Master Thesis

An analysis on fintech apps for payments

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Abstract

The aim of this study consists of two main objectives: First, to investigate the penetration and preferences of fintech solutions from the payments sector within the studied population, as well as the elaboration of a forecast for the upcoming years. Second, to examine the main elements that influence the intention of young customers when deciding to adopt fintech-based payment solutions. Existing research has tested several factors from which the variables of trust, transaction efficiency and ease of use are included on this paper. Additionally, the value-added proposition from this study is represented by the incorporation of sustainability-related purposes into this analysis with the intention of reflecting the increasing presence of efforts to integrate this component within the financial industry in recent years. A research model is proposed and tested by including elements based on the Technology Adoption Model (TAM). By exploring the results of primary data through a survey with 463 responses from university students and examining secondary sources of information, the findings of this study demonstrate that all four tested variables have a positive impact on the intention of using fintech-based payment solutions. Sustainability-related purposes do not play a major role in the decision of using these apps, however, even with a minimal influence, the effect on intention is positive and statistically significant. The findings of this study pose important implications for stakeholders within the fintech spectrum whose purposes are related to increasing the intention of young consumers towards using these products and to provide enough evidence of the importance of designing incentives that fuel sustainability stewardship within the financial sector.

Keywords: Fintech-based payment solutions, young consumers, TAM, trust, transaction efficiency, ease of use, sustainability-related purposes.

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List of Abbreviations

APM	Alternative Payment Method
BACS	Banker's Automated Clearing Services
BIC	Bank Identifier Code
Bn	Billion
B2B	Business-to-business
B2C	Business-to-consumer
CHIPS	Clearing House Interbank Payments System
EPC	European Payments Council
EU	European Union
EUR	Euro
Fintech	Financial Technology
IBAN	International Bank Account Numbers
IMS	Innovation Market Solutions
NFC	Near-Field-Communication
OS	Operating System
P2P	Peer-to-peer
POS	Point-of-sale
PSD	Payment Services Directive
PSP	Payment service provider
SEPA	Single Euro Payments Area
SME	Small and Medium Enterprises
SWIFT	Society for Worldwide Interbank Financial Telecommunication
TAM	Technology Acceptance Model
TAN	Transaction number
TRA	Theory of Reasoned Action
USD	United States Dollar

1. Introduction

1.1 Topic and Importance

Technological advancements have directly impacted the way in which financial services are delivered creating unprecedented and innovative changes. The dynamic between the disruptive combination of “Finance” and “Technology” elements is also known as Fintech. The use of technology within finance is far from being a new acquisition, however the explosion of new technologies in the last ten years are not only transforming markets but also society. Additionally, the fintech industry is diverse and it is characterized by the variety in the size of its incumbents. Tech-specialized start-ups are focusing in simplifying financial experiences and large institutions like banks are keeping up by incorporating innovative technologies into their financial-based core business. The exchange of fintech services creates completely new connections (Gomber et al. 2018) that can now take place at the business-to-business (B2B), business-to-consumer (B2C) or peer-to-peer (P2P) level (Gibraltar International 2017).

The worldwide impact generated by Fintech can be measured by numerous perspectives. From a penetration perspective, the number of active Fintech users has drastically increased since 2015 (Ernst & Young 2017). According to the 2017 EY Fintech Adoption Index, in two years, the ratio of digital active consumers using Fintech has augmented from one out of seven to one out of three. In other words, 33% of digitally active consumers around the world are customers of Fintech propositions (Ernst & Young 2017). The top five countries with the highest Fintech

adoption rates are China with 69%, India with 52%, the UK with 42% followed by Brazil with 40% and Australia with 37%. Germany is ranked at the eighth place with a 35% rate in overall fintech adoption (Ernst & Young 2017).

In terms of investment, the 2016 Accenture report on Fintech describes how global fintech financing activity increased from around two billion US Dollars in 2010 to 22 billion US Dollars in 2015 (Skan et al. 2016), as illustrated in Figure 1. During this period, North America took the first place in number of deals and total investment, followed in second place by the Asia-Pacific region, which saw fintech investments more than quadrupled in 2015. The European region observed a significant increase on fintech investments during 2015 and quickly caught up with third place globally. (Skan et al. 2016). Results from the Accenture report were based on data from CB Insights. In 2016, funding activity for fintech increased especially in the APAC region, specifically in India, as a result of a demonetization activity from the Central Bank which consisted on a strategy against corruption by taking bank-notes of high-value out of the market. This created a more than fivefold increase in venture capital for Paytm, a fintech company that provided millions of Indians with an alternative to make their payment transactions through mobile payments and other providers of cashless service (Barreto 2018).

Additional information from the latest CB Insights report on Global Fintech deals and funding shows that results obtained in the first quarter of 2018 hit a new quarterly record as USD 5.4 bn were raised around the world through 323 deals (CB Insights 2018). The report also explains that in terms of growth in funding, Asia and South

America have taken the top spots, with an increase in investments of 188% and 164% respectively.

Figure 1. Global Fintech Financing Activity by Region in USD (Millions) (Barreto 2018)

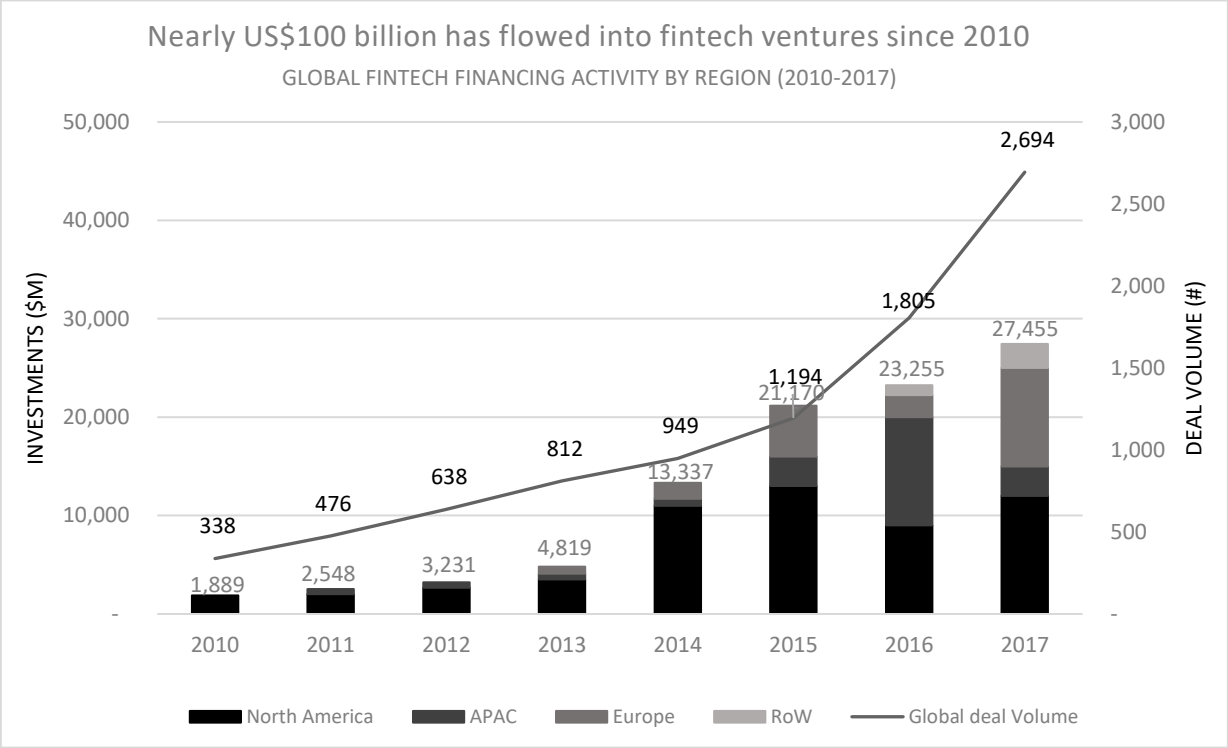

Figure 1. Global Fintech Financing Activity by Region (2010-2017). Adapted from "Global Venture Capital Investment in Fintech Industry Set Record in 2017, Driven by Surge In India, US and UK, Accenture Analysis Finds," by E. Barreto, 2018, *Business Wire*. 2018 by "Business Wire".

1.2 Research Objectives and Approach

This study aims to obtain general information about the current knowledge of digital payment technologies within the examined population. Additionally, the purpose of

this paper is to investigate about the possibility of harnessing the potential of fintech-related payment solutions for contributing towards sustainability-related purposes. Through the findings in the literature review, the researcher argues that if one of the main reasons of customer usage of digital payment solutions is related to minimizing the customer's personal incurred costs per transaction, then, customers would be willing to redirect a minimal portion of their savings towards sustainability-related purposes.

Quantitative and qualitative information are assessed to approach the objectives of the research. Primary and secondary sources are included into the analysis. A survey is the main foundation for the analysis. Also, a research model is presented to test the factors that influence the intention of users for using fintech-powered payment solutions.

The research questions of this study are:

- RQ1: What is the penetration that fintech-based payment solutions have within the population?
- RQ2: Which fintech-based payment solutions are the most popular?
- RQ3: What is the forecast on fintech-based payment solutions?
- RQ4: What are the factors associated with positive user acceptance of these payment solutions powered by fintech?
- RQ5: Are sustainability-related purposes linked to the intention to use them?

2. The Fintech Industry

2.1 Origins of the Relationship between Finance and Technology

Innovation attempts to interweave technological threads to financial transactions have continuously taken place in history. Some of the first written evidence of finance as an administrative system for recording operations can be traced back to Mesopotamian times, in where hunter-gatherer groups transitioned organizationally into settled agricultural states (Rowlinson 2010)(Arner et al. 2016). In a similar context, the creation of technologies for calculation, like the abacus, represent a comparable attempt to describe developments combining financial and technological tools (Arner et al. 2016). At the end of the Medieval Age and beginning of the Renaissance, Double Entry Accounting was introduced to the world and still constitutes one of the pillars to modern economy (Littleton 2002). In trade, currencies where originally backed by the value of a commodity like silver or gold until this value was decoupled through the introduction of Fiat currencies (Arner et al. 2016).

To understand the evolution of Fintech, Arner et Al. grouped important historic events into three principal eras: Fintech 1.0 which encompasses developments within the period from 1866 to 1967, Fintech 2.0 from 1967-2008 and finally Fintech 3.0 starting from 2008 and onwards (Arner et al. 2016).

Even though technology was present in the financial industry during the Fintech 1.0 period, financial solutions functionated mainly in an analogue way. In this era, the first period of financial globalization took place at the end of the nineteenth century and lasted until World War I with technological developments (canals, railroads,

telegraph, etc.) paving the path towards speedier transmission of transactions and financial information (Arner et al. 2016). There was a period of stagnation for the financial industry when the war was over, but the technological discoveries that resulted from the conflict continued to develop, especially for the communications and information technology sectors. For instance, as early as in 1918, the Fedwire Funds Service was created and implemented by the Reserve Banks in the United States and connected the Treasury Department, the Board and twelve Reserve Banks through a Morse code system that allowed the transferring of funds between them (Gilbert 1997). Also, this period saw the development of code-breaking tools into the first computers by the company IBM (Arner et al. 2016) and the introduction to Credit Cards by Diner's Club, Bank of America and American Express in the 1950's (Markham 2002) which created a transformational phenomenon for the experience of consumers and led to the foundation of Mastercard - a leading multinational financial franchise- in 1966 (previously known as the Interbank Card Association)(Mandell 1990). By this time, the Telex network was already converting messages into signals and transmitting them by electricity or radio waves for the message to be printed out at a location different than the original (Coopersmith 2015) (Arner et al. 2017) and along came the first commercial version, the fax machine (Coopersmith 2015). In 1967, two events marked the beginning of the Fintech 2.0 era, regarding Arner's classification: the first ATM was placed in the United Kingdom by Barclay's and the first hand-held financial calculator was produced and distributed by the company Texas Instruments (Arner et al. 2016).

The Fintech 2.0 period was defined by the transformation of the provision of financial services from an analog to a digital industry through key developments that represented the pillars for the second period of financial globalization. Within this timeframe and within developed countries, the industry of finance had already reached a high level of globalization and digitalization. The traditional and regulated financial industry had a dominant position in providing products and services to customers through financial technology (fintech) (Arner et al. 2016).

Several developments that took place during the late sixties and the beginning of the seventies were of massive importance to the Payments sector. In 1968, the grounds for the current Banker's Automated Clearing Services (BACS) were grounded by the establishment of the Inter-Computer Bureau (Welch 1999) in the United Kingdom. Later on, in 1970, the Clearing House Interbank Payments System (CHIPS) was founded in the United States (Payment Systems: Central Bank Roles Vary, but Goals Are the Same: GAO-02-303) and on that same year, the previously mentioned Fedwire System migrated completely from a telegraphic to an electronic system (Gilbert 1997). In the mid-1970's, a global telecom network was put into march with the purpose of making the process of money transfers more efficient and secure (Gomber et al. 2018). This important development for international banking communication was established by the Society for Worldwide Interbank Financial Telecommunication (SWIFT) and has allowed financial institutions ever since to exchange details about financial transactions in a secure environment.

An event in the year 1974 acted as the trigger for emphasizing the risks that arise from international financial networks, especially through the newly developed

payments system. As a result of the bankruptcy of the Herstatt Bank in Cologne (Francioni et al.) and the increasing use of new technologies and practices in the financial area, the focus was placed on the need to regulate this sector through international soft law agreements for robust payment systems. This incident led to the creation of the Basel Committee on Banking Supervision (Francioni et al.). Currently, the global foreign exchange market – which functions as a combination of finance, technology and regulation- constitutes the most globalized and digitalized element of the economy with US$ 5 trillion a day in transactions (Arner et al. 2017).

The NASDAQ stock exchange was established in 1971. And, with the development of the National Market System in the United States, this timeframe marked the transition from physical to electronic trading of securities (National Association of Securities Dealers 1987). In the early 1980's, online banking was originally introduced to the consumer sector in both the United States and United Kingdom (Arner et al. 2016; Watson 2018). Another very early example of Fintech innovation is the creation of Innovation Market Solutions (IMS) by Michael Bloomberg in 1981 (renamed Bloomberg L.P in 1986) which provides market data and other financial analytics in real-time. After only three years later, the financial industry was adopting Bloomberg terminals at an increasingly fast-pace. This period saw the steady replacement of paper-based mechanisms by the implementation of numerous IT developments for back-office and external operations (Arner et al. 2016).

In 1987, incumbents became increasingly aware of the importance of regulation within interconnected world markets as an effect of the worldwide stock market crash also known as "Black Monday", which is still recognized as the largest one-day

percentage decline in the Dow Jones Index (Nicoletti). This occurrence encouraged the implementation of several control mechanisms in relation to the speed of price changes (e.g. circuit breakers) and mechanisms that encouraged an increased amount of cooperation between bank regulators regarding cross-border issue (Nicoletti). Moreover, numerous financial Regulations and Directives that surged during the late 1980's to the beginning of the 1990's (e.g. the Single European Act - 1986, Big Bang Process -1986, Maastricht Treaty -1992) constituted the pillars for the complete interconnection of EU markets by the early 21st century (Arner et al. 2016). Moving on to a decade later, financial services were already part of a digital industry by large in 1998. In this year, the limits and risks of computerized risk management systems were tested during the Asian and Russian financial crises, with the collapse of numerous Long-Term Capital Management systems (Arner et al. 2016; Nicoletti).

Nevertheless, the turning point for the marriage between financial and technological solutions was around this time. Wells Fargo was the pioneer in offering online account checking in the mid-nineties using the World Wide Web (Arner et al. 2016; Nicoletti). This innovation opened the door to a whole new era of financial products and services not only to US-based banks, but banks all over the world. By the beginning of the new millennium, major global players were already offering similar systems and the customer database for eight major banks in the United Stated was over one million users per bank (Arner et al. 2016). In the United Kingdom, the first banks without physical branches appeared in 2005 (e.g. ING Direct, etc.). Banks internal processes became fully digitalized during the early-2000's and emphasis

was placed on the amount of IT expenditure by the financial industry (Arner et al. 2016; Nicoletti).

A shift regarding the ruling actors has taken place since 2008, marking the beginning of the Fintech 3.0 era as per Arner et Al.'s classification. The main characteristic of this timeframe is that the offer of financial products and services through technology to companies and the public in general is no longer restricted to traditional financial providers or in other words, banks. Instead, new established technology firms and start-ups are positioning themselves as top financial services providers in the industry. (Arner et al. 2016). For example, in 2009 the first version of the Bitcoin cryptocurrency was released and in 2013, the Google Wallet was launched allowing users to purchase through their mobile phones using Near-Field-Communication (NFC) technology (Arner et al. 2017; Watson 2018).

Whereas determining the origins of this trend is not an easy task, research shows that it might be possible to show that the Global Financial Crisis from 2008 and the alignment of market conditions that resulted from it, characterized a turning point for the expansion of this era (Arner et al. 2016; Nicoletti). Some of the factors that possibly acted as triggers for the Fintech 3.0 era were: the public's perception, economic determinants and increased supervision by regulators. In terms of human capital, approximately 8.7 million workers lost their jobs in the United States (Arner et al. 2016) and in the public's eye, the reputation of banks deteriorated after the obligations towards protecting consumers were found to have several breaches. This led to two outcomes: increased distrust in the traditional banking system and increased unemployment of professionals from the financial area (Arner et al. 2016;

Nicoletti; Watson 2018). These occurrences built the foundations for a new industry denominated “Fintech 3.0” by Arner et al. or also known as “The Fintech Revolution” nowadays. The experienced financial professionals that led the steps towards this phenomenon were also joined by new graduates facing a tough job market, but with the skills and abilities to understand the newly formed industry.

Another post-2008 factor that triggered the Fintech phenomenon from recent years was the reshaping of business models and banking structures caused by increased regulatory capital and obligations (e.g. Basel III, etc.) (Arner et al. 2016; Francioni et al.). These reforms echoed a call for new players into the field unintentionally. On one hand, banks identified the rise of new players, on the other hand, banks own ability to compete was reduced as a result of the established regulations. For instance, the main objective of one of the main global regulations (Basel III) aimed to ensure risk-absorbing capacity and market-stability, leading to increased capital requirements. This also meant that capital was not focused on SMEs and individuals who then had to look for alternative solutions to fulfill their need for credit (Konovalova and Trubnikova).

In this section the reader analyzed how developments in technology throughout the years represent a synonym to innovation and modernization attempts. Since the financial industry has been largely characterized by numerous of these attempts through history, the reader should infer that the use of technology as a way of enhancing financial services does not represent a novelty (Arner et al. 2017; Nicoletti) in the financial services industry.

Additionally, one of the principal industries in acquiring information technology (IT) at a global scale has been the financial services industry. This tendency originated in the mid-1990's, when the financial industry reached the position of "single largest purchaser of IT" (Arner et al. 2016; Nicoletti). In 2014, total global expenditure in IT purchases was estimated in over US$197 billion. (Arner et al. 2016)

2.2 Fintech: A definition for this study

Several definitions of Fintech have been adopted and published in academic literature however, there is currently no general and common definition for the term. According to Schueffel, one of the first traceable references to the term by scholars dates back to 1972 in which the term was defined as follows: "Fintech is an acronym which stands for financial technology, combining bank expertise with modern management science techniques and the computer." (Bettinger 1972) (Schueffel 2016). However, different perspectives have been included in the definitions found in scholarly literature. Some meanings originate from a product perspective, others are based on the channels through which Fintech can be reached, and others for instance, describe Fintech from the point of view of possible collaborators or potential competitors. All accounts that have described attributes, involvement and objectives regarding Fintech represent an attempt to provide a general definition (Schueffel 2016).

An analysis on all scholar definitions was carried out by Schueffel in 2016 and using the most common elements found in literature, the following was proposed as a potential universal definition: "Fintech is a new financial industry that applies

technology to improve financial activities" (Schueffel 2016). Later on, the transformation of business models as a result of the use of technology in the finance sector made reference to Fintech as a "technologically enabled financial innovation that is giving rise to new business models, applications, processes and products" (Kawai 2016) and in 2017, Gomber defined Fintech as "a neologism which originates from the words financial and technology and describes in general the connection of modern, and mainly Internet-related technologies with established business activities of the financial services industry" (Gomber et al. 2017).

More recently, academic and professional papers include institutional distinction between traditional financial firms and newly formed companies (van Loo 2018), with the purpose of highlighting startups that provide financial services and refer to the latter as "Fintechs". The potential rivalry between already established companies and newcomers has also been included into some scholarly definitions. In theory, fintech startups embody a potential threat to banks (van Loo 2018) because they propose alternative ways of delivering financial services. Some authors propose that in the last years, the trend in the relationship between fintech startups and traditional financial firms appear to have shifted and, it is opening the way to collaboration or acquisition of small firms by large ones (van Loo 2018). While there is a perception that technological developments carried out by banks cannot be classified as Fintech, in this paper traditional financial service firms represent a central element to Fintech activities because of the reasons stated in the previous section. Additionally, the reader should count the following fact as evidence: "one third of

Goldman Sachs 33,000 staff are comprised by engineers -a bigger number than those in LinkedIn, Twitter or Facebook" (Arner et al. 2016).

In terms of defining Fintech, this paper will not make a distinction at the institutional level, instead, Fintech will be understood as *the combination of financial services with technology to deliver customer-centric solutions*, therefore, incumbents of any size (e.g. a large bank, a newborn start-up, a financial SME, etc.) can implement or carry out Fintech activities to provide innovative experiences to customers.

2.3 The Fintech Ecosystem

Financial services provided through Fintech cover the full scope of traditional financial offerings by the financial services industry. Fintech solutions can be classified according to the nature of the product that they offer. Classifications have been carried out both in business reports and scholarly articles.

In the 2015 report "The Future of Financial Services" by the World Economic Forum, the first consolidated taxonomy for disruptive innovation in financial services was published. The outcome was a result of fifteen months of research by interviewing and organizing workshops with industry leaders (from traditional and global financial institutions) and innovators (start-ups, subject matter experts and innovative new entrants). Financial services were classified into six categories meanwhile eleven clusters of innovation where identified as exerting pressure on traditional business models (Mc Waters, R.J., Bruno G., Lee, A., Blake, M. 2015). According to the report the main elements of disruption (innovation clusters) are:

- Insurance: Insurance Disaggregation (sharing economy, autonomous vehicles, digital distribution, securitization and hedge funds) and Connected Insurance (internet of things, advanced sensors, wearable computers).
- Deposits & Lending: Shifting customer preferences (virtual technologies, mobile 3.0, third-party API) and alternative lending (P2P lending, alternative adjudication).
- Capital Raising: Crowdfunding (Virtual Exchanges and Smart Contracts, Alternative Due Diligence).
- Investment Management: Process Externalization (Advanced algorithms, cloud computing, capability sharing, open source IT) and Empowered Investors (Automated advice and management, social trading and retail algorithmic trading).
- Market Provisioning: Smarter, Faster Machines (artificial intelligence/machine learning, machine readable news, social sentiment, big data) and New Market Platforms (market information platforms, automated data collection and analysis)
- Payments: Cashless World (Integrated billing, mobile payments, streamlined payments) and Emerging Payment Rails (crypto currencies, P2P FX, mobile money)

Regarding scholarly articles, in this study, the taxonomy prepared by Dorftleiner, Hornuf et al. is used as reference. All segments described in the organization by Dorftleiner, Hornuf et al. are included within the analysis of the World Economic Forum. The authors organized fintech products into four main segments: financing,

asset management, payments and other fintechs (Dorfleitner et al. 2017). The financing segment includes crowdfunding, in all its variants (e.g. donation-based crowdfunding, crowd investing, etc.) as well as credit and factoring. In the part of asset management, one can identify rising solutions like social trading, robo-advice, personal financial management and investment and banking.

As for payment-related products, a separation exists between alternative payment methods, blockchain and cryptocurrencies and other fintech. Lastly, the other fintech category includes insurance, search engines and comparison sites, technology, IT and infrastructure and other fintechs, as well (Dorfleitner et al. 2017). This segmentation is illustrated in Figure 2.

Figure 2. Segmentation of the Fintech Industry (Dorfleitner et al. 2017)

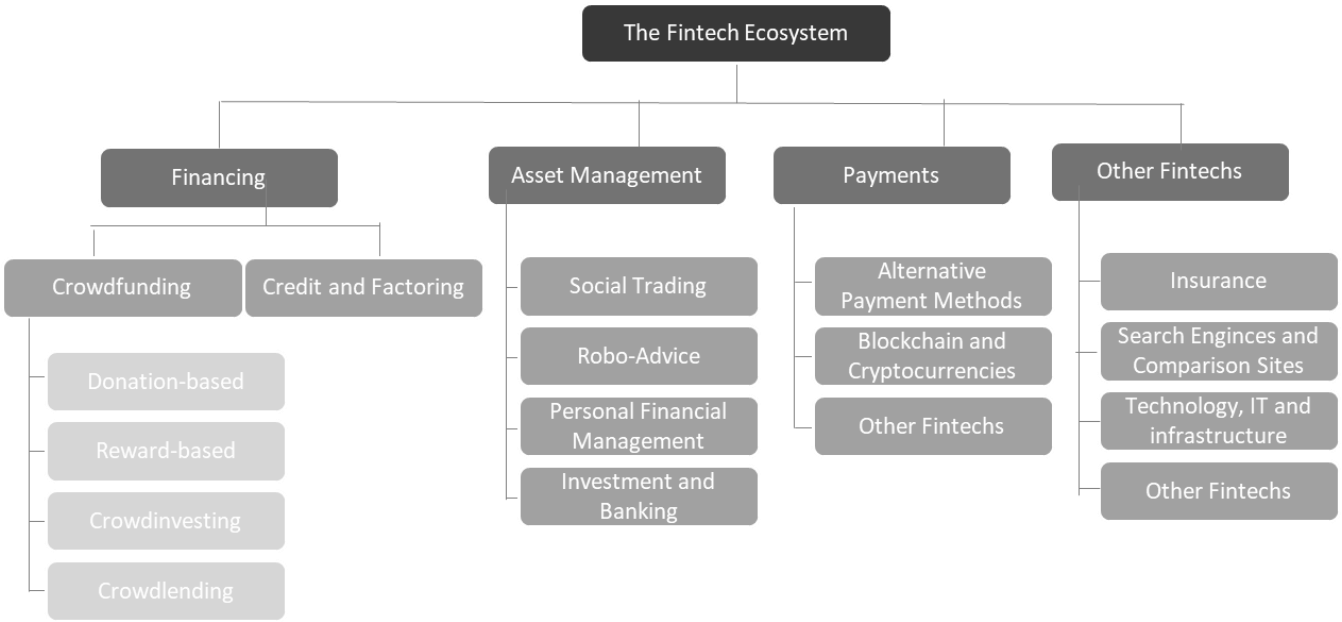

Figure 2. Segmentation of the Fintech Industry. Adapted from *Fintech in Germany* (p. 7), by G. Dorfleitner, L. Hornuf, M. Schmitt, M. Weber, 2017, Switzerland: Springer International Publishing AG. 2017 by "Springer International Publishing AG".

2.4 Scope of Thesis

This thesis paper will focus exclusively on digital payment solutions that provide alternative methods for online payments at the B2C level.

3. Theoretical Background: Fintech for Payment Services

Payments have always faced changes through technological disruptions (Gomber et al. 2018). Since the 1970s, the payments sector has experimented great development in systems for electronic payments, at the domestic and cross-border level. Nowadays, more than US$ 5.4 trillion are exchanged in global markets on a daily basis (Gomber et al. 2018).

In the recent years, monetary transactions have experienced at both the operational (process disruption) and commercial (service transformation) levels. The entry of new and unexpected market players into the payments industry is attributed to an alignment of conditions that took place after the 2008 Financial Crisis. (Arner et al. 2016). Nowadays, payment providers take the form of banks, newly established technology firms or start-ups (Arner et al. 2016). Additionally, as a result of the abundance of data, improved data infrastructures, system integration, machine learning and other tools; innovative payment services are being offered to customers through the communication provided by the Internet and mobile gadgets (Kashyap et al. 2017).

The payments sector takes the lead within the fintech ecosystem among several indicators. By breaking down the graphic shown on Figure 1 and classifying it into fintech sectors, one can corroborate that most fintech investments during the last

decade have been oriented towards payment solutions as shown in Figure 3. Moreover, research shows that there is a growing concern in traditional financial organizations about losing revenue to more innovative firms because of simplified payment offerings. In terms of global statistics, this concern grew from 83% in 2016 to 88% in 2017, as per the key findings of the PwC Global Fintech Report 2017 (Kashyap et al. 2017).

Evidence shows that large corporate organizations are usually slow at integrating new technologies, but with the disruptive nature of Fintech on the rise, 77% of banks are looking to increase internal efforts towards innovation and 82% expect to increase collaborative practices or partnerships within the next three to five years (Kashyap et al. 2017). These efforts include investment in artificial intelligence, increased resource allocation for Fintech related projects and acquiring or partnering-up with Fintech startups, all aimed towards the objective of sharpening operational efficiency in order to meet customer demands (Kashyap et al. 2017).

On the same line, incumbents around the world perceived that their customers were already using products from Fintech startups to fulfill their needs, specifically in activities related to payments and fund transfers (Kashyap et al. 2017). In relation to payments, there is a tendency within traditional financial institutions to learn how to integrate and engage in partnerships or collaboration with emerging startups (Kashyap et al. 2017). Partnerships between banks and fintech startups have an immense potential for increasing revenue in both sides and for providing numerous payment opportunities to customers through several channels (Watson 2018).

Figure 3. Global Fintech Financing Activity by Sector in USD (Millions) (Barreto 2018)

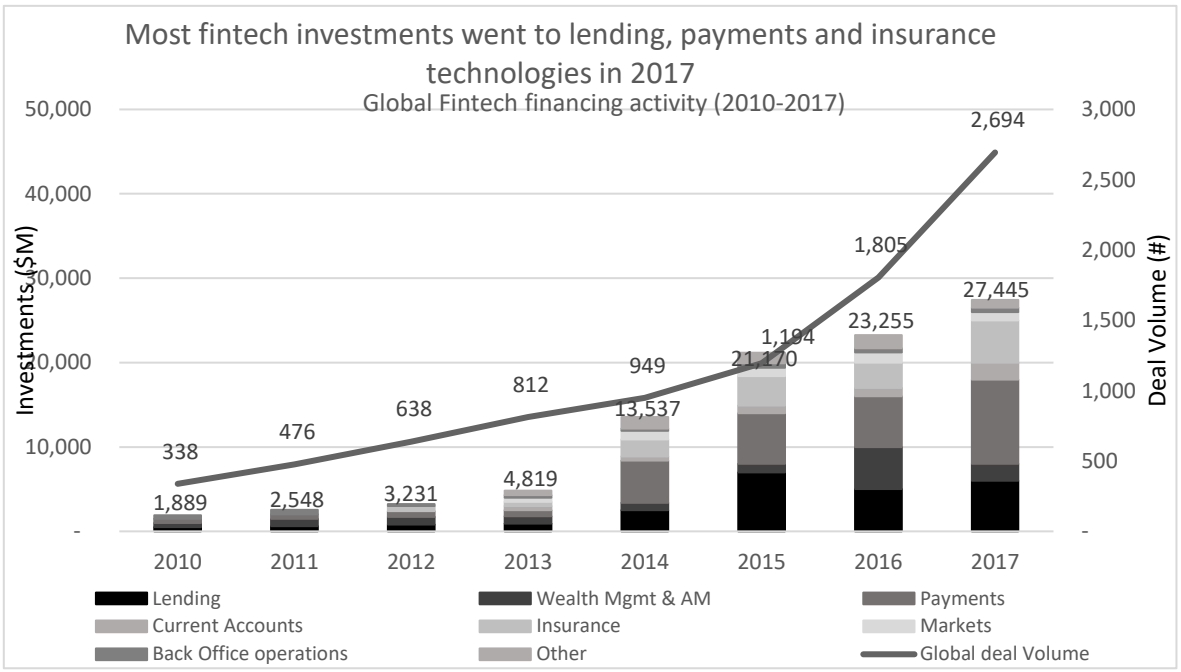

Figure 3. Global Fintech Financing Activity by Sector (2010-2017). Adapted from "Global Venture Capital Investment in Fintech Industry Set Record in 2017, Driven by Surge In India, US and UK, Accenture Analysis Finds," by E. Barreto, 2018, *Business Wire*. 2018 by "Business Wire".

Fintech services for payments can be offered from a business to another for the enhancement of operations (B2B) or they can refer to offerings addressed to consumers (B2C). The transition to a cashless society is far from being a new occurrence and currently undergoes digital disruptions at both the B2B and B2C level (Gomber et al. 2018). In the words of a Forbes Analyst, fintech for payments means "making it easier to pay and to be paid" (McGrath 2018). The undergoing worldwide development on digital payments is moving at an accelerated pace, even though cash has not yet ceased to exist (McGrath 2018).

At the B2C level, mobile fintech payment services also categorized as “Alternative Payment Methods” (APMs) allow customers to pay for their goods or services with methods other than the mainstream credit card schemes. Examples of these methods are digital apps and e-wallets, bank transfers, payment through smartphones, etc. (Dragt 2018). Credit cards still represent the largest share of global online-shopping transactions, however, it is expected that by 2021 more than half of all online transactions will be carried out through APMs, according to the 2017 WorldPay Global Payment Report, (Dragt 2018).

Hundreds of new APMs are surging in global markets and some of the most popular around the western world are: Apple Pay, Google Pay and PayPal (Dragt 2018). Nonetheless, APM preference varies from culture to culture. Particularly, new creative initiatives in developing regions (e.g. Asia, Africa, Latin America) have demonstrated immense potential and represent attractive alternatives to the population because of several factors like fast-growing and tech-savvy middle class with increased access to smartphones, lack of physical banking infrastructure, favoring convenience over trust as a behavioral pre-disposition, no access to bank accounts (untapped niches), less strict protection of data, etc. (Arner et al. 2016). For instance, PayPal is far from being the most popular APM in China in comparison with the dominance of Alipay and WeChat Pay (Dragt 2018) and even though customers feel comfortable using e-wallets in the United States, European customers prefer the security of bank-transfers through alternatives like paydirekt, giropay, etc. (Dragt 2018).

Some examples and descriptions of fintech payment services are presented below:

- Apple Pay: The fintech-backed payment solution by Apple which relies on the company as both hardware maker and operation system provider. Apple Pay can be used across several stores with contactless POS systems or for in-app purchases in iOS as well (Kang 2018). The Apple Pay account is loaded from the user's credit or debit cards. It provides service exclusively on Apple devices. Security and privacy protection are guaranteed to customers by using encrypted one-time token information for making online payments and offering a Secure Element which archives sensitive data in an independent way. Users can also enable the option of using biometric protection and recognition (Touch ID) for accessing payment screens. The Apple Pay app does not save details regarding payments or transactions on the device. Additionally, it protects merchants by not providing their location information and other details (Kang 2018).

- Google Wallet: With only an email or a phone number, customers can send money in a fast and easy manner. To sign up for Google's Wallet, users only need their debit card and a Google account. Only senders need to have the app installed to carry out transactions, meanwhile receivers of the payment do not need the app to get money. Additionally, there are no charges for transferring the money to the user's bank account, if preferred. In recent years, customers have the possibility of sending money by only attaching a photo with an email within the Gmail app. (Kang 2018)

- Alipay: Developed and offered by China's e-commerce giant Alibaba, this B2C platform can be used without hardware maker or operation system maker distinction. Users need to open an account which is linked to a regular bank account to recharge cash. Payments through Ali Pay can be conducted at the contactless POS terminal or at online terminals, as well. Ali Pay provides an integrated service, at the press of a finger, by allowing users to add money to their phone account, pay bills, transfer money and check their balance. All of these functionalities allow users to shop online and pay for their products through the app. (Kang 2018)

- PayPal: The pioneer alternative to banking payment systems (Osman 2015). Characterized by the easiness of use it provides to customers, PayPal is compatible with all credit and debit cards issued by major banks. Users link these cards to their PayPal account, set up an ID and start carrying out payment transactions. This mobile fintech payment service has simplified the process of linking one of the user's cards to the platform by only having to take a picture of the card. Within the platform, customers can also transfer cash from their bank account to their PayPal account for free and thus, start using the service to pay for e-commerce-based transactions. Moreover, if the customer also uses Slack, both accounts can be linked to send and receive payments through the PayPal bot. Customers must only type "PayPal" to start the bot followed by a simple text command like "Send $20 to @John". (Osman 2015)

- Klarna: Klarna provides and easy check-out experience for customers by allowing them to receive the goods and a Klarna invoice with a fourteen-day payment term, via credit card, bank transfers or other methods. The customer pays Klarna, since Klarna has already dealt with the merchant. Additionally, it provides customers with installment payment options and extended security as it does not provide merchants the payment information from customers (Kang 2018).

- Paydirekt: the fintech-based payment solution alternative from the German financial sector (Osman 2015). Customers can create a paydirekt account using their own online banking account. Several banks within Germany are connected to paydirekt and allowing it to function as a direct payment method within several merchants. The payment is corroborated using a TAN (transaction number) method and sent to the account of the merchant directly form the account of the customer. One of the main features of paydirekt is the increase security that it provides since the data from the customer's account is not shared with the merchant or any other third party; acting as a central payment processing service. (Osman 2015)

- SEPA payments: Credit transfer and direct debit schemes that facilitate e-commerce transactions between customers and merchants (more on this topic on section 3.1.1). Customers are just required to select the SEPA payment method at the merchant's checkout website and then to fill out an online form providing their IBAN (International Bank Account Numbers) and

when needed, their BIC (Bank Identifier Code). Once this is done, the customer has authorized the merchant to contact the customer's bank for receiving the payment for the acquired goods. This digital payment solution is available in all the EU area. (Silva et al. 2016; European Payments Council 2019)

- Sofort-Überweisung: Based on the bank transfer principle, this online payment solution allows customers to have a simpler experience when paying since they are only required to check the amount of the payment when using this method. Customers only need to log-in with their online banking details and through a secure payment form, allow Sofort to take funds from their bank account and to carry out the payment. Transactions are confirmed by the customer through the use of PIN codes or card readers. Finally, the customer receives confirmation for the order and transfer directly from the online merchant. According to the firm, they comply with all security requirements as of banks. (Mollie 2019a)

- Giropay: Using real-time bank transfers, Giropay allows customers to select their bank from a list of financial institutions when paying online. Afterwards, the customer is required to log into their online banking system. Users are only required to verify the payment information which has already been prefilled with their information. After this step has been completed, the customer makes the payment authorization and a confirmation is sent. (Mollie 2019b)

- Venmo: this digital payment solution provides the fund transfer service to other friends and establishments via mobile phone app. However, it is not available within the global market since the sender and receiver have to be located in the United States. However, Venmo is included into the analysis because of its innovative social component that allows users to interact within each other and to share transaction details which can be managed through three different feeds: the public, the friends and the private feed. The company claims to provide security to their customers using the same security principles as banks. (Kang 2018)

Furthermore, by analyzing the current range of mobile fintech payment services, Kang classified them into Hardware (HW) Makers, Operating System (OS) Makers, Payment Platform Providers and Financial Institutions (Kang 2018).

Mobile Fintech Payment Services provided by HW makers function only through devices from the HW makers (e.g. Apple Pay, Samsung Pay). These solutions store sensitive financial information from users within the mobile devices and protect it through secure methods developed by the HW maker. They enable payments through a link between financial institution systems and software systems – which can be the HW maker's own Operating System or Apps-. HW makers-based solutions provide enhancements in security by providing the possibility of incorporating biometric authentication tools (e.g. fingerprint recognition, etc.) (Kang 2018).

Solutions based on OS makers run exclusively on devices in which the OS from the corresponding OS makers has been installed (e.g. Android, iOS). These payment services are interconnected with systems from traditional financial institutions and use mobile apps to carry out the payment. The sensitive financial information from users is protected through software-based trust zones and they can also be linked to hardware to provide biometrical protection (Kang 2018).

Payment Platform Providers (e.g. PayPal, Alipay) do not develop their own hardware or operating systems for mobiles, but instead develop payment platforms that are compatible with the wide range of existing options of mobiles available regardless of brand. It benefits customers as they can shop through the platform using any device that is compatible. When these providers link their services to financial institutions, they need to comply with the security requirements indicated by the institution (Kang 2018).

Payment services that rely on Financial Institutions are provided by the institutions itself using IT Technology or by merging with other service providers (e.g. American Express Checkout, Master Pass by Mastercard, bank transfers). Services can only be provided if they meet the requirements of the maker of the operational system. Furthermore, in this spectrum, payments are carried out through the accounts of the corresponding institution (Kang 2018).

3.1 Alternative Payment Methods in Europe and Germany

3.1.1 Regulatory Framework

In 2002, physical euro banknotes and coins were introduced in the European Union as a way of harmonizing payments within the continent and with the objective of creating a single European market. The efficiency that the unified currency posed needed to be reflected into the world of electronic transactions as well. Consequently, the Single Euro Payments Area (SEPA) surged as an EU integration initiative carried out specifically by the European Commission, the European Parliament, the EU Council and the European Central Bank. SEPA was created with the aim of enhancing electronic euro payments. (European Payments Council 2019)

Various institutions from the banking industry formed the European Payments Council (EPC) with the objective of developing electronic means of payments that contributed to the administration of the SEPA Payment Scheme thus, harmonizing electronic payments within the continental area. Currently the EPC counts with 75 Payment Service Providers (PSP) as members in charge of facilitating more than 39 billion transactions per year (European Payments Council 2019).

In 2007, the Payment Services Directive (PSD) was implemented to act as a regulation for payment services and PSPs within the EU. As a directive – a legal act of the EU-, it provided the legal framework for the market and business conduct rules in which payment services should operate. The updated directive -the Second Payment Services Directive (PSD2)- marked the payment sector with possibilities of boosting innovation and competition (Worldpay 2018). Having come into effect in

January 2018, this modernization paves the way for growth and payment innovation impacting several stakeholders, from payment institutions to merchants and customers by aiming to reduce fraudulent occurrences and increasing privacy through the promotion of informed consent of data sharing, customer authentication and improved security (Worldpay 2018).

3.1.2 Projection for the EMEA Region

Payment innovation is expected to flourish under this new directive in both the ecommerce and the POS transactions segments (Dorfleitner et al. 2017; Worldpay 2018). For the purpose of this study, it is important to point out that only ecommerce transactions have been considered.

Within the e-commerce environment in the EMEA (Europe-Middle East and Africa) region, in 2018, an estimated 21% of online transactions were payed through e-Wallets followed by a 20% with credit cards and another 20% with debit cards. Bank transfers accounted for 16% of e-commerce payments. The latest Global Payment Report from Worldpay forecasts a 3% increase in the use of e-Wallets and a 4% increase in Bank Transfers for 2022, meanwhile payments through Credit Cards and Debit Cards are expected to decrease by 6% and 3%, respectively (Worldpay 2018). For the next five years, e-Wallets are expected to keep the top position followed by bank transfers in the second spot, displacing cards as the customer's choice for paying online. Particularly, consumers in Europe have shown a strong preference for bank-based payments as opposed to credit solutions through the years (Worldpay 2018). Therefore, there is an inclination for this tendency to continue and to spread at a faster pace as a result of favorable regulations.

In terms of collaboration between traditional financial institutions and financial technology companies, an estimated three quarters of all banks within the European region are already engaging in cooperation with these firms (Deutsche Bank Research 2018).

3.1.3 Projection for Germany

To evaluate the penetration of online-based financial solutions, the availability and the use of the Internet needs to also be considered. (Worldpay 2018). Internet penetration has expanded substantially within the last few years. To mention an example, according to a 2015 survey from the ARD/ZDF, only 28% of people living in Germany in 2000 who were over fourteen years of age used the internet occasionally (Frees, B., & Koch 2015). This figure increased to 80% in 2015. In 2017, internet penetration in Germany was estimated at a 93%, which means that currently most of the population has access to internet and uses it regularly (Koenig-Lewis et al. 2010)(Worldpay 2018). In relation to the acceptance of online-based banking and financial solutions, data from the Bundesverband deutscher Banken shows that the acceptance of online-banking products has increased in the German society since the mid-nineties. For example, by 1998, the number of people aged over eighteen who had already used online-banking within the country accounted to 8%. This number increased to 30% in 2004 and it reached 54% in 2014 (Bankenverband 2011; Dorfleitner et al. 2017).

According to research by the Deutsche Bank, between 2008 and 2017, there has been substantial change in the way consumers behave when making online transactions (Deutsche Bank Research 2018). In the year 2008, only 5% of e-

commerce transactions were made using online payment schemes in contrast with bank transfers (also known as credit transfers) which accounted for over 60% of online payments, followed by debit cards and credit cards in second and third place, respectively. The figures from 2017 show a different scenario since payments through online schemes represented 58% of e-commerce transactions (Deutsche Bank Research 2018) These figures also demonstrated that the increase in online payment schemes was influenced by customers using alternative payment methods characterized by having large client bases globally like PayPal. Also, a significant number of customers switched from bank transfers to other APMs (Deutsche Bank Research 2018).

The transaction volume of fintech solutions in the payments sector was of approximately 17 billion EUR in 2015 (Dorfleitner et al. 2017). Dorftleiner et al. calculated the market penetration within this sector by measuring the transaction volume against the potential addressable market. The market penetration according to this study was around 0.03% (Dorfleitner et al. 2017). Successively, forecasts for the real, the optimistic and the pessimistic scenario were developed by multiplying the previous factors by an additional one reflecting the potential value for the customer. The real case scenario forecast sustained that the transaction volume in the payments sector will face an increase, driven mainly by an upsurge on e-commerce sales (Dorfleitner et al. 2017). On this same note, a study has specifically calculated that 15% of the total amount of retail trade will be carried out online by 2025 (Doplbauer 2015). Dorftleiner et al. sustain that almost a third of sales transactions through e-commerce were already being effectuated with alternative

payment methods in 2015 and it is very likely that this percentage will continue to rise, hence, the transaction volume of payment services through mobile fintech solutions is expected to increase in the nearest future (Dorfleitner et al. 2017).

According to the Market Guide for Germany provided by Worldpay, bank transfers were the preferred payment method in the e-commerce environment embodying 27% of all online purchases in 2017 (Dorfleitner et al. 2017; Worldpay 2018). Online purchases made through e-wallets represented 20%, followed by credit cards with 18% of all purchases. Charge and deferred debit cards accounted for 11% of these transactions (Worldpay 2018). The percentage of transactions through Charge and deferred debit has grown in comparison to the last few years (Worldpay 2018) and therefore it is said to be transforming the way in which customers in Germany use cash online. At a more specific level, the most popular alternative payment methods for online purchases in Germany are bank transfers, PayPal and Klarna. Klarna is a bank established in Sweden, providing payment solutions with the core service of minimizing the risks for both buyers and sellers by assuming store's claims for payments and handling customer's payments. The e-commerce expenditure per capita was an estimated of US $1,047 in 2017 (Dorfleitner et al. 2017).

A recent study published by Emerald in 2018, demonstrated that even though internet penetration and the number of mobile users in Germany has increased at a fast pace, Fintech adoption has been rather lethargic (Stewart and Juerjens 2018). It is important to be aware that Stewart and Juerjens approached Fintech from a general perspective; including blockchain, robot-advisors, wealth management solutions and other concierge services. Also, the survey was directed to bank

customers and does not take into account demographic factors. 99% of the respondents from this survey had and used mobile phones, nevertheless, only 10% of the respondents had knowledge of fintech services and only 1% had used them (Stewart and Juerjens 2018). Additionally, data shows that 82% of Germans are unenthusiastic about sharing information with fintech organizations because they value their privacy (Statista - Das Statistik-Portal 2015). In country figures, in comparison to the UK and the US, Germans tend to place more value on their personal data (Stewart and Juerjens 2018). In terms of digitalization, Germany ranks 17 within a ranking of 35 industrialized countries (Deutsche Bank Research 2018). For these reasons, companies offering fintech solutions have a wide road ahead in pursuing consumers about the added value of using these services.

3.2 Proposed Theoretical Approach

E-commerce is being transformed by the Now Economy. The desires and needs from customers are being met in record times and instant gratification is now possible through mobile shopping and all touchpoints in between (Worldpay 2018). The payment process plays an important role for providing a seamless experience and companies within the industry look to assure that their customers' preferred payment methods are included into these services (Worldpay 2018). Understanding the preferences of young generations of tech savvy and demanding individuals represents a challenge too complex for simplistic answers (Worldpay 2018). As a result of growing up in a digital reality, these generations will clearly be early

adopters of payment-related IoT solutions. For this, the following hypothesis has been developed:

H1: More than 50% of the population will be using Fintech Apps

Since the expansion and diffusion of a new technological good relies on both the features of the good and the characteristics of the audience to whom it is being delivered (Escobar-Rodriguez, T. and Romero-Alonso, M. 2014), this study attempts to identify the elements that college students regard as the most important for using alternative payment methods in the fintech revolution era. College students are not only current users of mobile fintech for payment services, but they also represent the customers of the future as they are entering their prime spending years. Consequently, the hypothesis below is posed:

H2: More than 50% of the population will continue using Fintech Apps in the future

Over 200,000 results are obtained when searching for the keywords “Acceptance”, “Fintech”, “Payments” and “Mobile Banking” in EBSCOHost, Emerald Insight, Science Direct and SpringerLink Databases. The relative newness of the topic resulted in outcomes from 2009 onwards. With the intention of selecting a theoretical method that approached the topic and research questions of this paper, several articles were reviewed.

Seven studies were drawn as references for carrying out a methodology comparison. One of the selected studies was published in 2010, three in 2016, two in 2017 and one in 2018. The following papers were used as reference for the comparison of

theoretical grounds and methodology comparison: “Predicting Young Consumers’ take up of Mobile Banking Services” by Koenig-Lewis, Palmer et al. (2010), “The Adoption of Mobile Payment Services for Fintech” by Kim et al. (2016), “Understanding Acceptance of Fintech Service in Korea” by Joo (2017), “Determinants of continuance intention to use the smartphone banking services” by Susanto, Chang and Ha (2016), “Behavioural intention to adopt mobile banking among the millennial generation” by Tan (2016), “A weight and a meta-analysis on mobile banking acceptance research” by Baptista (2016) and “What makes users willing or hesitant to use Fintech?” by Ryu (2018).

The authors used existing theoretical frameworks to propose existing and new research models to carry out their analyses. The underlying frameworks that guided the research papers were: The Theory of Reasoned Action (1980), the Theory of Planned Behaviour (1985), the Technology Acceptance Model (1989), the Expectation Disconfirmation Theory (1980) and the Unified Theory of Acceptance and Use of Technology (2003).

Three out of the seven authors from the selected research papers designed and proposed new research models using elements from previous theory and adding some of their own, as it was the case for the Decomposed Theory of Planned Behaviour proposed by Joo (2017), the Expectation-confirmation model (ECM) designed by Susanto, Chang and Ha (2016) and the Net-Valence Framework presented by Ryu (2018).

This study reviewed elements from the Theory of Reasoned Action, the Theory of Planned Behaviour and the Technology Acceptance Model, as these are used as

common and usual reference guides for explaining human behaviour and technology adoption in literature. These theories are utilized as the base for creating the measurement items for testing the research model of this study in relation to the factors associated to the positive user acceptance of mobile fintech payment solutions.

The TRA was developed by Icek Ajzen and Martin Fishbein in 1967 and it was based in previous studies of persuasion models, attitude theories and social psychology. The main objective of the TRA is to describe the interconnection that attitudes and behaviours have in human action (Ajzen and Fishbein 1977). It is used as a predictive framework for behaviour as a result of behavioural intentions and pre-conceived attitudes towards a specific topic. It explains that a person will act in accordance to the expected outcomes that result from performing a certain behaviour (Ajzen and Fishbein 1977). In the fintech app context, for example, if an individual has a positive attitude towards alternative payment methods regarding trust, then this person will act accordingly, and would therefore become more prone to using these apps.

Apart from one's attitude towards performing the behaviour, the theory included additionally a normative component also understood as one's subjective norm in relation to performing that specific behaviour. In this case, subjective norm refers to social norms surrounding the act because they also contribute to the decision of performing the behaviour (Ajzen and Fishbein 1977). An example of subjective norm within this study would be the peer-pressure that a particular individual might feel to

use a particular app when knowing that the majority of people from his circle of influence are also using it.

In short words, the main concept of the TRA is that a behavioural intention is determined by attitudes towards that behaviour and subjective norms as well. As a result of the TRA's wide scope it has served as the basis for new theories with proposed improvements, because like any other theory, the TRA is regarded to have limitations on its own that require refinement and revision (Pinder 2008).

One of the limitations about the TRA that has been brought to light in academic literature is that the theory excludes involuntary elements, in other words, only voluntary conditions known to the person performing the behaviour are included into the equation. For instance, when the successful application of a transaction is mainly because of the quality of their internet connection and not because of a task carried out by the person itself. However, this involuntary elements play a role in the intention process (Eagly and Chaiken 1993). On another study, this assumption was supported with the statement "the performance of a behaviour is not always preceded by a strong intent" (Bagozzi et al. 1989). This assumption was found to apply specifically for when the behaviour in study does not require considerable cognitive effort.

The authors of the TRA added the predictive element of perceived behavioural control to the previously established theory and rebaptized it "Theory of Planned Behaviour" (TBP) (Ajzen). This extension to the theory was included to illustrate cases when the studied person has the intention to carry out the behaviour but because of objective or subjective reasons that intention is not concluded. In short,

the TPB argues that an individual's behavioural intentions and behaviours are shaped by the attitudes towards that behaviour, subjective norms and perceived behavioural control over the behaviour (Ajzen).

Research suggests that the TRA and TPB can be considered a behavioural-determinant only when there is high motivation and opportunity to process information (Conner et al. 2003), therefore, further research is an important necessity to demonstrate the casual links between the variables in TPB and its expansions (Conner et al. 2003). Additionally, the subjective norm element is often regarded as a poor predictor of intentions and this might be a consequence of weak measurements and the need for expansion in relation to this factor (Armitage, C.J. & Conner, M. 2001).

On the other side, a meta-analysis study from 2001 by Armitage and Conner supported the results from other meta-analyses in relation to the capacity of the TPB as a predictor of behaviour and intention. The study proved that TPB can explain 20% of the variance from actual behavioural measures and evidence also recommended the revision or inclusion of normative variables that could augment the prediction power of the normative factor from the model (Armitage, C.J. & Conner, M. 2001).

The Technology Acceptance Model (TAM) is one of the most recognized extensions from the Theory of Reasoned Action and it is the top model choice when studying user's acceptance and usage regarding new technologies (Venkatesh 2000). The model was created by Fred Davis and Richard Bagozzi in 1989. The authors removed some of the TRA's original elements (subjective norm) due to a weak

explanation and replaced them for measuring attitude with “ease of use” and “usefulness” to represent factors of technological acceptance. The model suggests that both factors have strong behavioural components and that they are part of several factors that influence user’s decisions on how and when to use a certain technology (Bagozzi et al. 1992). Additionally, the element “perceived ease of use” is considered to play a prominent part within this model, as per previous research related to the diffusion of innovations (Tornatzky and Klein 1982). Some authors have argued that this model ought to be expanded through the incorporation of innovation models in order to include factors that consider change processes (Legris et al. 2003).

The measuring items to test the factors associated to positive user acceptance of mobile fintech payment solutions were not only based on these theories, but they were also grounded on industry reports for Germany. For instance, according to the 2018 FIS PACE Report, consumers in Germany place value on two things: trust in the safety of financial operations, ease of use of the available services and increasingly digital self-service (FIS Global 2018).

Additionally, guided by the meta-analysis from Baptista and Oliveira, and by taking into account the different approaches from this literature review, the following three theory-deriving elements were selected to be tested as determinants of the intention to use fintech apps within the population:

H3: Trust has a positive effect on Behavioural Intention

H4: Transaction Efficiency has a positive effect on Behavioural Intention

H5: Ease of Use has a positive effect on Behavioural Intention

On the next section, an additional element is introduced into the research model to test the potential of payment-related mobile fintech payment services as catalyzers for sustainability-related purposes.

3.2.1 The Increasing Presence of Sustainability-related Components within the Financial Spectrum

Nowadays, sustainability-related purposes in business impact the way in which socio-economic and environmental issues are approached. Studies have shown that large corporations consider that the potential that sustainability has towards positive effects on overall profits and revenues is huge, especially in developed countries (Kiron D. et al. 2015). In some cases, corporate managers struggle when incorporating these purposes into financial initiatives because of numerous concerns, one of them being that philanthropic initiatives are not part of the company's mission statement, however, an MIT-backed survey shows that in fact, these purposes embody important business drivers (Kiron D. et al. 2015). Further studies in Journals of Corporate Finance have argued that sustainability related-purposes should be integrated into both financial decision-making and financial offerings since they represent an important business-driver component and can indeed become sources of strategic or competitive advantage (Schramade 2016).

Various sustainability-related initiatives from the financial and fintech sector have been sought and launched at several levels and through different channels (Schramade 2016). For instance, blended finance is a new financial tool that attempts to bring diverse forms of capital together with the objective of encouraging sustainable development (OECD 2018). In practice, organizations such as the Bill &

Melinda Gates Foundation have already appointed a Head of Blended Finance into its activities (Cass 2015).

In 2018, Finance Montreal, a Canadian financial cluster with over 45 institutional members from the financial industry announced that they will integrate all activities from the non-profit Finance and Sustainability Initiative (FIS) to form the Finance and Sustainability Initiative of Finance Montréal (IFD-FM) (Newswire). Since 2010, FIS' engagement has included activities as the implementation of ESG (Environmental, Social and Governance) criteria into investment analysis as well as the offer and promotion of a Sustainable Investment Professional Certification supported by Concordia University and the CFA Institute (Newswire).

In 2017, a Fintech Taskforce was created by the Banking Environment Initiative - through a secretariat from the Institute for Sustainability Leadership from the University of Cambridge- based on the premise that process automation in the financial services has progressed to an extent in which the application of fintech will encompass initiatives beyond the strict provision of financial services (Verhagen and Voysey 2017). The taskforce is formed by CEOs from several multinational financial institutions and the main objective is to create awareness and to implement industry-level fintech solutions that target sustainability-related issues.

One of the use-cases currently being developed is the "Energy Coin" concept that is stored in a blockchain (Verhagen and Voysey 2017). Generators of renewable energy would be issued clean energy coins when the production of new units of clean energy is verified and buyers of these coins would be certain that they are supporting energy generation at a specific location. This new fintech proposal is

oriented towards companies looking to offset carbon emissions and the idea that local producers could use energy coins as a payment method for municipal services to the local governments has also been proposed as a draft (Verhagen and Voysey 2017). Certain critics sustain that offsetting schemes create an impression in the general public that they can get away with a contaminating lifestyle by buying their way out at low costs. On the other side, offsetting schemes provide several benefits like raising the public's awareness towards the intensity in which individual carbon dioxide activities are carried out through an "avoid, reduce, compensate" (Deutsche Emissionshandelsstelle 2017) mentality and additional benefits for related sustainable development projects in guest or host countries (Deutsche Emissionshandelsstelle 2017).

Another blockchain-powered example is a new form of fintech called "Social Credits" which originated as an initiative from the Young Global Leaders, an association launched by members of the World Economic Forum and supervised by the Swiss Government (Ibrahim and Joshi 2017). Social Credits work as an incentive mechanism to "mobilize private investment for sustainable development and growth" (Ibrahim and Joshi 2017) and it works under tax liability incentives among companies.

The payments sector has included initiatives related to sustainability on its own. These initiatives exist both within the digital and non-digital sectors. For example, the global franchise Mastercard along with Gemalto, Giesecke & Devrient and Idemia -some of the biggest credit card manufacturers in the world- have launched

a Green Payments Partnership to reduce the use of PVC plastic in the manufacturing of Credit Cards as a way of “greening” plastic cards (PYMNTS 2018).

Within the digital sector, Kenya-based company M-KOPA is promoting sustainable objectives among the fintech payments industry. By leveraging the successful domestic mobile payments platform M-PESA, M-KOPA is offering a solution with unique and pioneer character that aims towards selling solar power systems to poorer communities (Fintech News Singapore 2017). The firm finances the payment of solar-powered solutions for the generation of electricity and its storage to people that do not have access to electricity. Payment is made via mobile money accounts over a twelve-month period (Leke et al. 2019). An additional example of an African company harnessing the potential of mobile money is Fenix in Uganda. Fenix sells solar power kits via a mobile money financing and payments scheme called “ReadyPay” for the minimum amount of $0.20 per day (Leke et al. 2019). After customers have repaid their loan within a period of thirty months maximum, they can still continue using their “ReadyPay” credit score to pay for other products and loans (Leke et al. 2019).

Another example is how Ant Financial has successfully gamified decreasing greenhouse emissions through its Ali Pay Forest App for payments (Verhagen and Voysey 2017). Over 200 million Chinese fintech users (Verhagen and Voysey 2017; Hua 2017) accumulate energy points whenever they make a transaction that encourages a low-carbon lifestyle. For instance, points are accumulated every time that the customer pays digitally instead of paying with paper or uses rental bikes for transportation instead of taxis. These points can be added to a virtual seed that

grows into a digital tree with constant care. The digital tree is indeed transformed into a real one which is later planted by the company in Inner Mongolia (Hua 2017). The app also allows users to track the real growth of their tree through satellite technology (Hua 2017). While the app educates citizens to be more aware on the impact that their choices have on the planet, it parallelly turns them into loyal users of the app and pioneers of green fintech as well (Hua 2017).

In 2017, the Sustainable Digital Finance Alliance was launched by the UN Environment division and Ant Financial as an initiative of working together through the use of fintech technologies to breed financing capable of creating positive impact in global sustainability challenges (UNEP 2017). The alliance is comprised of institutions from the environment, development and finance sectors worldwide. Examples of members are: PAYTM, a leading Indian e-commerce payment system and digital wallet company, the European Climate Foundation, the MIT Media Lab, the International Finance Cooperation -member of the World Bank Group-, and the MAVA Foundation, to name a few (SDFA 2017).

In this line of thought, the following hypothesis is presented:

H6: Sustainability-related purposes have a positive effect on Behavioural Intention

4. Empirical Methodology

This thesis combines primary and secondary data to test hypotheses and draw results and conclusions regarding the nature of the research questions. To test the six hypotheses of this study, elements of qualitative and quantitative research are included. H1 and H2 are evaluated through analysis of primary and secondary data and H3, H4, H5 and H6 through the assessment of primary data using the partial least squares regression model. The research model for H3, H4, H5 and H6 is shown in figure 4.

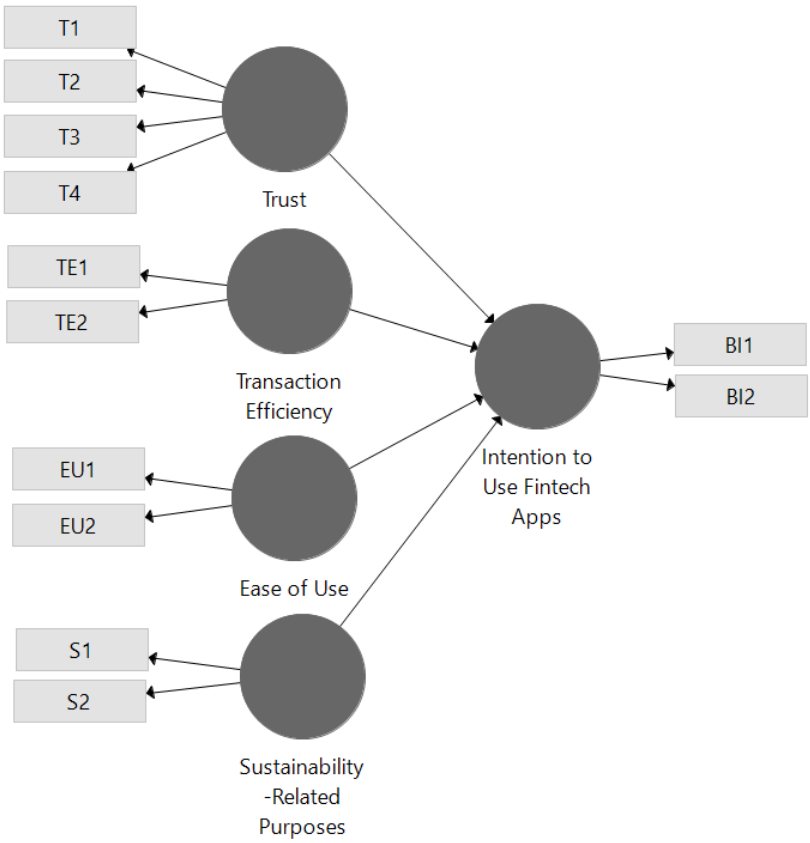

Figure 4: Research Model

4.1 Measurement Items

The literature review provided the input to design the questionnaire. Open and closed questions were included into the survey to gather data in relation to the research questions and hypotheses. Baptista and Oliveira provided focal input on the most-used constructs and relationships within 57 articles found in literature. An adaptation from Kim (2009) and Ryu (2018) was used as the basis for the items regarding Trust. The items for Transaction Efficiency came from Chang et al. (2016) and Ryu (2018). To measure Ease of Use, items were drawn from Joo (2017) and Koenig-Lewis et al. (2010). The Sustainability dimension was included using the literature review from this study as reference and the items for Behavioural Intention came from Chang et al. (2016) and Kim (2009). All items were measured on a five-point Likert scale, ranging from strongly disagree to strongly agree. The items are shown in Table 1.

4.2 Data Collection

The survey period lasted two weeks. The questionnaire was distributed to the total population of students from the Hochschule Furtwangen (6345 students, as of November 2018) through a Google Forms Questionnaire. The link to this seven-minute questionnaire was sent by email to each of the student's university email account. The survey period started on November 15th, 2018 and closed on November 29th, 2018.

4.3 Sample

A total of 465 responses were received and recorded. Two records were eliminated due to inconsistencies with the questions from the survey. In total, 463 responses were considered into the analysis. The demographics of the survey are represented in Table 2. The gender distribution of the respondents was 54.60% male and 44.70% female. Ages were organized by groups and 78.20% of the respondents were aged between 18 and 24, 19.20% between 25 and 31, 2.20% between 32-38 and.0.40% between 39 and 45. In terms of country of origin, 88.30% of the respondents were German, followed by 2.40% respondents from India.

The 9.30% left represented over thirty nationalities. In relation to education level, the greater percentage was accounted by Highschool Graduates which constituted 69.98% of all answers. 21.17% of the population had a bachelor's degree, 6.47% had concluded Vocational Training and 2.38% already had a master's degree. The total population consisted of students and 59.20% dedicated their time entirely to studies meanwhile 39.70% were working students.

Constructs		Measurement Item	References
Trust	TR1	"I think that my financial information is secure when I use fintech"	(Baptista and Oliveira 2016), (Kim 2009), (Ryu 2018)
	TR2	"I perceive that using fintech has more benefits than risks"	
	TR3	"I think it is safe to use Fintech due to government regulations"	
	TR4	"I rather use fintech apps than traditional channels (e.g. offline Banking)"	
Transaction Efficiency	TE1	"I am certain that transactions through Fintech Apps will be applied successfully"	(Baptista and Oliveira 2016), (Chang et al. 2016), (Ryu 2018)
	TE2	"Using Fintech Apps reduces my overall costs when making a transaction (time-saving, money-efficient, etc.)"	
	TE3	"The efficiency of Fintech Apps relies heavily on the quality of the Internet connection"	
Ease of Use	EU1	"I think everyone perceives Fintech Apps as easy-to-use Apps"	(Baptista and Oliveira 2016), (Joo 2017), (Koenig-Lewis et al. 2010)
	EU2	"I can quickly become skillful at using Fintech Apps without any help due to their intuitive design"	
Sustainability Purposes	SP1	"One of the main reasons why I use/intend to use Fintech Apps is linked to an attempt to help reduce paper, gas or my overall carbon footprint"	See Section 3.2.1 regarding sustainability component (Baptista and Oliveira 2016)
	SP2	"I would be willing to pay a fee per transaction if this fee is used to promote financial inclusion or to contribute to socio-economic progress in underdeveloped areas of the world"	
Behavioural Intention	BI1	"My intention to continue using Fintech Apps is directly related to their performance"	(Baptista and Oliveira 2016), (Chang et al. 2016), (Kim 2009)
	BI2	"I intend to use/continue using Fintech apps in the future"	

Table 1: Measurement Items for Survey

Sample Characteristics

Respondents (n=463)		Frequency	Percentage
Age			
	18-24	362	78.20%
	25-31	89	19.20%
	32-38	10	2.20%
	39-45	2	0.40%
Gender			
	Male	253	54.60%
	Female	207	44.70%
	Other	3	0.70%
Country			
	Germany	409	88.30%
	India	11	2.40%
	Other	43	9.30%
Education Level			
	Highschool Graduate	324	69.98%
	Bachelor's Degree	98	21.17%
	Vocational Training	30	6.47%
	Master's Degree	11	2.38%
Employment Status			
	Student	274	59.20%
	Working Student	184	39.70%
	Other	5	1.10%

Table 2: Demographics

4.4 Analysis and Results

The approach for the analysis of hypotheses in this paper consisted of two parts. First, analysis on both secondary data and data obtained from open and closed questions from the survey was assessed qualitatively for evaluating H1 and H2. Second, the proposed research model was analyzed using the regression model of the Partial Least Squares Path Modelling to test H3, H4, H5 and H6, respectively.

In academia, the PLS Path Modelling Method has been found to be suitable and has been recommended for: research models of predictive nature highlighting theory development (Fornell and Bookstein 1982), for exploratory analysis (Chin) and for estimation of the validity and reliability of constructs (Wasko and Faraj 2005). In addition, the PLS model has been found to provide significantly more stable results than the Ordinary Least Squares model when the size of the sample is small, when data has missing values and when there is multicollinearity (Farahani et al. 2010). Since one of the main objectives of this paper represents an attempt to test a theoretical model that explains the factors related to the intention to use Fintech Apps, PLS is an appropriate measure to test our research model.

Data analysis should be assessed in two-stage analytical processes: to test the validity of the measurement model and to measure the proposed hypotheses (Gefen et al. 2000). Therefore, the first task of the analysis was to observe how the items were loaded on the model constructs (measurement model) and the second task was to test hypotheses by examining relationships among the models constructs (structural model) (Gefen et al. 2000). The software Smart PLS 3.0 was used to analyze both the measurement and the structural models of the research.

4.4.1 Measurement Model

Three validity criteria (content, construct and discriminant validity) were assessed to corroborate the measurement model of this study: In first place, content validity of the model was guaranteed through the investigation pronounced on the chapter from this paper containing the literature review on the constructs of the TRA, TPB and TAM. Moreover, all measurement items were derived from existing literature as mentioned in section 4.1.

To review the validity of the constructs from the research model, convergent validity was tested for each of the constructs through the assessment of composite reliability (CR) and average variance extracted (AVE). The values of the CR assessment were all above the threshold of 0.70 and all values pertaining to the AVE assessment were higher than the 0.5 threshold, therefore, convergent validity was supported. The results are shown in Table 3. In this study, Cronbach Alpha (CA) was not included as a measure of validity because of its “lower bound value which underestimates true reliability” (Peterson and Kim 2013) or in other words, this indicator assumes that all items on the construct have the same loading, making it sensitive to the number of items in each construct and tending to underestimate the internal consistency reliability (Peterson and Kim 2013). Additionally, in PLS some items are more important for a specified construct than others, implying different outer loadings for the construct. This differences are already taken into account when assessing composite reliability (Hair et al. 2017).

Finally, to continue reviewing construct validity, the discriminant validity element of the research model was tested by the square root of the AVE. As shown in Table 4,

the square root of the AVE of each construct turned out to be larger than the correlation with other constructs, hence, indicating discriminant validity.

Furthermore, the factor loadings of each indicator were also taken into consideration for convergent and discriminant validity. In terms of cross loading, the factor loading should be over the threshold of 0.70 and it should also be higher than all other related cross-loadings (Wasko and Faraj 2005). The results of the cross-loading analysis are illustrated in Table 5. The results obtained on validity assessments support the suitability of the research model for analysis.

Composite Reliability and Average Variance Extracted

	Composite Reliability (CR)	Average Variance Extracted (AVE)
Trust	0.872	0.632
Transaction Efficiency	0.804	0.672
Ease of Use	0.798	0.668
Sustinability-related purposes	0.762	0.622
Intention to Use Fintech Apps	0.834	0.717

Table 3: Composite Reliability and Average Variance Extracted Assessment

Correlations between Latent Constructs

	Ease of Use	**Intention to Use Fintech Apps**	**Sustinability-related purposes**	**Transaction Efficiency**	**Trust**
Ease of Use	**0.817**				
Intention to Use Fintech Apps	0.512	**0.847**			
Sustinability-related purposes	0.175	0.177	**0.789**		
Transaction Efficiency	0.461	0.632	0.155	**0.820**	
Trust	0.494	0.680	0.109	0.667	**0.795**

Table 4: Correlations between Latent Constructs

Cross-Loading

	Trust	Transaction Efficiency	Ease of Use	Sustinability-related purposes	Intention to Use Fintech Apps
T1	0.871	0.584	0.423	0.104	0.609
T2	0.841	0.553	0.445	0.066	0.578
T3	0.769	0.524	0.370	0.082	0.478
T4	0.686	0.451	0.321	0.097	0.482
TE1	0.588	0.823	0.403	0.079	0.522
TE2	0.505	0.817	0.353	0.175	0.515
EU1	0.329	0.299	0.712	0.189	0.297
EU2	0.463	0.437	0.910	0.121	0.505
S1	0.093	0.146	0.166	0.913	0.173
S2	0.084	0.091	0.100	0.641	0.092
BI1	0.406	0.410	0.385	0.140	0.774
BI2	0.698	0.628	0.474	0.160	0.913

Table 5: Results of Cross-Loading Analysis

4.4.2 Structural Model

This study used PLS Path Modelling to analyze the research model for H3, H4, H5 and H6. The measures to examine the validity of the structural modelling are: R squares, t-values and path coefficients. Figure 5 shows the result of the structural model test.

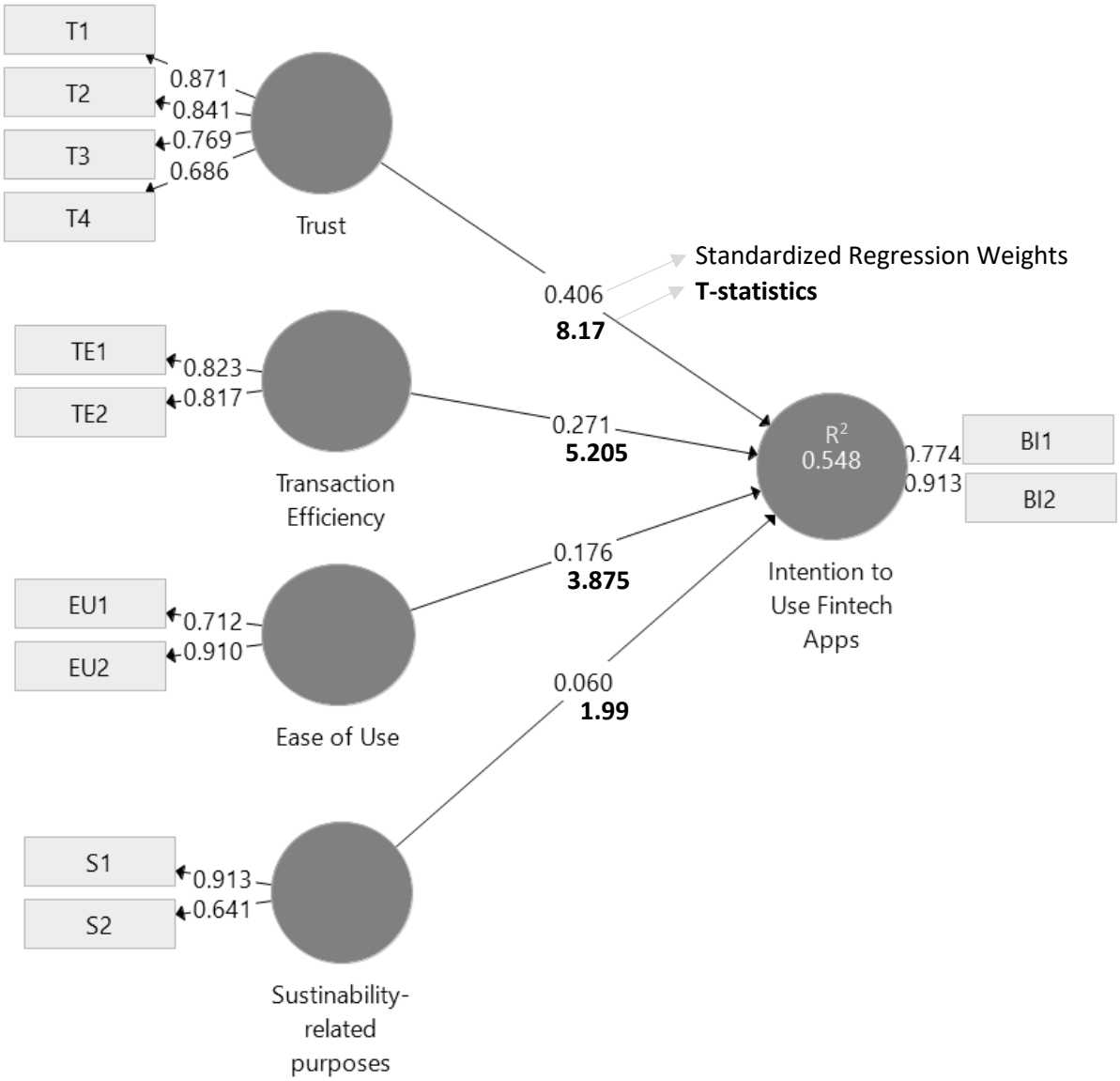

Figure 5: Results of the PLS Analysis

5. Discussions and Implications

Behavioural Intention towards using payment solutions powered by fintech represented the dependent variable from the research model in this study. The proposed model explains 54.8% of the variance in intention to adopt payment services powered by fintech. The two pillars that form the construct of our dependent variable are discussed in the following section. Additional qualitative information from the survey and secondary sources are also considered for the analysis of H1 and H2. The detailed explanation of the four independent variables that were tested provided the input for the evaluation of hypotheses 3,4,5 and 6 and these are described on section 3.2.

5.1 Analysis of Results for H1 and H2

As part of the qualitative side of the survey, students were asked directly if they currently use fintech apps to make payments, to which 73.2% of them answered affirmatively. 26.8% said that they did not use fintech apps to make online payments. This closed ended question provided the information to answer H1 and the first research question of this study directly which its objective was to determine the penetration that fintech apps from the payments sector had among the population, and this percentage was over the proposed 50%, therefore H1 is accepted. Additionally, in terms of internet penetration, surveys from the financial sector have shown that in 2017, the ratio of people with access to the internet who used online banking services (online banking is usually regarded as a benchmark within the fintech-payments environment) accounted up to three-quarters of all internet users.

Evidence that financial services are gradually becoming more digital is that thirty percent of people within this ratio claimed to not have visited any bank branch at all.

To answer the second research question and to get a clear picture of the knowledge that students have in relation to the alternatives that they have for paying online, respondents were asked to mark “the fintech solutions that they had used in the past, the ones that they are currently using or that they intend to use”. Some of the options were: Amazon Pay, Apple Pay, Bank transfers, Facebook Pay, PAYTM, Alipay, Google Pay, Samsung Pay, Square, M-Pesa, Amex Express Checkout, WeChat Wallet, Baidu Wallet, Azimo, etc. (Hereby, bank transfers refer to payments made using fintech solutions that involve logging into the customer’s online banking account to seal the payment or with methods like the SEPA-Lastschriftmandat). An additional box for specifying “others” could be ticked. Out of the total responses, PayPal was the most popular alternative payment method as it was mentioned by 72% of the population, followed by a 53% in mention for Bank Transfers and 18% for Amazon Pay. Interestingly, 11% of respondents stated that they have never used or know of any alternative payment methods to make online payments. This answers the second research question from the study. Appendix 2 shows in detail the options that where mentioned by the students. When comparing the survey results with the literature review for this question, the answers are quite similar. According to secondary sources, the preferred alternative online payment methods within Germany are bank transfers (credit transfers and direct debit through SEPA, etc.), PayPal and Klarna (Silva et al. 2016; Worldpay 2018).

A forecast was intended for the third research question of this paper. H2 was accepted and the conclusion was that it is very likely that more than 50% of the population intends to continue using fintech apps in the future. The information to make a projection was based on three main facts, which are presented as follows. First, it is important to observe that from the population under examination, 97.4% of respondents are situated between 18 and 31 years of age (78.20% aged between 18-24 and 19.20% between 25-31). By comparing the obtained results with those from previous studies with different ages in population, this study demonstrates that young, early adopters of mobile fintech payment solutions are more enthusiastic about using these products than their older counterparts. Additionally, 73.2% of these early adopters claim to have knowledge and to have paid with one of these fintech products, in comparison with the percentage of older users from which only 10% claimed to have knowledge of fintech and only 1% had already used fintech solutions in the past (Stewart and Juerjens 2018; Statista - Das Statistik-Portal 2015).

Second, on the quantitative side of the survey, the proposed research model was proven to be statistically significant in all constructs and explained 54.8% of the variance of the intention to use fintech apps. The dependent variable of behavioural intention was built as a construct and was tested directly by the following two statements: “I intend to use/continue using Fintech apps in the future” and “My intention to continue using Fintech Apps is directly related to their performance”.

For the first statement, 51.8% of the respondents strongly agreed, 25.9% agreed, 12.5% remained neutral, 4.5% disagreed and 5.2% strongly disagreed. In total

percentages this reflects that 78% of the population under scrutiny intends to start using or continue to use fintech apps in the future, whereas 10% of respondents do not intend to do so. 13% chose to remain neutral.

The results obtained about student's opinion on the second statement reflected that 70% of respondents intend to keep using payment-related fintech solutions if these continue to meet their personal expectations in relation to the four independent variables that were tested in this study as well as any other variable that influences in explaining the variance on the intention of using payment services powered by fintech. 8% of students disagree and do not perceive that the performance of these solutions regarding the protection of financial information, the correct application of seamless transactions, their user-friendly nature and up to a minimal extent, their linkage to sustainability purposes, is directly related to their intention to keep using them and 22% of respondents remained neutral.

Third, several sources of secondary data are also included into the forecast projection. The most important sources of information for this purpose have been the forecasts from the book "Fintech in Germany" by Dorftleiner et al., the description of the behaviour of the German market within this industry by Stewart and Jürjens and the market guide for Europe and Germany provided by the latest Global Payments Report by Worldpay. First, Dorftleiner et al. make projections in three scenarios, the pessimistic, the real-case and the optimistic scenario. This study takes the real-case scenario as reference since the transaction volume in the payments sector will face an increase driven by the expansion of e-commerce sales and an updated regulatory framework regarding the use of financial technology (Worldpay 2018; Stewart and

Juerjens 2018; Dorfleitner et al. 2017). Doplbauer calculated that by the year 2025, 15% of the current amount of offline retail trade will be effectuated through online channels (Doplbauer 2015). Also, the increase of payments using Charge and deferred debit through platforms like Klarna, for example, is on the rise every year and it represents a transformation on how customers in Germany are making online payments (Worldpay 2018). Additionally, nearly a third of e-commerce sales were already paid using alternative payment methods back in 2015. Therefore, the likeliness of a gradual and continuous increase in these figures is high and echoes directly on the growth of transaction volumes (Dorfleitner et al. 2017).

All revised sources point to an increase on e-commerce sales, but, since studies have showed that 82% of the people within the total German market tend to be doubtful about sharing private data with fintech organizations (Stewart and Juerjens 2018), instead of adopting the more optimistic scenario, this study adopts a prudent position in relation to the growth in the use of alternative payment methods. With this numbers, it is safe to say that more than 50% of the population will indeed continue paying through digital solutions, however, even though this percentage is on the rise, the diversity of alternative payment methods is not guaranteed to grow as well. Additionally, a great percentage of this transactions are made through the use of bank transfers which are of great importance in Germany -they represent 27% of the total online payments from 2017 (Worldpay 2018)- and within the European union. However, when measured against other countries, this option is not available, and some studies do not consider this method into the wide spectrum of payment-related

fintech propositions. Thus, further research is needed to understand the preference of customers for when switching payment channels.

5.2 Analysis of Results for H3, H4, H5 and H6

In recent years, not only the use, but also the awareness of the benefits and risks posed by alternative payment methods have been on the rise. Customer benefits include lower costs, improved data protection, faster service, etc., whereas customer risks consist mainly of vulnerability of personal data in cyberattacks or fraud attempts. The results of the survey from this paper showed that university students perceive that the value that they gain from making online transactions through these apps is higher than the possibility of perils that might come along with online purchases.

The Trust construct from the research model resulted in a standardized regression weight of 0.406. With a t-statistic result of 8.17 on a one-tailed test with a 95% confidence interval, the results lead to the acceptance of H3: “Trust has a positive effect on Behavioural Intention”. Therefore, the relationship that trust has on the intention of using fintech solutions for payments is positive and it surpasses the 1.96 threshold to be statistically significant.

The trust factor has proven to be the most important factor when measuring the acceptance and intention to use fintech apps not only within the market of college students in Germany, but also, within other demographic sectors across the country (Koenig-Lewis et al. 2010). In a survey from 2015, 82% of people living in Germany

were reluctant about sharing information with organizations that offered fintech solutions because of privacy breaches (Statista - Das Statistik-Portal 2015).

In general, people fear that their personal information could be somehow divulged in a way that poses a security problem for them. However, the results from this study demonstrate that younger consumers tend to place more trust in payment-related fintech services than users with different demographic characteristics. When students were asked to respond to the question “I think that my financial information is secure when I use fintech”; 56% of respondents said that they perceive their financial information to be secure when they use these apps. Only 18% disagreed with this statement and 26% remained neutral. These results show that more than half of respondents perceived that their financial information is secure when they use fintech apps.

Furthermore, for the statement “I perceive that using fintech has more benefits than risks”: 61% find it more beneficial than risky to use fintech apps for making payments online. 14% of respondents are skeptical about benefits and 25% remained neutral. Consequently, students think that payment-related fintech solutions provide more benefits than risks.

The survey-takers were also asked about their opinion on the regulations imposed by the government to companies that offer these solutions and whereas they “think it is safe to use Fintech due to government regulations”. To this, 39% feel that fintech is safe because of the protection that these regulations provide. 25% said that they disagree with regulations being an important factor of fintech safety and 36%

remained neutral. It is important to note that the percentage of people who remained neutral on this question might reflect low knowledge about the subject.

When asked “I rather use fintech apps than traditional channels (e.g. offline Banking)”, 53% of respondents state that they prefer to use fintech solutions than traditional channels like offline banking for carrying out everyday transactions. However, this was the element with a higher percentage of disagreement within the trust construct since 29% of the students said that they do not prefer to use fintech solutions than traditional channels. 18% remained neutral.

Transaction Efficiency also proved to impact positively in the intention of using fintech solutions for payments with a standardized regression weight of 0.271. The obtained results were statistically significant at the 95% level, as the t-statistic was found to be above the required 1.96 threshold with a result of 5.205. Therefore, H4: “Transaction Efficiency has a positive effect on Behavioural Intention” is accepted. The variable T3 was omitted from the analysis. In the following lines, an individual analysis for each of the questions for this construct is described.

Students responded to the statement “I am certain that transactions through Fintech Apps will be applied successfully” majorly in a positive way as 78% of them perceived that transactions through payment-related fintech apps would be carried out successfully. A low percentage of divergence followed, with 5% of the respondents disagreeing to this statement and 17% choosing to remain neutral.

More than half of the surveyed students -65%-agreed with the fact that fintech apps for payments help them in reducing their own costs when making a transaction. One

small percentage -13%- disagreed with this claim, thus, externalizing their opinion on how they perceive that fintech does not help them in reducing their own transactional costs. 22% of the respondents decided to remain neutral.

53% of the respondents observe that the efficiency of these apps relies heavily on the quality of the Internet connection that they count with. A smaller percentage, 16%, do not distinguish the quality of internet connection as a factor with great impact for the efficiency of payment solutions and 32% remained neutral.

The outcome for Ease of Use permits to accept H5, as it turned out to be statistically significant with a t-statistic of 3.875 within a 95% confidence interval and results also allow to state that this factor creates a positive impact on behavioural intention with a standardized regression weight of 0.176. Almost half of the students, 49%, agreed with the proposition “I think everyone perceives Fintech Apps as easy-to-use Apps”. On the other hand, 21% of the survey-takers do not agree with this statement, implicating that this task could be perceived as complicated for certain groups of people. 30% remained neutral.

74% of respondents considered that they can become skillful at using payment-related fintech apps at a fast pace and without any help. Contrastingly, only 6% disagree and 20% remained neutral when giving their opinion about the statement “I can quickly become skillful at using Fintech Apps without any help due to their intuitive design”.

Moving on to the added construct for testing the impact of sustainability-related purposes, the positive correlation (a result of 0.060 for the standardized regression

weight of this construct) was found to be statistically significant (a t-stat of 1.99 at the 95% level) but, with a close margin to this being the opposite.

People were asked to rate their approval or disapproval with the argument: “One of the main reasons why I use/intend to use Fintech Apps is linked to an attempt to help reduce paper, gas or my overall carbon footprint”. The approval rate for this case was of 30%, meaning that this percentage of students links their intention to use payment-related fintech solutions with their personal attempts to reduce paper, gas, or their overall carbon footprint. But, a percentage of 45% did not consider this as one of the underlying reasons that influence them towards using these apps. A relatively high percentage of respondents, 25%, adopted a neutral position for this statement.

With the objective of learning about the intention of students in relation to using these alternative payment methods and also to test the viability of a fee per transaction scheme, students were asked to reflect their intentions according to the following statement: “I would be willing to pay a fee per transaction if this fee is used to promote financial inclusion or to contribute to socio-economic progress in underdeveloped areas of the world”. The percentage of students who agreed accounted for 26% of the sample size. However, 45% of the respondents disagreed, expressing that they would not be willing to pay a fee-per-transaction to promote financial inclusion and/or to contribute to socio-economic progress in underdeveloped areas of the world. The percentage of neutral answers was the second highest among all questions with 30% students adopting this position.

Within this construct, a third question of qualitative nature was posed to the students to measure if their willingness to pay regarding sustainability-related purposes changed when asked specifically for a fee that represented around 1 % of the transaction amount. This question was not included into the research model because of its different nature, however it is of upmost importance for the analysis of this paper. Respondents were asked the following: “Please associate a price (in euros) to a fee per transaction that you would be willing to pay as contribution to sustainability purposes”. Four options were given including an extra option for the possibility of open answers. The options were: zero, less than 1% of transaction amount,1% of transaction amount, more than 1% of transaction amount and other.

The population under scrutiny was more inclined to contributing economically towards sustainability-related purposes when a threshold was specified and when this figure was around 1% of the total transaction amount. In this case, when testing the willingness-to-pay for a fee per transaction scheme, the percentage of people who were keen to contribute increased from a mere 26% to 62%. By breaking down the results to have a clear idea of the percentage figures, the analysis resulted on the following: 35% of people would be ready to contribute with less than 1% of their transaction amount, 24% would be prepared to pay 1% of their transaction amount and 3% would be willing to contribute with more than 1% of their transaction amount. The percentage of students who were still reluctant to a fee-per-transaction scheme accounted to 38%, this percentage represents the part of the population that declined to contribute and who selected “zero” as the answer to this question.

The results from this study provide enough ground that can be fertilized with extra incentives to raise sustainability stewardship among the financial sector. Financial institutions should be responsible about sustainability issues among their own operations, however, this should not be mistaken as the key to sustainability within this industry (Eccles and Serafeim 2013). This paper attempts to trace the first steps along fintech grounds to harness innovative initiatives that enable customers to adopt more environmentally responsible practices and the obtained results prove that sustainability-related purposes have the potential of affecting the decision of using fintech apps.

5.3 Limitations and Future Research Directions

Currently, there is no universal or unified definition of Fintech. Additionally, when narrowing it down to fintech solutions for payments, the criteria of what payments embody usually differs from study to study. Therefore, the researcher needs to be extra careful and invest extra time in selecting the specific factors on which the definition from the study -and thus, the analysis- will be based. On this same note, search results from databases will provide results that comprise different elements and the researcher will need to go through each of the studies to determine if the information is related to the topic in mention. When searching for fintech, some results refer to it as an industry, others as a phenomenon, as a tool or even as one of the players within this sector. Likewise, when searching for alternative payment methods or fintech-based payment solutions, bank transfers are included as APMs in some papers meanwhile others completely disregard them. In this paper, and as

in other papers for example, bank transfers (credit transfers and direct debits) were considered into the analysis, however several studies do not consider these solutions as part of fintech-based payment solutions. Additionally, when addressing this topic, the researcher should also be able to classify fintech solutions according to the environment where the transactions are taking place, whereas it is at the physical point-of-sale or at the e-commerce level.

Moreover, the sampling in this study consisted of college students, therefore, the outcome cannot be generalized to the country level. To achieve a generalization of such caliber, the random sampling strategy should be made by considering the whole population. As digital natives, college students tend to have a higher interest in technology which mainly represent the intention to use these apps.

6. Conclusion

Purchasing goods and services online has never been easier. Companies engaging in fintech activities make it a reality for customers to effectuate transactions with merchants through applications on mobile devices. These fintech-based payments solutions are also known as alternative payment methods and enable payments and value transfers to be carried out at the local and international level. Usually, users are required to create an account within their chosen APM so it can be simultaneously connected to already existing cards from users. Card information (credit or debit) can also be stored on e-wallets for tokenization, which offers transaction-specific protection. In other cases, customers can also pay by having

their phone bill charged or by having debits directly taken from their bank account. In global figures, currently, credit cards still embody the principal share of worldwide online transactions, but according to several sources included in this paper, over fifty percent of total e-commerce transactions will be done using APMs by the year 2021.

Payments represent one of the most important building blocks for understanding the e-commerce landscape because online deals have a higher chance of being sealed when the customer's preferred payment method is offered. Therefore, cultural and demographic factors are an important part of the equation when studying payments, because current APMs represent the diversity between the world's cultures, their economies and regulations. Results will vary among respondents with different characteristics, hence, stakeholders in general should be certain that the intention to adopt new fintech products will depend on elements that are usually too complex or specific to make generalizations.

Within the United States, Venmo has gained popularity among customers by offering a social feed where transactions details can be shared with contacts on a social platform. In India, the use of the Paytm app soared after the recent national demonetization policy. In other emerging economies like those in Africa and Latin America, apps offering payment services through mobile schemes have been on the rise because of several reasons, for instance, the inclusion into fintech for people who do not have access to bank accounts. In China, fintech apps owned by Tencent and Alibaba that offer integrated solutions have been responsible of dominating the payments market and reducing the use of credit cards to a minimum.

This study showed that the fintech app preference of university students located in a southern region in Germany is different from the preference that their older counterparts have at the national level. Country figures describe how in general, the German market tends to be highly skeptical about disclosing personal information online because of possible security breaches that might harm privacy, which is highly valued. The results from this study propose that APMs could be welcomed by younger consumers at a larger extent, since their opinion about payment-related fintech services tends to be more positive than their older counterparts and the current fintech app penetration among this group is estimated to be above seventy percent. Readers should be aware that the penetration rate obtained in this study might differ from other sources because, to be congruent with the definition of fintech of this paper, bank transfer schemes (credit transfers and direct debits) have also been included as fintech-based payment solutions.

Regarding the adoption of a wide variety of fintech solutions for online payments, considerable progress has been made in worldwide terms. In Germany, within the population under analysis, readers can easily observe how fintech app penetration is formed mainly by three solutions: PayPal, Bank Transfers and Amazon Pay. Additional sources also cited Klarna as a top participant. The results obtained in this study are congruent with results from secondary data from both academic and business sectors.

Even with digital payment platforms gaining popularity among students, there was still an important percentage of the representative sample of this study that had not yet adopted APMs, specifically, eleven percent of total respondents. This leads to

the second part of the study. A research model based on the Technology Acceptance Model principle was developed to test the effect that four independent variables (Trust, Transaction Efficiency, Ease of Use and Sustainability-related purposes) have on the intention to adopt fintech apps. The results showed that the model can be used to describe 54.8% of the variance in intention to adopt these apps. Results were tested using the PLS Path Modelling method based on regression. All four constructs had a positive impact on the dependent variable. Trust represents the factor that most influences the decision of adopting fintech apps with a standardized regression weight of 0.406, followed by Transaction Efficiency (0.271), Ease of Use (0.176) and Sustainability-related purposes (0.060), respectively. All constructs were tested at the 95% confidence interval.

The fourth and last construct represented the originality of this research. Sustainability-related purposes were found to influence the decision at a minimal extent, but the effect was still positive and statistically significant. Consequently, further in-depth research with a focus on the creation of strategies to incentivize the participation of users in collaborative ways towards sustainability-related purposes at this level is recommended.

Firms looking to incur in this market by offering fintech-backed payment solutions or looking to offer new functionalities should have a clear strategic position to present innovative proposals that guarantee the protection of data, reduce transactional costs and provide a user-friendly platform that helps customers to engage in sustainable-related solutions. The potential for customer engagement towards sustainability purposes through fintech can be harnessed and implemented by

providing simplified options that require just one click, that have a previously defined threshold or that provide innovative incentives like gamification and prizes. Fintech payment firms looking for benchmarks can analyze cases such as the Ant Forest feature from the Alipay payment app, M-KOPA and Fenix, since they have contributed greatly on offering responsible fintech solutions and have simultaneously attracted massive participation from customers, within their respective geographical areas. This research identifies the element of transparence as the main success factor of payment schemes that have a sustainability component within.

Market studies are recommended before the implementation of new schemes into the field of payments. New solutions should not only be developed with the purpose of keeping up with the latest market trends, but instead they should reflect measurable benefits for users. Stakeholders should be able to track the process or see tangible results for these initiatives to work. It is mainly about opening to a world of responsible offerings and leaving behind financial products that maximize economic revenue at unsustainable paces. As key players, fintech institutions are welcome to look at the creation of payment schemes that encourage customers to buy products that do not destroy the environment or have been manufactured under poor working conditions, to offset the impacts of a particular purchase or to contribute to projects in underdeveloped areas of the world.

On the same note, it is essential to be aware that large financial institutions and fintech firms are no longer focusing merely on competition within each other. Companies are currently redirecting efforts towards engaging in collaboration to take advantage of their own strengths and complementing their weaknesses to provide

creative services to online and mobile users of fintech apps for payments. Increasing collaboration among specialized firms and updated regulations like the Second Payment Services Directive (PSD2) in the EU allow to make a projection of growth for these services for the upcoming years.

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Appendix

Appendix 1 - Questionnaire

Dear fellow students:

Do you use mobile apps to make payments or transfer money? What is your opinion about them? For my Master Thesis, I am currently conducting a survey to know your opinion about Fintech Apps.

It will only take about 3-5 minutes to complete the questionnaire and all respondents have the chance to participate in a raffle for two amazon vouchers, valued at €25 each.

Please, click the link to be redirected to the online survey: https://docs.google.com/forms/d/e/1FAIpQLSfbIUOYkE1GN5tvBEB8xXZ9mFl9vgBBjtPk0c_VfRcXhGWwCg/viewform?usp=sf_link

All information will be treated anonymously, confidentially and only used for my research.

Thank you very much for your support!

Best regards,
Maria Fernanda Quevedo

***

Hallo liebe Mitstudierende,

Benutzen Sie Apps um Geld zu überweisen? Was denken Sie über diese Apps? Im Rahmen meiner Masterarbeit mache ich eine Umfrage und würde gerne Ihre Meinung über Fintech Apps wissen.

Die Dauer der Umfrage beträgt nur ca. drei bis fünf Minuten und unter allen eingereichten Antworten verlose ich jeweils einen von zwei 25 Euro Amazon Gutscheinen.

Bitte klicken Sie auf den Weiterleitungslink um direkt an der Umfrage teilzunehmen:

https://docs.google.com/forms/d/e/1FAIpQLSfbIUOYkE1GN5tvBEB8xXZ9mFl9vgBBjtPk0c_VfRcXhGWwCg/viewform?usp=sf_link

Alle Informationen werden anonym und nur für meine Thesis verwendet.

Vielen Dank für Ihre Unterstützung

Mit freundlichen Grüßen,

Maria Fernanda Quevedo

An Analysis on Fintech Apps

Fintech refers to the combination of financial services with technology to deliver customer-centric solutions. The Fintech Ecosystem includes: Roboadvisors, blockchain and bitcoin, digital banks, payments and money transfers, for example. The analysis of this survey will ONLY take into consideration Fintech Apps for Payments.

This 17-question survey will only take 5 minutes of your time. Thank you

*Required

Age: Please select your age-group *

- ◯ 18-24
- ◯ 25-31
- ◯ 32-38
- ◯ 39-45

Gender: Please select your gender *

- ◯ Female
- ◯ Male
- ◯ Divers
- ◯ Prefer not to say

Country: Please select your contry of origin *

- ◯ (Drop-down list of countries)

Education: What is the highest degree or level of school you have completed? *

- ◯ Doctorate Degree
- ◯ Master's Degree
- ◯ Bachelor's Degree
- ◯ Vocational Training
- ◯ Highschool Graduate

Employment Status: Are you currently...? *

- ◯ a student
- ◯ a student with a minijob/internship/part-time job/full-time job
- ◯ self-employed
- ◯ Other:

Penetration

I currently use Fintech Apps to make payments *

- ○ Yes
- ○ No

I currently use Fintech Apps to transfer money *

- ○ Yes
- ○ No

Please mark the Fintech Apps that you have used in the past/ are currently using / intend to use *

Your Online Banking Service (Bank Transfers)

Amazon Pay

Apple Pay

Facebook Pay

PayPal

Paytm

Google Pay

Stripe

Square

Adyen

SamsungPay

M-Pesa

WorldRemit

AMEX Express

AliPay

Transfer Wise

WeChat Wallet

Baidu Wallet

JD Pay

None Other:

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1 = strongly disagree

2 = disagree

3 = neutral

4 = agree

5 = strongly agree

Trust *	**1**	**2**	**3**	**4**	**5**
I think that my financial information is secure when I use Fintech	○	○	○	○	○
I perceive that using Fintech has more benefits than risks	○	○	○	○	○
I think it is safe to use Fintech due to government regulations	○	○	○	○	○
I rather use Fintech Apps than traditional channels (e.g.offline Banking)	○	○	○	○	○

Transaction Efficiency *	**1**	**2**	**3**	**4**	**5**
I am certain that transactions through Fintech Apps will be applied successfully	○	○	○	○	○
Using Fintech Apps reduces my overall costs when making a transaction (time-saving, money-efficient, etc)	○	○	○	○	○
The efficiency of Fintech Apps relies heavily on the quality of the Internet connection	○	○	○	○	○

Ease of Use *	**1**	**2**	**3**	**4**	**5**
I think everyone perceives Fintech Apps as easy-to-use Apps	○	○	○	○	○
I can quickly become skillful at using Fintech Apps without any help due to their intuitive design	○	○	○	○	○

Sustainability *	**1**	**2**	**3**	**4**	**5**
One of the main reasons why I use/intend to use Fintech Apps is linked to an attempt to help reduce paper, gas or my overall carbon footprint	◯	◯	◯	◯	◯
I would be willing to pay a fee per transaction if this fee is used to promote financial inclusion or to contribute to socio-economic progress in underdeveloped areas of the world	◯	◯	◯	◯	◯

Please associate a price (in euros) to the fee per transaction that you would be willing to pay as a contribution to sustainability purposes

◯ 0
◯ less than 1% of tx amount
◯ 1% of tx amount
◯ more than 1% of tx amount
◯ other: _____

Intention to use Fintech*	**1**	**2**	**3**	**4**	**5**
My intention to continue using Fintech Apps is directly related to their performance	◯	◯	◯	◯	◯
I intend to use/continue using Fintech apps in the future	◯	◯	◯	◯	◯

Appendix 2 – Base Data

Settings

Data file Settings	
Data file	An Analysis on Fintech Apps [463 records]
Missing value marker	none
Data Setup Settings	
Algorithm to handle missing data	None
Weighting Vector	-
PLS Algorithm Settings	
Data metric	Mean 0, Var 1
Initial Weights	1.0
Max. number of iterations	300
Stop criterion	7
Use Lohmoeller settings?	No
Weighting scheme	Path
Construct Outer Weighting Mode Settings	
Ease of Use	Automatic
Intention to Use Fintech Apps	Automatic
Sustinability-related purposes	Automatic
Transaction Efficiency	Automatic
Trust	Automatic

Appendix 3 – Collinearity Statistics (Outer and Inner VIF Values)

Outer VIF Values	VIF
BI1	**1.253**
BI2	**1.253**
EU1	**1.147**
EU2	**1.147**
S1	**1.080**
S2	**1.080**
T1	**2.139**
T2	**1.901**
T3	**1.679**
T4	**1.331**
TE1	**1.135**
TE2	**1.135**

Inner VIF Values	EU	BI	SP	TE	T
Ease of Use		**1.400**			
Intention to Use Fintech Apps					
Sustinability-related purposes		**1.040**			
Transaction Efficiency		**1.892**			
Trust		**1.957**			

Appendix 4 – Final Results: Mean, STDEV, T-values, P-Values, Confidence Intervals

Path Coefficients

Standardized Regression Weights, Mean, STDEV, Statistics, P-Values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)
Ease of Use -> Intention to Use Fintech Apps	0.176	0.177	0.045
Sustinability-related purposes -> Intention to Use Fintech Apps	0.060	0.061	0.030
Transaction Efficiency -> Intention to Use Fintech Apps	0.271	0.274	0.052
Trust -> Intention to Use Fintech Apps	0.406	0.404	0.047

	T Statistics (|O/STDEV|)	P Values
Ease of Use -> Intention to Use Fintech Apps	3.875	**0.000**
Sustinability-related purposes -> Intention to Use Fintech Apps	1.998	**0.023**
Transaction Efficiency -> Intention to Use Fintech Apps	5.205	**0.000**
Trust -> Intention to Use Fintech Apps	8.717	**0.000**

Confidence Intervals

	Original Sample (O)	Sample Mean (M)
Ease of Use -> Intention to Use Fintech Apps	0.176	0.177
Sustinability-related purposes -> Intention to Use Fintech Apps	0.060	0.061
Transaction Efficiency -> Intention to Use Fintech Apps	0.271	0.274
Trust -> Intention to Use Fintech Apps	0.406	0.404

	5.0%	95.0%
Ease of Use -> Intention to Use Fintech Apps	0.101	0.252
Sustinability-related purposes -> Intention to Use Fintech Apps	0.011	0.110
Transaction Efficiency -> Intention to Use Fintech Apps	0.191	0.362
Trust -> Intention to Use Fintech Apps	0.326	0.476

Confidence Intervals Bias Corrected

	Original Sample (O)	Sample Mean (M)	Bias
Ease of Use -> Intention to Use Fintech Apps	0.176	0.177	0.001
Sustinability-related purposes -> Intention to Use Fintech Apps	0.060	0.061	0.001
Transaction Efficiency -> Intention to Use Fintech Apps	0.271	0.274	0.003
Trust -> Intention to Use Fintech Apps	0.406	0.404	-0.002

	5.0%	95.0%
Ease of Use -> Intention to Use Fintech Apps	0.099	0.249
Sustinability-related purposes -> Intention to Use Fintech Apps	0.010	0.108
Transaction Efficiency -> Intention to Use Fintech Apps	0.189	0.361
Trust -> Intention to Use Fintech Apps	0.323	0.475

Outer Loadings

Standardized Regression Weights, Mean, STDEV, Statistics, P-Values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)
BI1 <- Intention to Use Fintech Apps	0.774	0.772	0.036
BI2 <- Intention to Use Fintech Apps	0.913	0.913	0.007
EU1 <- Ease of Use	0.712	0.711	0.045
EU2 <- Ease of Use	0.910	0.910	0.020
S1 <- Sustinability-related purposes	0.913	0.900	0.064
S2 <- Sustinability-related purposes	0.641	0.631	0.141
T1 <- Trust	0.871	0.870	0.014
T2 <- Trust	0.841	0.840	0.020
T3 <- Trust	0.769	0.769	0.024
T4 <- Trust	0.686	0.685	0.032
TE1 <- Transaction Efficiency	0.823	0.821	0.025
TE2 <- Transaction Efficiency	0.817	0.816	0.026

	T Statistics (|O/STDEV|)	P Values
BI1 <- Intention to Use Fintech Apps	21.289	**0.000**
BI2 <- Intention to Use Fintech Apps	125.471	**0.000**
EU1 <- Ease of Use	15.742	**0.000**
EU2 <- Ease of Use	46.020	**0.000**
S1 <- Sustinability-related purposes	14.222	**0.000**
S2 <- Sustinability-related purposes	4.530	**0.000**
T1 <- Trust	63.547	**0.000**
T2 <- Trust	41.460	**0.000**
T3 <- Trust	31.949	**0.000**

T4 <- Trust	21.373	**0.000**
TE1 <- Transaction Efficiency	32.745	**0.000**
TE2 <- Transaction Efficiency	31.103	**0.000**

Confidence Intervals

	Original Sample (O)	**Sample Mean (M)**
BI1 <- Intention to Use Fintech Apps	0.774	0.772
BI2 <- Intention to Use Fintech Apps	0.913	0.913
EU1 <- Ease of Use	0.712	0.711
EU2 <- Ease of Use	0.910	0.910
S1 <- Sustinability-related purposes	0.913	0.900
S2 <- Sustinability-related purposes	0.641	0.631
T1 <- Trust	0.871	0.870
T2 <- Trust	0.841	0.840
T3 <- Trust	0.769	0.769
T4 <- Trust	0.686	0.685
TE1 <- Transaction Efficiency	0.823	0.821
TE2 <- Transaction Efficiency	0.817	0.816

	5.0%	**95.0%**
BI1 <- Intention to Use Fintech Apps	0.706	0.823
BI2 <- Intention to Use Fintech Apps	0.901	0.924
EU1 <- Ease of Use	0.628	0.780
EU2 <- Ease of Use	0.874	0.939
S1 <- Sustinability-related purposes	0.782	0.988
S2 <- Sustinability-related purposes	0.388	0.810
T1 <- Trust	0.845	0.891

T2 <- Trust	0.806	0.870
T3 <- Trust	0.726	0.805
T4 <- Trust	0.626	0.735
TE1 <- Transaction Efficiency	0.773	0.857
TE2 <- Transaction Efficiency	0.771	0.856

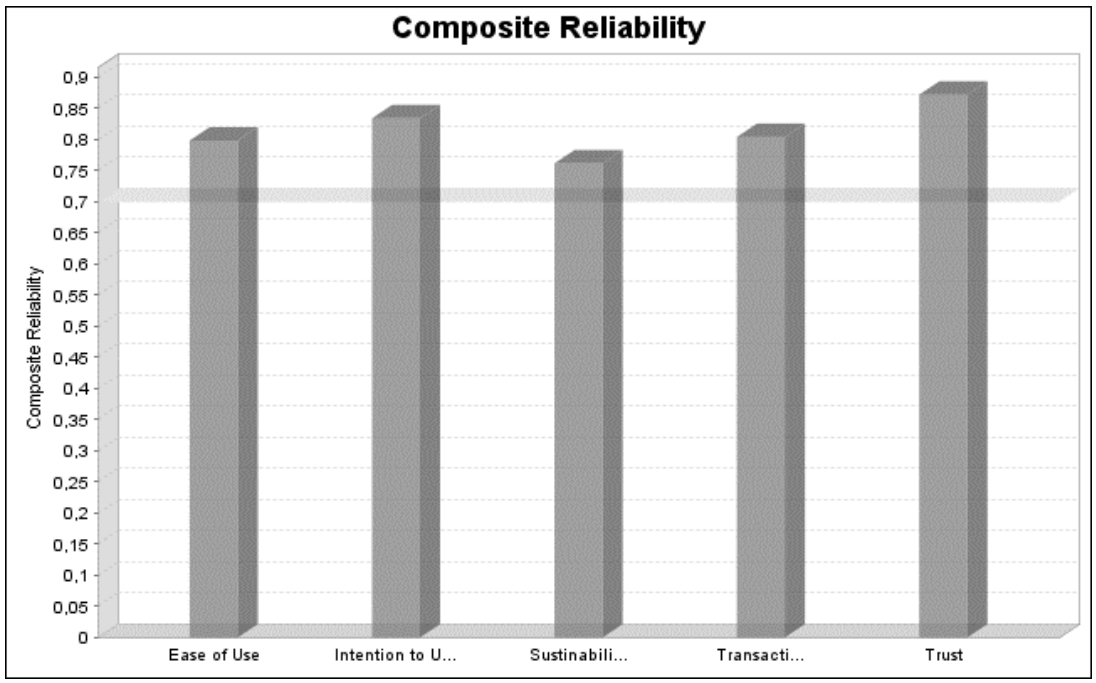
Confidence Intervals Biased Corrected

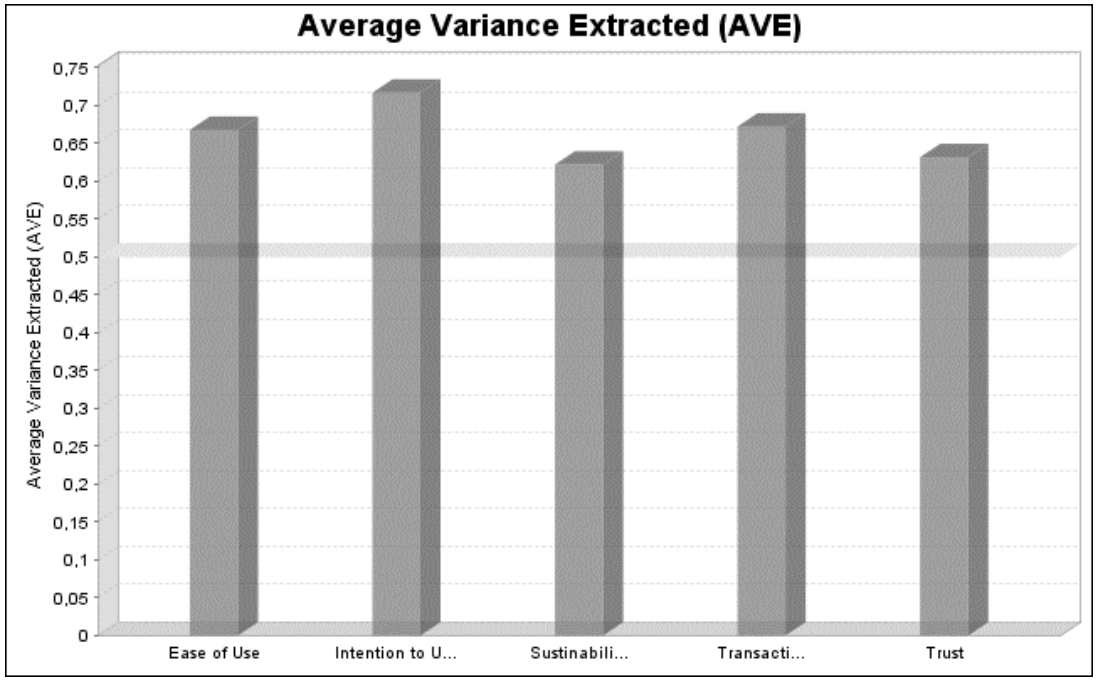
	Original Sample (O)	**Sample Mean (M)**	**Bias**
BI1 <- Intention to Use Fintech Apps	0.774	0.772	-0.002
BI2 <- Intention to Use Fintech Apps	0.913	0.913	0.000
EU1 <- Ease of Use	0.712	0.711	0.000
EU2 <- Ease of Use	0.910	0.910	-0.001
S1 <- Sustinability-related purposes	0.913	0.900	-0.013
S2 <- Sustinability-related purposes	0.641	0.631	-0.010
T1 <- Trust	0.871	0.870	-0.001
T2 <- Trust	0.841	0.840	-0.001
T3 <- Trust	0.769	0.769	0.000
T4 <- Trust	0.686	0.685	-0.001
TE1 <- Transaction Efficiency	0.823	0.821	-0.001
TE2 <- Transaction Efficiency	0.817	0.816	-0.001

	5.0%	**95.0%**
BI1 <- Intention to Use Fintech Apps	0.703	0.823
BI2 <- Intention to Use Fintech Apps	0.902	0.925
EU1 <- Ease of Use	0.619	0.771

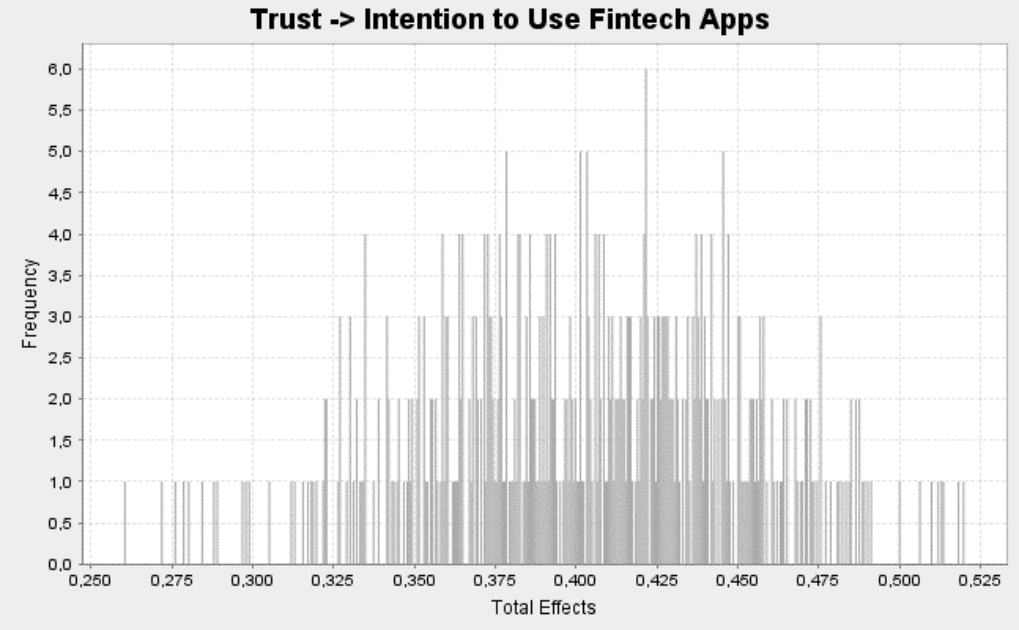
EU2 <- Ease of Use	0.871	0.936
S1 <- Sustinability-related purposes	0.793	0.989
S2 <- Sustinability-related purposes	0.381	0.807
T1 <- Trust	0.844	0.890
T2 <- Trust	0.807	0.871
T3 <- Trust	0.726	0.805
T4 <- Trust	0.624	0.730
TE1 <- Transaction Efficiency	0.772	0.855
TE2 <- Transaction Efficiency	0.769	0.854

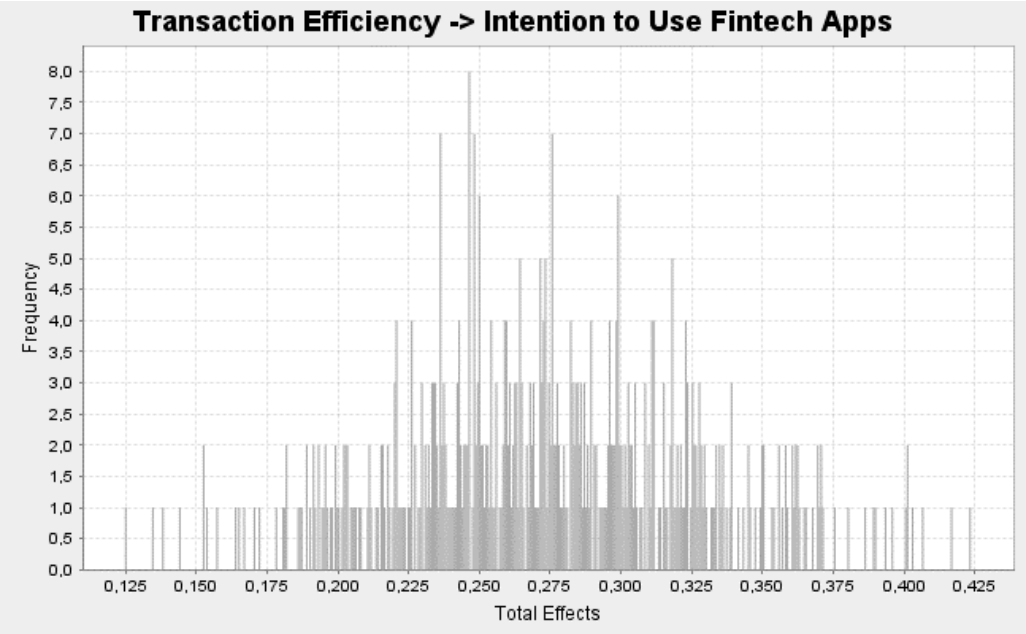
Appendix 5 – Composite Reliability and Average Variance Extracted Graphs

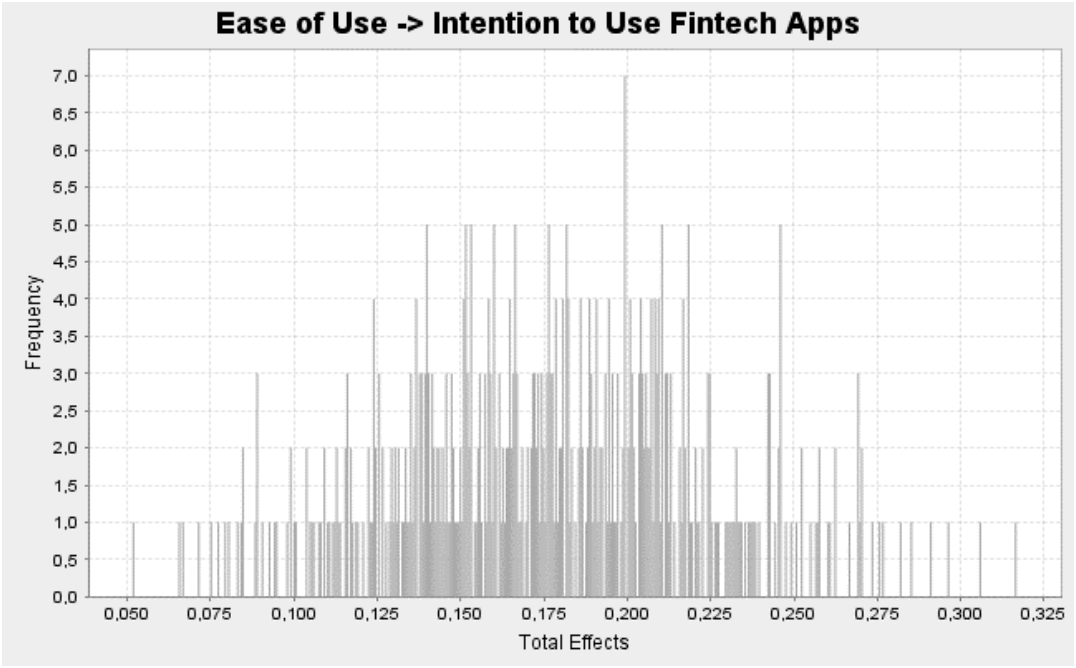


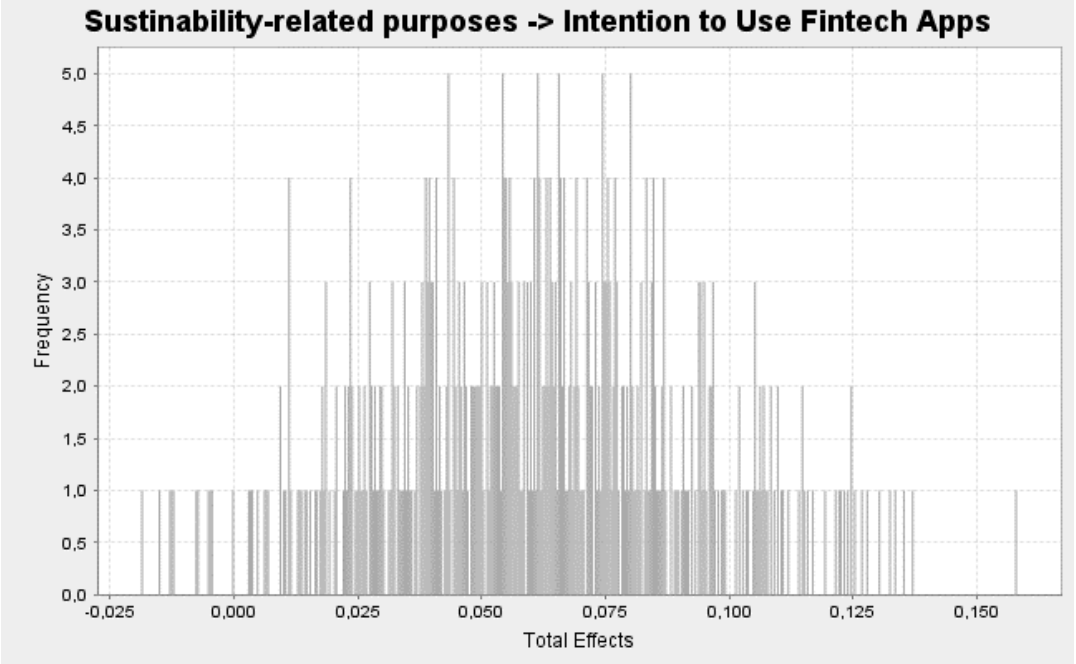


Appendix 6 – Total Effects Graphs






Ease of Use -> Intention to Use Fintech Apps
Frequency
7,0
6,5
6,0
5,5
5,0
4,5
4,0
3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
0,050
0,075
0,100
0,125
0,150
0,175
0,200
0,225
0,250
0,275
0,300
0,325
Total Effects


Sustinability-related purposes -> Intention to Use Fintech Apps
Frequency
5,0
4,5
4,0
3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
-0,025
0,000
0,025
0,050
0,075
0,100
0,125
0,150
Total Effects

Statutory declaration

I declare that this Master Thesis is my own work, based on my personal research and that all material and information sources, including book, articles, and any kind of document as well as electronic or personal communication sources that were used for the preparation of this study have been acknowledged. This paper or similar versions of it have not been previously submitted for academic assessment nor are being published elsewhere. I also certify that I have not plagiarized the work of others.

Maria Fernanda Quevedo Abarca Nürnberg, March 25th, 2019