



AN OVERVIEW ON THE BRAZILIAN DIGITAL PAYMENT SYSTEM

NEASF

**POLICY PAPER SERIES
02/2019**

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ABSTRACT

The adoption of new, digital payment methods brings significant benefits to customers and society such as improved efficiency, greater competition, broader financial inclusion, and more innovation, according to IMF in *Digital Currencies: The Rise of Stablecoins*, 2019. The digital payment market is a \$3 trillion industry, corresponding to 13% of total commerce, and will more than double by 2022, informs the McKinsey report *Global payments 2018: A dynamic industry continues to break new ground*, 2018. Although it is a prospective market, the Digital Payment System is not an intensive research topic, with a literature still in an embryonic stage. Even more: it does not completely capture the real movement on digital payments systems happening worldwide. Through an extensive but not exhaustive *overview* on the Brazilian digital payment system, this paper aims to develop the literature on the field, mainly but not exclusively focused on the *business* and *technology* fronts; to partially fulfil the gap between market and academia, through a comprehensive analysis on usual KPIs and descriptive statistics on digital payment systems, establishing a parallel with recent literature; and, finally, to describe challenges and opportunities for development in the Digital Payment System both in market and academia.

1. THE DIGITAL PAYMENT SYSTEM

The digital payment market, defined as *all consumer remote point-of-sale transactions through online or mobile channels, including retail ecommerce and digital travel but excluding in-store digital wallets*, is a \$3 trillion industry, corresponding to 13% of total commerce, and one that will more than double by 2022 [MCKINSEY, 2018]. Asia-Pacific comprises 50% of this \$3 trillion and, due to the fast-growing Chinese market, will increase its share to nearly 70% by 2022 [BNP PARIBAS, 2018]. *Mobile commerce*, including in-app payments and mobile browser payments, is the dominant factor driving strong digital commerce growth – due to rising smartphone adoption, an increasing shift towards online shopping, and improvements in network bandwidth – accounting for 48% of digital commerce sales globally as of 2017, forecasted to reach 70% by 2022 (tripling to \$4.6 trillion).

The mobile payment market has started in the first payment transaction conducted with a mobile device in 1997 when, in Finland, Coca Cola experimented vending machines that accepted SMS payments [DAHLBERG, GUO & ONDRUS, 2015]. Since then, the digital-payment landscape is growing in a fast pace and has become crowded [KAZAN & DAMSGAARD, 2016]: “New payment actors with different industry backgrounds and novice start-ups are attempting to gain a foothold in the once-protected payment market. In doing so, new payment actors are betting on various technologies to connect payers and payees in novel ways. These new dynamics in the payment market are largely driven by falling operating costs, as new payment actors leverage on agile and affordable cloud systems, but, more importantly, by regulation. (...) To illustrate the competitive market space, *AngelList* [EUROPEAN COMMISSION, 2009] listed about 996 U.S. and European mobile payment start-ups *without* including established actors such as *MasterCard*, *PayPal* or *Visa*.”

The mobile payment research has started just after the Coca Cola experience, with [DAHLBERG, GUO & ONDRUS, 2015], [OZCAN & SANTOS, 2015] and [HENNINGSSON & HEDMAN, 2015] established as seminal papers in the last decade. According to

[DAHLBERG, GUO & ONDRUS, 2015], the mobile payment research received a considerable number of publications and focused mainly on two issues since its inception: *technology* and *consumer adoption*, while several studies continuously show that *security* and *trust* are important prerequisites for the adoption and use of mobile payments. They also argue that mixing articles focusing on *developing* and *developed* markets can cause confusion about the progress of mobile payment research, because mobile payment services from developing markets are unlikely to penetrate developed economies with their advanced financial markets and sophisticated telecom, merchant and consumer infrastructures. Therefore, they prefer to avoid the inclusion of both types of markets into their review and solely focus on developed economies. In this paper, we follow the same criteria: we do not mix developing and developed markets. We mainly focus on *developing* markets, almost exclusively the *Brazilian* one.

This *overview* paper is structured as follows: chapter 2 presents The Brazilian Payment System, more specifically its legal landscape, the market itself with most relevant KPIs and quantitative estimates, besides major research papers regarding the theme; chapter 3 contemplates major perspectives for the market, pointing out the great historical moment for The Digital Payment System worldwide; chapter 4 concludes the paper, with possible paths for future work.

2. THE BRAZILIAN PAYMENT SYSTEM

2.1. REGULATION

Banco Central do Brasil (BACEN, or BCB) is the monetary, regulatory and supervisory authority which regulates financial institutions, money, credit, payments and exchanges, in accordance to guidelines issued by the *Conselho Monetário Nacional* (CMN) [BACEN, 2019], [THE LAW REVIEWS, 2019]. Payment services are subject to the rules regarding the *Sistema de Pagamentos Brasileiro* (SPB), created by Law N°. 10.214/01 [PLANALTO, 2001], and other entities of the *Sistema Financeiro Nacional* (SFN) such as the BCB and the *Comissão de Valores Mobiliários* (CVM) which also regulate their operations.

The year of 2018 was relevant to the payment market, as BACEN introduced provisions expected to innovate and promote financial inclusion and a more competitive market. By means of Resolution N°. 4,707 and Circular N°. 3,924, both of 19 December 2018, BACEN governs the use of payment arrangement receivables as collateral for credit transactions. On Circular N°. 3,925 of 20 December 2018, which amended the Annex to Circular N°. 3,682 as of 4 November 2013, BACEN addresses the provision of payment services within the framework of the arrangements of the SPB, establishing guidelines and standardizing the service providers need to abide by [THE LAW REVIEWS, 2019].

BACEN has continued its acts by establishing a working group with the objective of contributing to the construction of a competitive, efficient, safe and inclusive instant payments ecosystem. The working group helped the Board of Governors to determine an ecosystem guideline to the actual payment system. Around 130 institutions, including associations, banking institutions, payment schemes owners, credit unions, government institutions, financial market infrastructures, *fintechs*, marketplaces, consultancies and law offices took part in the discussions. The group finished the work by December 21st, 2018, with the announcement of the *Communiqué 32,927* and the final version of the guidelines. BACEN, in line with

other central banks, took the role of implementation leader and catalyst of the instant payments ecosystem in Brazil, with broad discussion with stakeholders, aiming at the definition of guidelines and other relevant matters [BACEN, 2019]. For a rigorous analysis of the Brazilian payment market and mainly feasible proposals for the payment system regulation, see [FGV, 2019].

According to *Communiqué N°. 32,927*, 21 December 2018, BACEN recognizes instant payments as valid and addresses the fundamental requirements for its environment within the Brazilian payment system regulatory framework. This enables the inclusion of new players in the financial market, which is of extreme significance in a country with high rates of banking concentration. The most important concern is that regulation in Brazil will respect permissionless innovation as a default [THIERER, 2016], in a productive interaction that will not completely stifle innovation while attempting to provide security. Regulatory sandboxes are a viable tool to achieve such a goal [FENWICK et al, 2017] and this strategy is being considered by the CVM. In September 2019, it issued a call for a public consultation on draft regulation that would institute rules for the functioning of such a sandbox encompassing temporary authorizations for companies to test novel business models in the Brazilian capital market.

2.2. THE MARKET

Figures 1 to 8 [STATISTA, 2019] provides recent historical data and perspectives for The Brazilian Digital Payment System.

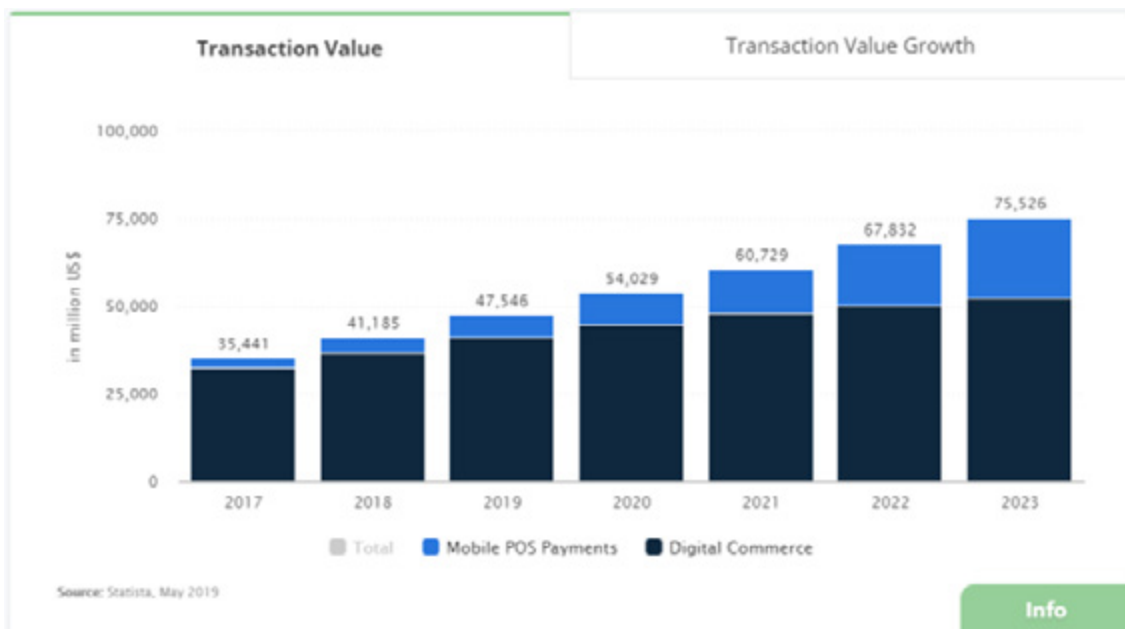


Figure 1: Total Transaction Value in the Digital Payment segment amounts to US\$47,546 million in 2019.

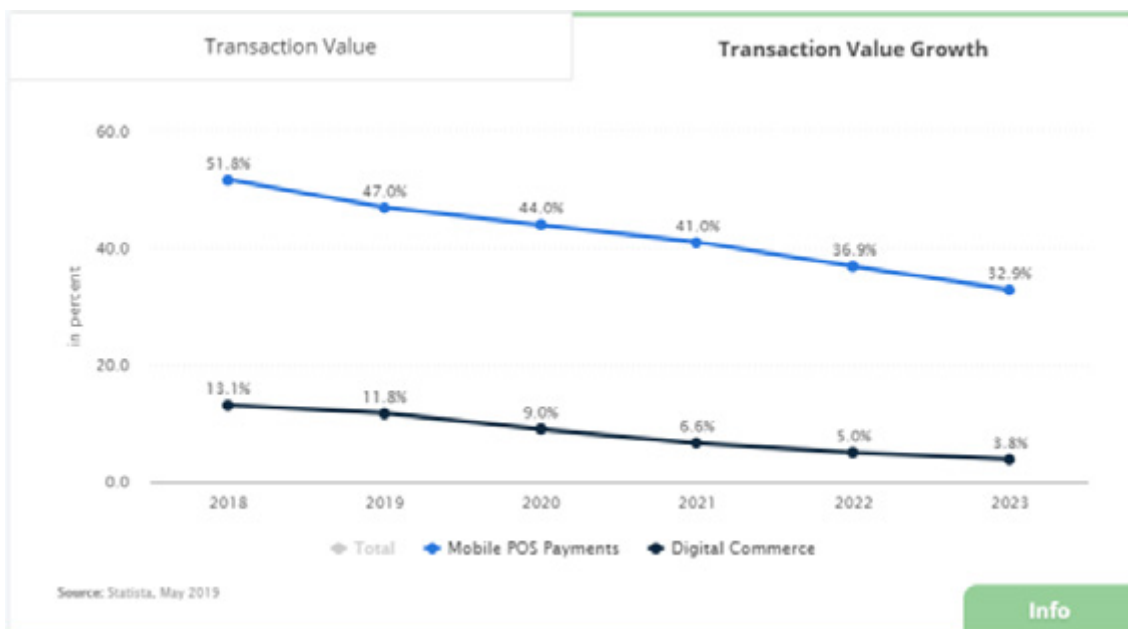


Figure 2: The Mobile POS Payment segment is expected to show a transaction value growth of 44.0% in 2020.

The total transaction value in the Digital Payments segment amounts to US\$47,546 million in 2019, with a Compound Annual Growth Rate (CAGR) of 12.3% from 2019 to 2023, resulting in a perspective of US\$75,526 million by 2023. The market's largest segment is Digital Commerce with a total transaction value of US\$41,249 million in 2019, although Mobile POS Payments are expected to grow at a higher rate than the first, and both taxes are expected to decrease as years go by.

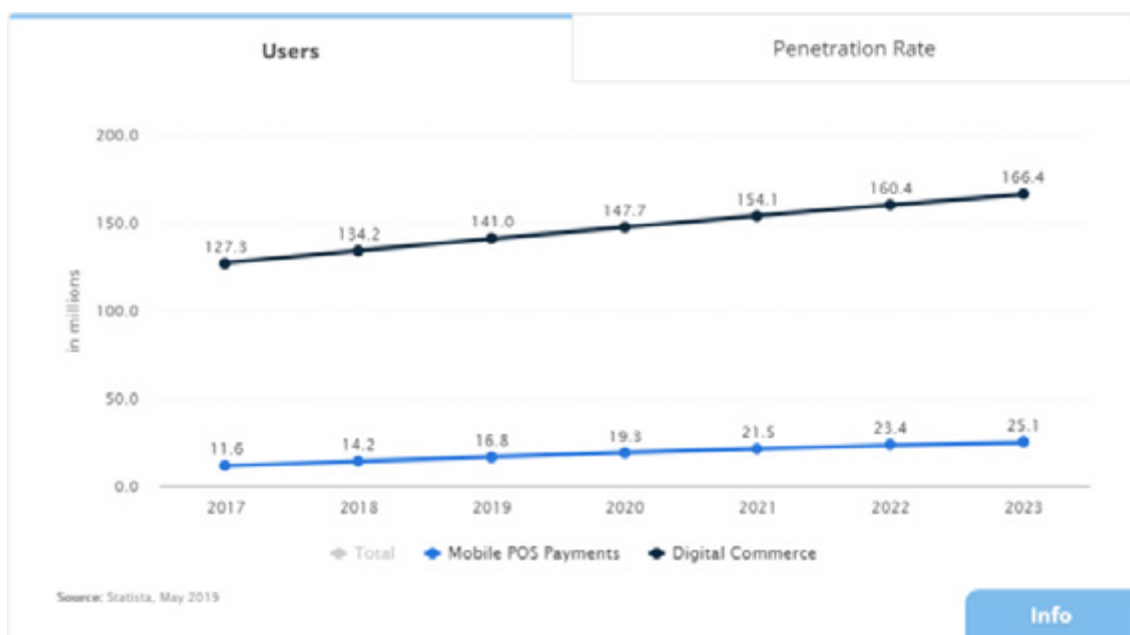


Figure 3: In the Mobile POS Payment segment, the number of users is expected to amount to 25.1 million by 2023.

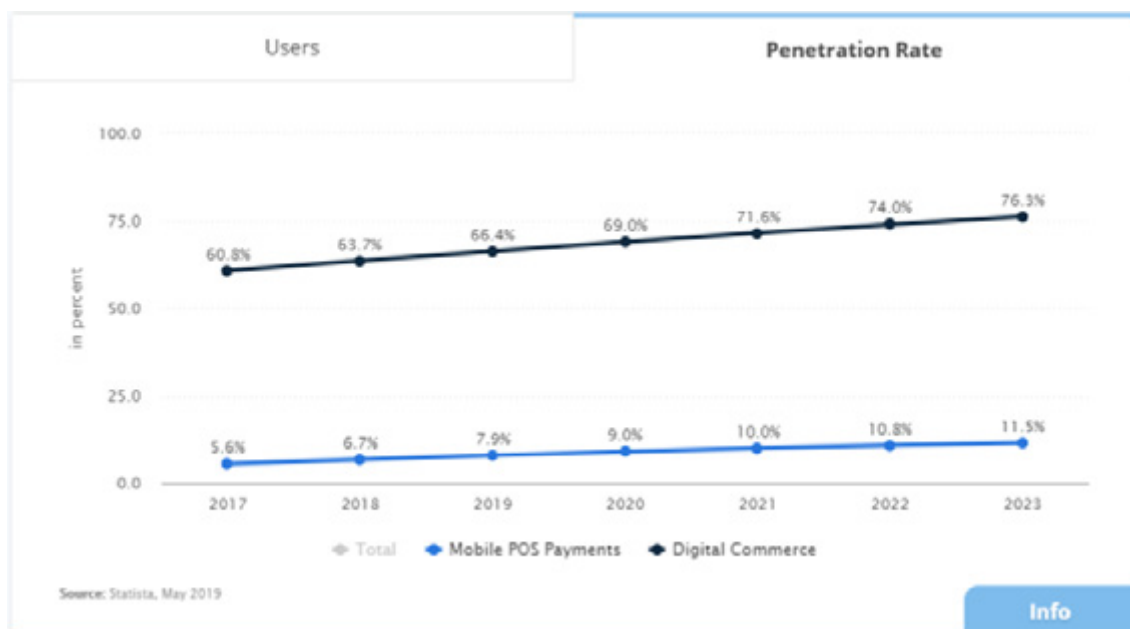


Figure 4: User penetration in the Digital Payment segment is at 66.4% in 2019.

Number of users in both Mobile POS Payments and Digital Commerce are expected to grow in an approximately linear pace, although the rate of change for the latter is slightly higher than the same measure for the former.

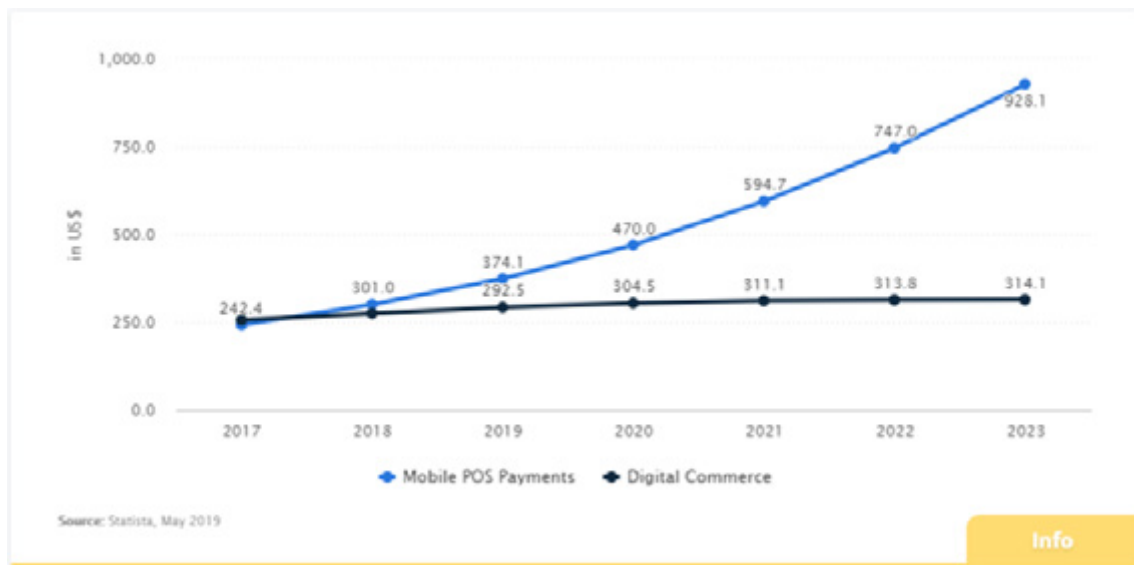


Figure 5: The average transaction value per user in the Mobile POS Payments segment amounts to US\$374.1 in 2019.

There is a perspective of detachment for the Mobile POS Payments and Digital Commerce segments. As we will show in the following sections, this effect is potentially influenced by the Chinese retail payment revolution occurred in the last decade.

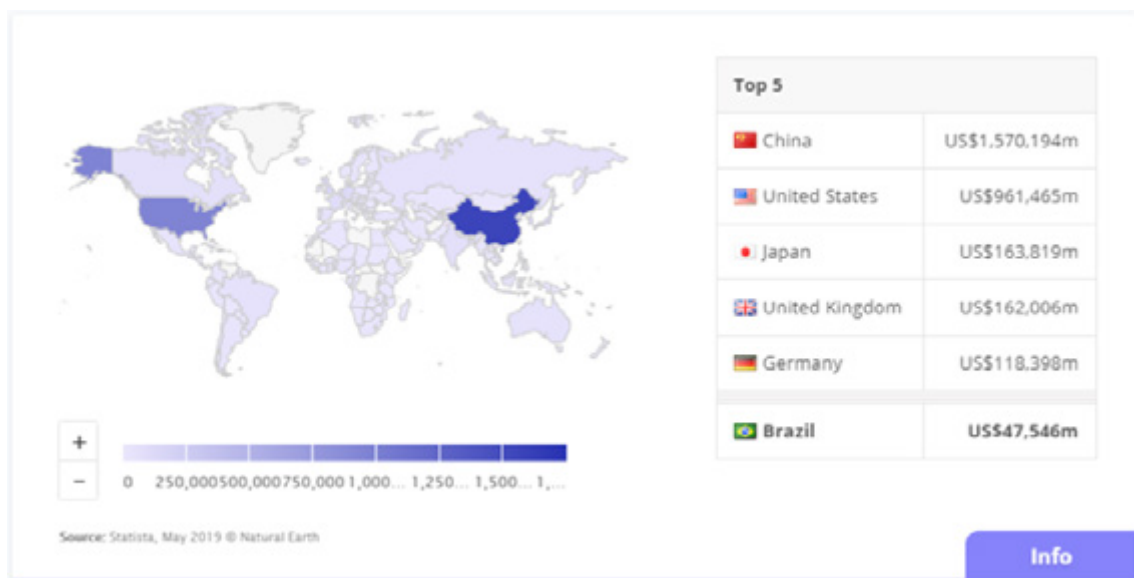


Figure 6: With a total transaction value of US\$1,570,194 million in 2019, the highest value worldwide is reached in China. Brazil scores US\$47,546 million.

From a global comparison perspective, it is shown that the highest cumulated transaction value is reached in China (US\$1,570,194 million in 2019), with Brazil figuring apart from the leaders.

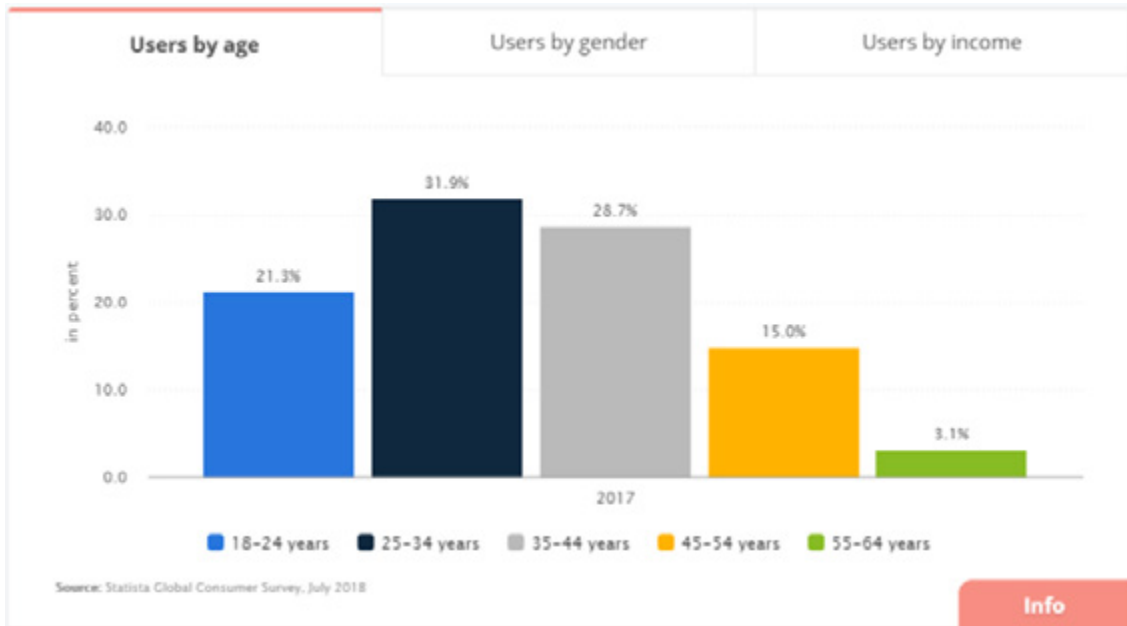


Figure 7: In 2017, 31.9% of users are in the 25-34 years old range.

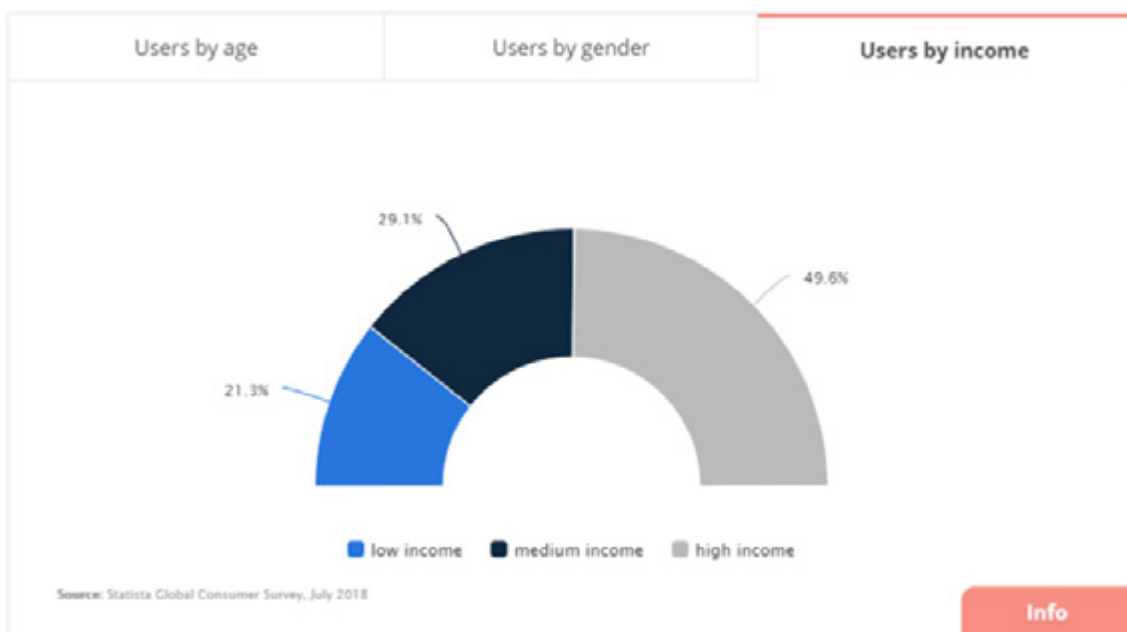


Figure 8: In 2017, 49.6% of users are settled in the high income category.

Figures 7 and 8 show histograms for percentage of users distributed by age range and income status, respectively. All information presented in this sub-session is relevant for the majority of analysis that one could be interested in: financial, marketing, and more. For our purpose, an *overview* of the Brazilian digital payment system, the previous analysis and conclusion is sufficient: *perspectives for the market are of straightforward growth*.

2.3. LITERATURE

“The recent and relevant literature in the Brazilian digital payment system, and how it is dealing with recent advances, is still in the embryonic stage. Significant articles on the field are rare” [BRAGA, ISABELLA & CORREIO, 2019]. This is completely understandable, since the ecosystem of mobile payments requires the creation of accords between various players and it is essential to develop interest and synergy between banks, technology businesses, credit card companies, telephone services, startups, governments, businesses, customers and other stakeholders – the context Brazil is facing now. BACEN’s initiative aims to ground that landscape.

In the following section, we highlight and discuss major recent works in the Brazilian Payment System and Market, without exhausting the literature. The focus is on their contribution and possible suggestions for improving the system and market, mainly using models and methods to identify most relevant variables.

2.3.1. NFC TECHNOLOGY ACCEPTANCE FOR MOBILE PAYMENTS: A BRAZILIAN PERSPECTIVE, 2018 [LUNA ET AL, 2017]

It investigates the acceptance of NFC (Near Field Communication) technology for payment through mobile in a Brazilian context, allowing to infer factors that influence NFC acceptance directly or indirectly. They have decided the need to study mobile payments in Brazil by comparing the number of credit/debit cards with the number of mobile phones in developed and developing countries, observing a larger amount of credit/debit cards than mobile phones in developed countries, and the opposite in developing ones.

Through an online and self-administered questionnaire and using the snowball sampling procedure on social networks, a final sample with 423 mobile phone users in Brazil was collected and used – the technique used to prove the hypothesis was the *Structural Equation Model*. Results show that *attitude*, *personal innovation in IT* and *perceived usefulness* are determinants of future intention to use the NFC technology for

payments in Brazil. The proposed model has a predictive power of intention to use NFC payment of 71%, demonstrating that it includes background with a large predictive power of acceptance of NFC technology which led to highlight the main implications for the management and development of new studies in the field. The authors state that there were no specific studies on NFC’s acceptance in Brazil by the time of their work and, for this reason, their contribution is relevant for both Brazilian academia and the mobile industry.

The study also cites authors that consider the subject is still in its infancy (e.g., [SLADE, WILLIAMS & DWIVDEI, 2013], [LIÉBANA-CABANILLAS, LUNA & MONTORO-RÍOS, 2015]), despite the significant advances in recent years in this field (e.g., [DAHLBERG, GUO & ONDRUS, 2015]).

2.3.2. DIGITAL PAYMENT MEANS: THE BRAZILIAN REALITY. AN “ENVIRONMENTAL SEGMENTATION” STUDY, 2019 [BRAGA, ISABELLA & CORREIO, 2019]

Through the environmental segmentation model of [ALMEIDA, 2001], this work aims to present the main factors necessary for the viability of the use and expansion of digital payment means in Brazil, using a qualitative exploratory research (including interviews with experts in the field) on electronic and digital payment case studies. The authors conclude that digital payments will bring gains in *efficiency* and *security*, as well as a reduction in cash maintenance costs and, perhaps more importantly, the rise of new markets and new services. However, they point to obstacles such as lack of specific regulation, technology to more securely identify users, high hardware costs, digital infrastructure bottlenecks “and conflicts of interest among the main players in the segment”. Another study focused on e-commerce and digital payments in Brazil had similar findings regarding security as a deterrent [MOREIRA, 2016].

2.3.3 PREDICTING THE DETERMINANTS OF MOBILE PAYMENT ACCEPTANCE: A HYBRID SEM-NEURAL NETWORK APPROACH, 2018 [LIÉBANA-CABANILLAS, 2018]

It develops a new research model to predict the most significant factors influencing the decision to use *m-payment* (mobile payment), using an online survey of a national panel of smartphones users, through two sequential techniques: *Structural Equation Modeling* (SEM), used to determine which variables had significant influence on mobile payment adoption, and a neural network model to rank the relative influence of significant predictors obtained by SEM. It has been found that the most significant variables impacting the intention to use m-payment were *perceived usefulness* and *perceived security variables*. On the other side, the results of neural network analysis confirmed many SEM findings, but also gave slightly different order of influence of significant predictors. Although the dataset is composed by Spanish users, many elements of this research are highly applicable to Brazilian market.

Complementing the ideas discussed in the papers above, which are highly contemporary and have their own merit, the next section will approach some perspectives for the Brazilian Digital Payment System, focusing on its nature in comparison with counterparts worldwide.

3. PERSPECTIVES

Data from 2018 shows that 49% of Brazilian internet users use only their smartphones to access the internet, while 47% combine smartphones and desktop, laptop, tablets and other devices to do so. This is the first time the former category surpasses the last [GLOBO, 2018]. If discriminated by social category, *Smartphone Internet Access* type (SIA) is even bigger for Brazilian classes D and E than for A, B and C together, with *pre-paid* type connections representing 70% of the total. From one way or another, Brazilian numbers are greater than the global average: 39% of people in the world use SIA. Regarding the time spent online, Brazil is 3rd worldwide: Brazilian internet users spend 9 hours and 14 minutes by day, on average, with more than 30% of this time dedicated to social networks, a share surpassed by one country only. Thailand (9 hours and 38 minutes) and Philippines (9 hours and 24 minutes) are the world leaders. Cellphone/smartphone average penetration, i.e. the number of devices *per capita*, is close to 68% worldwide, a number also observed in Brazil [GLOBO, 2018].

Contradictorily, Brazil is below the average when the topic is the proportion of the population that buys online: only 45% of Brazilians, compared to a global average of more than 50%, with global leaders like United Kingdom, South Korea, Germany, Sweden and USA scoring 78%, 74%, 74%, 69% and 69%, respectively [TILT, 2018], [DATAREPORTAL, 2019]. From 2013 to 2018, a BACEN report shows just a little difference in the form that Brazilian commercial institutions receive payments: cash, debit and credit cards accounted for 96% of payments in 2013; in 2018, the proportion went up to 98% [INFOMONEY, 2019], [BACEN, 2018]. In the rest of the world, the situation is just the opposite: in 2018, less than 1% of transactions were made with cash in Sweden; in China, more than 90% of payments are made using two *apps* (*WeChat* and *Alipay*) nowadays, with more than 50% of the money generated by commercial payments in the country [QUARTZ, 2019].

With all those numbers, the following question arises naturally: Why do not Brazilians largely use

digital payment devices? The country is one of the leaders in *hours-online* and also on social media, in smartphone use and follows the world average on cellphone/smartphone average penetration.

To answer the former question is quite challenging: hundreds, maybe thousands of variables could be considered to model this, apart from the type of possible approaches, and this article will not follow this path. Instead, it is reasonable to ask: *How is the Brazilian system compared to other major payment systems in the world?*

This following section is almost entirely based on [BROOKINGS, 2019].

3.1. THE NORTH AMERICAN PAYMENT SYSTEM & THE CHINESE PAYMENT SYSTEM

50 years ago, the USA led a global revolution with the creation of magnetic striped cards linked to bank accounts and lines of credit, allowing a small plastic card to replace cash and checkbooks for billions of consumers and merchants, processing trillions of transactions. This system has continued to grow, providing the backbone for *e-commerce* and new methods of *m-payments*. Devices can now turn smartphones into credit card processors and transactions can be securely transacted online (e.g. *Paypal*). **However, the underlying payment networks in America remain a bank-based system**, where the payment and banking systems have been intertwined for centuries.

While the USA spent the past decade upgrading its bank-based magnetic striped cards with chips, China experienced a retail payment revolution. Running away from the card-based landscape, two new payment systems now dominate person-to-person, retail, and many business transactions. It is built on Digital Wallets (DW), QR (Quick Response) codes, and runs through their own big tech firms: *Alipay*, running through *Alibaba* (China's version of *Amazon*), and *WeChat Pay*, running through *Tencent* (China's version of *Facebook*), counting for more than 1 billion users each. **China has performed**

something far beyond the creation of a new technological form of payment: it has largely disintermediated the banking system, taking away from it an important and long-standing source of revenue. Other digital platforms such as fintechs that operate as P2P lending marketplaces are also “instruments for financial disintermediation” that operate in a very different way from banks: “digital platforms are ‘transparent’ intermediaries between borrowers and investors, while banks are ‘opaque’ intermediaries that extend credits to clients on their own books, while receiving deposits from savers as liabilities.” [FERRARINI, 2017: 124].

3.2. IS THERE A TREND IN PLACE?

“Is QR (Quick Response) code the new card?” Payments using QR codes dismiss cards or money, using just a smartphone, for example, and can also be associated with a company which DW allows a recharge by a payment bill, something that directly affects more than 45 million Brazilians (22% of the total population) that do not have or trade bank accounts [EXAME, 2019]. In 2019, the study “*Novos Meios de Pagamento*” listened to 500 people from distinct age groups, income ranges and geographic regions in Brazil, attesting that 17% of consumers are now using QR code for payments in retail stores, while the same quantity was 0% in 2018. But money, credit card and debit card are still the leaders in preference for payments in retail stores: percentages are 68%, 62% and 54%, respectively, while payments using apps, like *Samsung Pay* and *Apple Pay*, account for 24% [SBVC, 2019]. Users also affirmed that QR codes and apps are the digital payment method they would most like to use (17% and 20%, respectively), but they do not do so because most commerce vendors do not accept them.

3.3. CHALLENGES

“Through the process of improving payments by QR code, one of the challenges is exactly the user education”, according to Daniel Bergman, CEO of *Movile Pay*, one of the companies that hosts DW and QR codes, a method that does not stop growing and has become a major problem in Brazil, as there is no unique system for hosting all

the DWs and making them iterate and recognize each other. *Cielo*, the largest Brazilian credit and debit card operator and the biggest payment system company in Latin America by revenue and market value, recently started a partnership with *PicPay* (the biggest DW in Brazil, with 10 million users), but its QR code is also accepted in dozens of DWs, like *BanQi* (from *Via Varejo*) and *Next* (from *Bradesco*). *GetNet* (from *Santander*), *Stone*, *PagSeguro*, *Mercado Livre* and *Itaú* bank also offers QR codes [EXAME, 2019]. There is evidence that some Brazilian banks perform poorly in the transition to digital and it would be important for them to invest on digital transactions in order to improve [CARAFFINI et al, 2018].

4. CONCLUSION

This paper is successful on fulfilling its' objectives, giving an overview on the Brazilian Digital Payment System and certainly developing the literature on the field. The topics of *regulation* and *technology* play a major role, as companies need to adequate themselves to rules and good practices that are still under development, e.g. the way consumers and vendors will manage dozens of DW and QR codes payment options. A similar issue happened in the past, when BACEN had to intervene in the *payment machines* market. Until 2010, *Cielo* (former *Visanet*) and *Rede* (former *Redecard*), controlled the market, requiring exclusivity from vendors. BACEN disabled the duopoly, promoting an open market with more competitors [EXAME, 2019]. Thus, the DW standardization is already a theme of discussion and a natural topic to be developed in both market and academia. An *econometric* approach is also viable for future work, aiming to understand how relevant variables quantitatively affect one or more variables of interest, as in [NELSON & PLOSSER, 1982], [CAMPBELL & MANKIW, 1987] and [DAVIDSON & MACKINNON, 1993].

Some recent papers on the Brazilian Digital Payment System were analyzed and they all converge: *attitude*, *personal innovation in IT*, *perceived usefulness*, *perceived security* and related were the main findings as determinants of actual and future intention to use *m-payment* and novel technology for payments in Brazil. The question "*why do not Brazilians largely use digital payment devices?*" is still in place. The country is one of the leaders in *hours-online* and also on social media, in smartphone use and follows the world average on cellphone/smartphone average penetration, thus that fact is noteworthy for future research. Instead of answering the former question, we focused on "*how is the Brazilian system compared to other major payment systems in the world?*" We got some viable information about a mix landscape, majority composed by elements in the well placed North American Payment System with some incipient and novel aspects of the Chinese Payment System, forming a unique Digital Payment System with all characteristics

from Brazilian regulation, consumer profile and socioeconomic outlook.

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