in China is not about competing technologies in form of credit cards, QR codes or NFC payment, however the underlying business ecosystem and strategy the provider follows and gain network effects from.

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\(^{53}\) The sound wave payment system was introduced with the Alipay Wallet mobile app in January 2013 and uses white noise generated by a smartphone to carry digital information to another device e.g. a vendor machine in the Beijing MRT system. The technology was initially used for smartphone-to-smartphone transactions by Alipay (Techcrunch, 2013)
Step 3 – Identification of component technologies: Alipay

Several component technologies have been used by the focal technology of Alipay in the previous defined context of use. The component technologies deemed most important will be analyzed below with focus on the implications and applications for Alipay. The relevant path of influence will also be assessed for each component technology. The identified relevant component technologies in scope are Internet connectivity through 3G and 4G, mobile and smartphone diffusion (including mobile apps), cloud computing, QR codes, data analytics/AI and facial recognition technology54.

Internet connectivity: China has and will continue to leapfrog directly into a digital financial market place, this is partly due to a mature digital infrastructure (EY & Development Bank of Singapore, 2016). For instance, China had 710 million internet users in June 2016 corresponding to 51.7%, compared to only 1.8% in 2000 and 8.5% in 2005, at this rate growth rate will the penetration rates of North America and Europe be within reach in a few years, Cf. appendix 17 for graph of development (China Internet Network Information Center, 2017). The majority of these Internet users have access to 3G and 4G networks through different devices making utilization of sophisticated Internet finance products such as Alipay possible (Harvard Business School, 2016). Thus, the path of influence from connectivity through 3G and 4G has been mainly a “feed-forward” influence where new product innovations become possible in the presence of a new component innovation i.e. 3G and 4G networks (Liu et al. 2015).

Diffusion of mobile and smart devices: Similar to the importance of connectivity has the diffusion of smartphones been important to the adaptation of Alipay, hence China’s utilization ratio of mobile online payments stood at 57.7% in 2016, with more than 1-in-2 Chinese consumers using their smartphone to conduct financial transactions primarily through Alipay and WeChat pay (EY & Development Bank of Singapore, 2016).

In 2016 were 695 million or 95.1% of Chinese Internet users going online via a connected devices, Cf. appendix 18 for graph of development (China Internet Network Information Center, 2017). This development has partly been due to government initiatives of developing of ‘Smart City’ and ‘Wireless City’ public access wireless networks in China’s major cities (EY & Development Bank of Singapore, 2016).

Through the diffusion of smartphones the Chinese consumers also received access to mobile applications with endless functionalities, especially these applications has been essential for Alipay, hence Alipay works as an mobile application with integration into countless other applications implying a pull-push effect (BBVA, 2017). Thus, the path of influence from smartphone and mobile application has been mainly a “feed-forward” influence (Liu et al. 2015). The importance of smartphones was also highlighted

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54 Facial recognition technology in the context of Alipay has been included because of its potential future importance for Alipay. A illustration of how facial recognition technology works in relation to Alipay can be seen on flowingly link https://www.youtube.com/watch?v=f-NIAUhU2E0 (Youtube, 2017)
by the interviewed management consultant “Chinese consumers have leapfrogged from cash to mobile payments enabled by the fast diffusion of smartphones, hence they have never experienced traditional bank transfers or products”.

**Cloud computing:** The development of cloud computing has as previously mentioned played an incremental role in the success of Alipay, cf. section 2 in this chapter. First of all have the development of internal cloud capabilities been essential to reduce operating cost of Alipay and make the cost per transaction competitive (US$ 1.4 cent per transaction, combined with the capacity to manage billions of daily transfers) (Reuters, 2018a). Thus, in order to gain access to a future-proofed core-banking system for its financial products Ant Financial decided not to look for an external provider but to develop it by creating Ant Financial Cloud (Fintech Ranking, 2016).

Alipay leverage cloud technology for their cloud based Alipay Wallet which both allow for peer-to-peer and online e-commerce transactions, furthermore have Alipay released more than 60 API’s for third-party developers to build online storefronts integrating Alipay. By integrating Alipay into your storefront you also get access to cloud based data analytic capabilities, for instance for personalizing product recommendations (Kshetri, Fredriksson, & Torres, 2017). These data analytics is also an essential part of Alipay’s internationalization strategy, hence In order to attract merchants in Europe, Alipay is providing advanced analytics around Chinese consumers using its app, allowing the merchants to analyze spending patterns, preferences and seasonality of Chinese travelers (Forbes, 2016).

Furthermore, did Alipay’s cloud based system process Alipay’s core functions (e.g., accounting and payment) with peak processing power reaching an average of 120,000\(^55\) transactions per second and a peak of 175,000 (a world record, previously Visa) during the 11.11 Festival in 2016 (Zhu et al. 2017). This Illustrates the importance of cloud technology for Alipay and how it in general is the foundation for Ant Financials core products. This path of influence can be characterized as a “feed-back” influence, hence the development and scaling of Alipay forced Ant financial to develop the required cloud computing capabilities to enable scalability and new functionalities (Liu et al. 2015).

**QR Codes:** The technology of QR\(^56\) codes or Quick Response codes has also played an important role in the development of mobile and online payments in China, hence 90% of all third-part mobile payments are controlled by Alipay and Tencent whom both leverage QR codes for their payments products (Fung Global Retail & Technology Group, 2016). The price competitiveness of QR codes compared to POS terminals combined with adaptation by Alipay and Tencent have been the key drivers behind the popularity in China (The Asian Banker, 2014). This path of influence can as with Internet connectivity be

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55 According to Alipay they reached 256.000 payments per second (Alipay stated this on Twitter) for the Alibaba Group on 11.11 Festival in 2017, which again is a new world record. In total Alipay reached 1.48 billion transactions (Enterprise Innovation, 2017)

56 A QR code consists of black and white squares arranged in a square grid on a white background, which can be read by an imaging device and processed. The necessary data is then extracted from patterns in the QR image (Global Alipay, 2018)
characterized as a “feed-forward” influence, hence the development of QR codes as a component influenced the evolution of Alipay.

**Data analytics and AI:** Big data and AI based fraud risk management capabilities has enabled Alipay and Ant Financial to implement and achieve effective control measures and risk recognition with one tenth of a second (approximately 100 milliseconds) (Chen et al. 2015). For instance, approximately 80% of all risk related issues on Alipay can be handled and resolved through automated and intelligent risk control processes. As a consequence of above is the capital loss rate due to fraud at Alipay lower than 0.001%, which is significant lower than competitors (Zhu et al. 2017).

Alipay also provides big data based marketing advice to their retail merchants, for instance to enable more targeted omni channel marketing strategies (RFI Group, 2017). Thus, the path of influence from data analytics and AI has been mainly a “feed-forward” influence where new product innovations and functionalities on Alipay have become possible in the presence of new component innovations, however a “feed-back” influence can also be argued because it has been incremental for Alipay to develop these skills to scale the application (Liu et al. 2015).

**Facial recognition:** One of the newest technologies being employed in Alipay to increase its functionality is facial recognition technology, the software applied analyzes more than 600 facial features to make a match, and uses a 3D camera and a "liveness" algorithm to avoid being tricked by a photo or video (CNN, 2017).

Leveraging factional recognition technology is Alipay’s latest initiative to enhance security, convenience, user experience and effectively remove the last financial friction and cumbersome processes for transactions (Ant Financial, 2018).

Alipay’s progress with and use of facial recognition technology for payments was recognized as on of 2017’s breakthrough technologies by MIT’s Technology Review (MIT Technology Review, 2017b). This path of influence can as with Internet connectivity be characterized as a “feed-forward” influence. R

**Step 4 – Identification of support and business infrastructure technologies: Alipay**

Several innovations have added value to both the functionality and performance of the focal technology of Alipay, however the main contribution to the business infrastructure have been the development of additional services and products creating an embedded delivery platform of financial inclusion centered around Alipay (Oliver Wyman, 2017). This has been through internal developed additional business infrastructure and external location based services, both will be analyzed below.

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57 QR codes were first created back in 1994 by a Toyota subsidiary named Denso Wave whom developed the code in order to help in the manufacturing process, they aided in tracking vehicles and parts (Mobile QR, 2018)
Alipay has been extremely successful in utilizing its online-to-offline app as a gateway to create an embedded platform and thereby “cross-sell” or “cross-distribute” other financial products produced by Ant Financial such as financing, investment products and insurance offerings (Oliver Wyman, 2017). Examples of this Ant Financial ecosystem integration are, for instance 1) direct integration with Yu’e Bao and its convenient cash management for the funds in the users Alipay account, Cf. Yu’e Bao analysis in previous section 2) integration with Zhao Cai Bao which offers peer-to-peer lending to business and individuals, 3) integration with Hua Bei which offers online consumer loans/financing for purchases of goods and services on Taobao or Tmall (requires approval from Ant Financial), 4) integration to Jie Bei which offers cash loans with application being made through Alipay and funds being directly transferred to your Alipay account (Citi, 2018), and 5) integration with Zhima credit scores which both give privileges in the Ant Financial ecosystem and to external location based services which will be explained below, Cf. Zhima credit analysis in previous section (CNBC, 2017d).

Alipay has also pursued this strategy of creating an embedded delivery platform by integrating external location based services offerings such as, connecting and booking appointments with doctors, hail taxis, buy cinema tickets, order take-away food, pay utility bills, book hotels, top up mobile phone, and much more only by opening the Alipay app (Greven & Wei, 2018). Alipay has also pursued a strategy of enabling these location based services for Chinese tourist going abroad by providing information on restaurants, tourist attractions and shopping destinations in Europe (Forbes, 2016). This strategy is part of the previous introduced agenda of using Alipay as a life enabler or “finlife” product, Cf. appendix 19 for an illustration of Alipay’s finlife ecosystem (Ant Financial, 2017).

Lastly, has the Alibaba ecosystem also constituted essential enabling business infrastructure for Alipay, hence Alipay has managed to gain significant scale by leveraging the existing large online user base by funneling customers through Alibaba’s reputable ecosystem and specific platforms such as Taobao and TMall (Oliver Wyman, 2017). This has served Alipay as an effective low-cost and high-reach strategy for reaching scale, Cf. appendix 20 for illustration of strategy with Ant Financial and Alibaba user bases. The paths of influences in relation or business infrastructure has both been “feed-forward” and “feedback”, hence the focal technology of Alipay has caused new innovation and development in the surrounding business infrastructure and the development of relevant infrastructure has motivated innovation and development of Alipay (Liu et al. 2015). Thus, a continues enabling loop of technological evolvement and co-development has been taking place, similar to the defining characteristics of a business ecosystem (Iansiti & Levien, 2004).

58 A location-based service (LBS) is a software application for a IP-capable mobile device that requires knowledge about where the mobile device is located. Location-based services can be query-based and provide the end user with useful information such as “Where is the nearest ATM?” or they can be push-based and deliver coupons or other marketing information to customers who are in a specific geographical area (Searchnetworking, 2018)
Regulation in the specific context of use: Alipay

In terms of the effect of regulation on Alipay from the relevant Chinese authorities it is fair to argue that it has been strongly accommodating as previously described, hence Alipay was allowed to operate for 6 years without requiring any license or be subject to any regulation (Zhu et al. 2017). This was also found to be common practice that the Chinese regulators allowed for certain experiments without government approval or explicitly disapproval (Greeven & Wei, 2018). Xiao Xiao also pointed at this factor “especially in relation to the Internet sector, the Chinese Authorities don’t want regulate to early and limit innovation, the want to wait and see who is the dominating player and then work directly with that player regarding coming up with regulation. This was also the case with third-party payments and Alipay”.

As early as in 2013, the People’s Bank of China explicitly expressed their support for technology companies to promote Internet Finance, this has been done to encourage the healthy development of Internet banking and financial innovations, Cf. appendix 21 for public statements from Chinese officials (McKinsey & Co., 2016). This deliberate support from the Chinese authorities is therefore perceived to have been an accelerating force behind the development of Internet finance and BigTechs role in it in China.

For instance, the regulation of third-party payment providers such as Alipay were without any Know Your Customer (KYC) requirements, reserve funds ratio requirements or transaction limits until 2015 where it was proposed by People’s Bank of China to impose such restrictions (Citi, 2016).

The days when the Chinese authorities took a black seat to facilitate disruption of the entire payment industry is however coming to an end. For instance, 1) PBoC raised payment platforms reserve funds ratio from 20% to 50% December 30 2017, 2) PBoC introduced caps on payment by QR codes pending on security measures and user credentials to in-between 500 RMD (77$) and 5000 RMD (769$) late December 2017, and 3) lastly announced their intention to regulate how payment platforms uses data collected from consumers (Forbes, 2018).

New potential regulation in China can also be impacting the preferred technology behind third-party payments, this is due to raising security concerns in relation to QR codes which recently have been exposed to fraud based on viruses and malware. Regulation in this area could have influence on the competition between NFC QR codes, hence NFC payments are regarded as more secure (Fung Global Retail & Technology Group, 2016).

Lastly, the Chinese authorities also succeeded with shielding the Chinese Internet finance industry from external competition by not providing guidance for international third-party payment license applications, Niklas Weckesser elaborated this unique market environment “The way China’s Government can structure and promote a market is very special, for instance developing own companies and solutions by
not opening up for e.g. western companies. This has been strongly contributing for these extreme “winner-takes-it-all” platforms, also in the fintech or Internet Finance space”.

Thus, the overall regulatory environment surrounding Alipay has been assessed as highly accelerating for Alipay and Internet finance in China in general.

**Strength of incumbents: Alipay**

The strength of the incumbent Chinese financial sector and the quality/reach of financial products, before the revolution of Internet finance, can best be described as inefficient, hence the existence of significant unmet financial needs from retailer customers and SME’s in China (EY & Development Bank of Singapore, 2016). This is the case in relation to financial infrastructure such as commercial bank branches and ATM’s, current retail loan penetration, SME’s access to bank-disbursed loans and diffusion of payment cards and other payment solutions (EY & Development Bank of Singapore, 2016). The bank-driven indirect financing model in China has historically been structured around large and government-related corporates related to the state owned Chinese banks (Oliver Wyman, 2017).

Especially, retail customers have been under-served by China’s under-developed consumer banking system, where the traditional banks are perceived to be offering homogeneous, uncompetitive and unimaginative financial services that are pushed out to consumers, rather than responding to existing needs, Cf. appendix 22 for reasons for using a non-bank rather than a traditional bank in China (EY & Development Bank of Singapore, 2016).

This uncompetitive context for retailer consumers, especially for the lower middleclass, was due to strict regulation and lack of professionalism in the state-owned banks, which further had experienced a strong monopolization without being subject to the market mechanisms (Xiao, 2018). This resulted in high profit margins and little innovation for most state owned financial institutions and no focus on the private sector and individuals in China (Greeven & Wei, 2018). This historical protection and strict regulation created a structural mismatch between supply and demand in the Chinese financial sector, and for many years the long tail or “grass roots” in China remained unbanked. These under-served Chinese customers have created an eager appetite for Internet finance to realize a truly inclusive financial system (McKinsey & Co., 2016).

The state owned Chinese banks also had and continue to have high overhead and personnel expenses, effectively making them focus on the segments with the highest margins, hence SME’s, micro-enterprises and the rural population were critical under-served or simply unbanked (Zhu et al. 2017).

In terms of innovation and digitalization were the commercial banks in China also late to adapt to digital banking and online/mobile payments, allowing for third-party companies to offer convenient and cost competitive products as alternatives to cumbersome and costly bank payments (Citi, 2016).
Niklas Weckesser, however hypothesized that the Chinese state controlled banks actually did not seek to engage in this competitive battle “The largest banks in China are all government owned, hence the government has also influenced their efforts towards digitalization and inclusive finance and thereby indirectly created opportunities for big techs providing financial services in China... I could imagine that the Chinese government had an incentive to promote a few big technology players in finance which they could influence and work with”. 

This market situation effectively allowed Ant Financial and Alipay to enter banking without much competition, however not to seek to disrupt traditional financial institutions, but rather aiming at serving the market segments that were underserved by large banks (Zhu et al. 2017). Thus, the strength of incumbents is assessed to be limited.

**Business model problem addressed: Alipay**

Providing third-party online/mobile payments and another financial services have been of strategic importance for the Alibaba ecosystem due to the existing under-developed consumer banking system (Citi, 2016). Thus, payments are core to their online-to-offline strategy. Alipay was initial developed to facilitate transactions in Alibaba’s ecosystem of 439 million active buyers, 8.5 million active sellers and a C2C market share of 96.5% boosting a gross merchandise volume of RMB 837 billion (USD 126 billion) (Zhu et al. 2017). The founder of Alibaba Jack Ma, expressed the importance of the development of Alipay in following way “The lack of development in Chinese e-commerce was due to one missing piece — a mechanism that could facilitate trust between people. I believe that Alipay is the mechanism that can fulfill this gap. Chinese values credibility but lack a system of trust. If Alipay wants to have value in China, it must establish a trust system” (Ma, 2016). 

The forces behind this evident business model problem were not only the lack of efficient payment infrastructure, however also weak consumer protection laws coupled with deteriorating consumer confidence in C2C and B2C. This made Alipay’s escrow services incremental for Alibaba’s development, hence the relationship between Alipay and Taobao was synergistic and mutual reinforcing (Zhu et al. 2017). One could argue that Alipay could not exist without Taobao and Taobao could not be thriving without the effective and trustworthy payment solution of Alipay. This finding was also supported by Xiao Xiao “Alipay was created at the same time of the Taobao platform, exactly to address the problem of trust through their escrow service, this also gave Alipay legitimacy to be used outside e-commerce or to be provide other financial services, because of the trust build form the start”. Besides Xiao Xiao, all interviewed industry stakeholders acknowledged this observation, Cf. appendix 24 for relevant quotes.

The above-analyzed strategic importance addressed by Alipay in Alibaba’s ecosystem was essential also a “strategic” problem for the general economy of China, hence it is argued by MIT Technology Review

59 See previous explanation of Alipay escrow service and its impact
that Alipay could ultimately have a bigger impact on the Chinese economy compared to Alibaba (MIT Technology Review, 2015).

**Main findings of the Alipay case study**

The case study, the general analysis of Ant Financial and the subsequent analysis of the focal technology of Alipay has brought forward several findings relevant for answering our defined research question in an Ant Financial perspective.

More concrete has the case study highlighted important and formative market and internal dynamics incremental for Alibaba’s and Ant Financial’s success in providing financial services and further identified some of the likely strategic consideration for Alibaba to move into financial services. The main findings under the two categories will be presented below with a short description and interpretation.

*Formative underlying dynamics:* To produce a mutual exclusive and collective exhaustive view on the identified dynamics we have divided them into internal and external factors.

*External dynamics:* Among the external dynamics formative for the rise of big tech in finance in China it was evident that 1) That the existing state-owned and controlled banks were not focusing on the low margin consumer and SME segments in the Chinese economy, hence creating a significant segment of under-served and unbanked individuals and SME’s. This was hypothesized to be deliberate choice by the Chinese regulators, 2) it was shown that Alibaba and Ant Financial had experienced a highly accommodating regulatory environment, hence they were not subject to any regulation in the beginning due to the “wait-and-see” approach from the Chinese authorities. Furthermore, did the Chinese authorities in general support the creation of Internet finance as a sector with a few dominating players. Lastly, the authorities effectively shielded the market from outside competition by not issuing any international guidance for applying for licenses to operate third-party financial services. One can argue that the development of Internet finance in China and BigTech’s dominance have been controlled by the Chinese government through their regulation and indirectly through their control of the incumbent Chinese banks. 3) That the Chinese consumers leapfrogged directly from cash to mobile payments due to the inadequate existing financial infrastructure, the rapid diffusion of smartphones and the well-developed Internet connectivity both identified as essential component technologies for Alipay.

*Internal dynamics:* In terms of internal factors it was highlighted how Alibaba’s and Ant Financials focus on developing component technologies such as modular cloud computing, AI and big data capabilities were absolutely incremental in the development of Ant Financial. Second, it was shown how Alibaba and Ant Financial had been successful in developing internal (e.g. Yu’e bao & MYbank) and external (location based services) business infrastructure around Alipay and thereby creating an embedded delivery platform or ecosystem of financial inclusion with strong network effects to the Alibaba platforms.
**Strategic considerations:** The case study analysis and the findings discovered through our framework also provided indication on the strategic consideration for Alibaba’s to move into finance. It was discovered that the development of Alipay has been highly incremental for the success of Alibaba’s platforms, hence its description as the missing piece in Chinese e-commerce. This strategic importance and synergistic relationship to the Alibaba ecosystem was also highlighted in other Ant Financial products and in internal developed business infrastructure integrated in Alipay. It can be argued that Alibaba was not particular interested in providing financial services, however extremely focused on being customer centric by providing necessary solutions for all participants in their e-commerce ecosystem, hence both consumers and SME’s. Our interviewed management consultant also supported this finding “The Alibaba’s of the worlds did not intend to build ecosystems or provide financial services from the start, however they focused on solving customer needs and how they could improve customer experiences, this led them to build ecosystems”. In general did all interviewed industry stakeholders argue this, Cf. appendix 24 for relevant quotes.