

World Conference on Technology, Innovation and Entrepreneurship

Transformation of Consumption Perceptions: A Survey on Innovative Trends in Banking

Ceren Türkmen^{a*}, Alper Değerli^b

^a*Sakarya University, Geyve Vocational School, Geyve, Sakarya, 54700, Turkey.*

^b*Beykent University, Faculty of Economics and Administrative Sciences, Ayazaga, Sarıyer, 34396, Turkey.*

Abstract

Having a 65 year history, credit cards like we use today brought about a great transformation and dissolved the obligation of being dependent on holding cash. In line with technologic improvements, evolving with increasing acceleration, the world of economy and finance is experiencing a new transformation nowadays. These technological improvements have challenged financial service providers with the change in the way of buying, selling or doing business. As a result of developments in mobile technologies, this time credit cards themselves are facing a drastic transformation by means of increasing penetration of smartphones, at least materially. With the evolution of consumer technology, consumers will leave the traditional ways of consumption, their leather wallets and standard credit cards, etc. Along with both the improvements in technology and the change in consumer perception and wants, the theory of finance is also changing a separate but similar trajectory due to the help of new security designs, telecommunication technology improvements. This paper aims to provide a unique insight into how financial sector will evolve in the next decade and tries to draw out the drivers of this change. In this aspect, our study will provide series of new trends. Toward this end we will present six new trends, namely; biometric technology, contactless payment systems (m-POS), NFC technology, Host Card Emulation (HCE), mobile Wallet (m-Wallet) and other wearable payment systems, and discuss their probable impacts over banking sector and shopping habits.

© 2015 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of Istanbul University.

Keywords: financial innovation; banking; payment trends.

* Corresponding author. Tel.: +90-264-517-52-47; fax: +90-264-517-10-89.

E-mail address: cerozer@yahoo.com

1. Introduction

Financial sector is evolving by a constant stream of new technological development news, new entrants and new possibilities became available for consumers to pay. A constant theme in the evolving changes and developments is the smart mobile phone and consumer perceptions can be accepted to catalyze mobile payment technologies. The term “mobile payments” is a very broad description that is used for representing a vast number of distinct payment methods and channels.

According to OMLIS, a global mobile payments solutions provider, M-Commerce Trends in Payment Technologies 2014 Report by Emma Thompson, 1.3 billion active credit and debit accounts and more than 5 billion active mobile phone accounts exist globally. By the end of 2013, there were about 245 million mobile payment users, and Juniper Research predicts this will almost double within the next three years. While considering the total commerce value, since the global adoption of mobile payments is on an upward curve, total mobile payment transactions are expected to follow an increasing trend.

At the moment, depending on consumers’ access to technologies, lifestyle choices, and underlying economic factors, Africa currently holds the top place for worldwide mobile payment usage according to Gartner. (Summing up to nearly 52 percent of all global mobile money services.)

On the other hand, if we consider the remaining parts of the world; it can be safely concluded that Asian market comprise an important portion in mobile payments as opposed to North America or Western Europe. Dominant markets in Europe include UK, Germany, Spain Russia and Sweden, backed by high mobile internet penetration infrastructure. Brazil, Mexico and Chile currently hold the highest mobile payment adoption rates in Latin America, which is an expanding market. The main reason for this is due to the need for secure payments system for the unbanked masses.

To sum up, as mobile payments are comprising a higher portion in our lives, secure transaction enabling technologies and authentication alternatives come into use. Biometrics in banking was a major theme for 2014 since banks are bound to use a combination to better authenticate customers and ensure the optimal level of security for online banking and purchasing transactions. From this aspect, biometrics can help to obtain secure services over different features of the customer.

This paper tries to investigate the main driving forces, beneficiary and problematic aspects of potential payment technologies and summarize the key themes for mobile payments by examining some possible scenario outcomes for banking sector. In other words, this report presents unique insight into how the banking market will evolve, what will drive and shape this market evolution, and where the most lucrative technological opportunities will be. This paper is not a comprehensive overview of the underlying technology or the whole industry. It is just an advanced strategic market analysis providing a basic understanding of market associated technologies.

The paper is presented in three parts. Part One is introduction, following part one, second part is comprised of six sub sections, of each of the new trends, namely; biometric technology, contactless payment systems (m-POS), NFC technology, Host Card Emulation (HCE), mobile Wallet (m-Wallet) and other wearable payment systems are investigated. The last part is conclusion, where the technologies' probable impacts over banking sector is stressed. The whole analysis is drawn from public domain and private research and reports, surveys over on-going technical developments.

2. Background

According to the market forecast report through 2020 by ACUITY (2009), the drivers of the changing worldwide environment and IT development can be divided into two main categories of mega trends and meta drivers.

Mega trends of which have specific implications for biometric technology can be counted as; Globalization and Developing Economies, Borderless Economies, Workforce Decentralization and Mobility, Population Mobility, Proliferation of Mobile Devices and the Rise of Trusted Access Anywhere, Central Role of Digital Identity, Inevitability of eGovernment and Rise of Cloud Computing.

On the other hand Meta Drivers shape both opportunities for widespread deployment of biometrics as well as determine the technological capabilities required to address these applications.

The three key Public Sector Application Solution Meta Drivers are: eBorders, eID, and eGovernment. The three key Commercial Application Solution Meta Drivers are: Enterprise Security, Information Transactions and Financial Transactions. The four key Technology Evolution Meta Drivers are: Secure Identity Core, Secure Mobility, Secure Credentials and Secure Transactions.

2.1. Biometric Technology

Biometrics technology is already used at enterprise-wide network security infrastructures, government IDs, secure electronic banking, and other financial transactions, retail sales, etc. Biometrics is an automated method of recognizing a person by a physical, physiological or behavioral characteristic. Among the features measured are; face, fingerprints, hand geometry, ear shape, skull structure, finger nail bed structure, DNA matching, handwriting, iris, retinal, vein, odour and voice.

The industry that has mostly developed in last year, following Descartes Biometrics firm's application which enables users sign into their phone using ear recognition.

From the banking side, In October 2014 MasterCard and Zwipe partnered for the launch of a contactless payment card featuring an integrated fingerprint sensor. From this aspect, the Zwipe MasterCard payment card is billed as the world's first fingerprint authenticated contactless payment card. It contains an EMV certified secure element and MasterCard's contactless application. Cardholder fingerprint data is stored directly on the card, not in an external database. By a fingerprint scan, the Zwipe MasterCard card can be used to make contactless payments of any amount. (Biometric Technology Today, 2014)

This type biometric authentication replaces PIN entry or supports PIN-based systems by creating for 3-factor authentication. on-card biometric data storage eliminates threat of unauthorized use, and prevents any doubt for bad usage of mass stored fingerprint data.

In addition to that MasterCard also pioneering tests for face and voice recognition and cardiac rhythm recognition to authenticate cardholders. Moreover, Texas University are working on a biometrics technology which is able to assess the state of the person such as level of fatigue or stress. Separately, Google now has a second patent on iris scanning technology based on a contact lens system. China Getin Noble Bank has introduced the concept of electronic signatures authenticated by fingervein biometrics. (Caldwell, 2014)

While a number of global banks are experimenting the use of any kind biometrics for securing customer transactions, it can be concluded that because of the yet unidentified risks, the banking sector is still not prepared to use biometrics as a unique authentication factor.

2.2. Contactless Payment Systems (m-POS)

The term mPOS or namely, mobile point of sale is referring to using a consumer mobile device such as a smart phone or tablet to facilitate a payment transaction instead of using a traditional point-of-sale terminal.

2.3. NFC Technology

Payment cards can be used in multiple channels including shopping face to face at while card present, and shopping at internet retailers while card not present.

A relatively recent development in the bank card world is the NFC technology for face to face payments. The banking industry has delivered contactless payment systems in order to give a more convenient payment experience to consumers. In parallel, telecommunications industry has evolved the mobile phone into “smart phone”. By this way, the ability of the mobile device has embedded a payment application through the converging arrival of two technologies, each from different industries. (Sang Un Chae and Hedman, 2014)

NFC is a set of short-range wireless technologies, allowing to make transactions, data exchange with a touch typically requiring a distance of 4 cm or less. If the working procedure is considered, any personal drive will serve as a passive target, which is activated by an initiator. In other words, instead of the cardholder places his payment card into physical contact with the terminal reader, simply brings the chip within close proximity of the reader. From this view, it enables NFC targets to take simplistic forms of tags, stickers, key fobs, or cards that do not require batteries. Hence this technology is easily adoptable from consumer side. NFC payments have reached mass market in Japan (de Reuver, M., et al., 2014)

If we consider the benefits for the society, consumers are allowed to show and pay at the point-of-sales, aiming to fasten their shopping experience. On the merchant side, NFC technology enables them to strengthen their customer relationships by offering faster, easier shopping.

At 2012, NFC market in Turkey still has a long way to go with only 2 million contactless POS terminals, summing up to 3% of the total number of terminals. On the other hand, since all mobile operators in Turkey looking to compete in the NFC space in Turkey, growing of the industry it is expected in some time.

2.4. Host Card Emulation (HCE)

Host card emulation (HCE) technology, which allows for contactless payments to be made directly between consumers' and retailers' banks by using NFC technology, allows the sensitive data used to facilitate transactions to be stored on, and accessed from, cloud servers rather than a mobile device on contrary to traditional NFC applications. We can conclude that, next generation consumer cards won't be a card at all.

According to analysis, while just 18.2% of mobile phones were NFC-ready in 2013; 2018 penetration is predicted be 64%. HCE essentially offers issuers an alternative solution where the use of a physical secure element (SE). By moving the SE to the cloud, the cost and complexity of the model can be reduced significantly, at the same time increasing user experience by ensuring security.

In addition to that it allows consumers to make contactless payments, even without an internet connection, by using preloaded tokens. An example for this can be Starbucks, whose application barcode that can be read at appropriately equipped POS terminals at the stores. The barcode emulates the customer's debit or credit card through a secure gateway and preloads an amount of money, which can be used till used up. (Fisher, 2014)

There are two possible HCE NFC models available at the moment, pure HCE and Hybrid HCE. Pure HCE simulates the SE in its communication with a POS terminal and by this way receives the data required for the transaction from cloud environment. In such a transaction procedure, while card issuer gets the role of payment token manager, MNO retains just the data carriage role.

On the other hand, hybrid HCE can be implemented onto a wider range of handsets. In addition to that, since most of the transaction data is stored on the cloud, the SIM does not have to be replaced for NFC to be enabled.

By pre-authorized EMV tokens, both HCE models enable the mobile device to process an entire transaction even internet connection cannot be maintained.

2.5. Mobile Wallet (m-Wallet)

Today a typical consumer uses his wallet in order to both carrying cash, payment and loyalty cards. At the payment point the consumer “traditionally” pays and then return the cards plus any receipts back to the wallet.

Mobile wallets are digital wallets which are accessed through mobile devices, in that sense m-wallet app has the ability to communicate with the bank and retailer system, based on hardware and software infrastructures enabling secure storage, processing and communication of the data provided by the wallet holder, the wallet issuer and the application/service providers. The customer will have the opportunity to combine different types of cards, such as credit and debit cards loyalty cards driving licences ID cars, etc., perhaps in order of priority, and at the transaction point, the results of the transaction such as billing information, shopping cart contents, loyalty earned and other information such as location, promotions and incentives will be returned to the m-wallet of the consumer. (Brisk, 2014) Furthermore it may be also used for other applications such as loyalty, transport or ticketing.

If we consider the benefits for the society, consumers are allowed fasten their shopping experience. On the merchant side, the retailer tracks the behaviour of the customer and hence is better to know and target each customer’s potential and attracts them by better promotion opportunities and enabling a faster, easier shopping. If we consider the other side, we can clearly state that, m-wallet usage enables consumers to experience more customized promotions, while enabling to get the best deal through instant price comparisons both at the local vicinity and globally.

There are two popular mobile wallet apps by Google and ISIS, referring to the abovementioned benefits of the system, a strong potential lies in it. (Sang Un Chae and Hedman, 2014)

2.6. Other Wearable Payment Systems

A wearable device that is designed to capture biometric measurements has so much potential for identification and authentication of the wearer but so far that remains mainly potential yet. After the launch of Apple Watch in 2014, the wearables market with biometric sensors are started to expand. While, Sensoria announced plans produce bio-sensing fabric sensors, Ralph Lauren partnered with OMSignal for a new fashion collection that will be able to read biological and physiological information via sensors knitted into the core of the product (Caldwell, 2014).

3. Conclusion

As for the conclusion, a case study considering the overall look of the Turkish online payment habits and mobile banking structure is investigated deeply. The online space usage has potentially reached saturation, Virtual cards are an interesting development in the card-not-present segment of the banking payments system and represent an attempt to address security concerns of consumers when making online payment transactions, but still at the infant stage- and no further improvements are expected due to new rivalry technologies of NFC and HCE combined with biometric security. Prepaid cards such as Starbucks Card, are also developing their own niche in crowded cities.

Joint and common infrastructure development is a new issue in Turkish banking industry (the term “joint” should not be understood in terms of competition regulation). Common POS terminal spreading and common ATM applications are frequently used. On the other hand, they are unwilling to work together effectively to create a joint and common NFC infrastructure.

The release of Google's Android allows financial institutions and service providers to take control of their payment transactions independently. The marketplace is weak in terms of contactless infrastructure. As of 2012, NFC market in Turkey still has a long way to go with only 2 million contactless POS terminals, summing up to 3% of the total number of terminals. As of 2014, 22% of credit cards and 8% of debit cards have contactless payment property. (BKM, 2015)

Contactless mobile payments (NFC or HCE) fail to gather broad consumer adoption in 2015. Reasons beneath can be listed as; low phone compatibility and retailer support, POS upgrades that need to be overcome before mass adoption will occur. On the other hand, since all mobile operators in Turkey looking to compete in the NFC space in Turkey, growing of the industry it is expected in some time. Since Turkish consumers are just got accustomed to online purchases and money transfers and also "tap and go" behaviour is new, more informative public advertisements are needed.

Depending on Turkish population structure with young crowds, it can be clearly expected that HCE/NFC can become the dominant technology for fast and widespread mobile payments deployment when the required public knowledge and security sense is established. By deploying services to HCE, allows more independence to end user and also narrows the gap between application issuers and customers. Since value chain will be shortened this ends up with lower provisioning costs and higher profits. As more choices become available in the market, it both triggers competition and developments for future solutions. Opponents of this idea claim that the significant infrastructure costs will further delay public support. However the evolution of mobile payments and side improvements of technical devices is not clear, in a sense we do not know is what other new game changing developments will appear in the future.

Biometric security technologies and m-wallet app have promising future hence increased private and public investments can be expected- keeping Turkish e-government project in mind. Moreover, enhanced security means increased customer satisfaction and higher adoption in the long and medium term. But fingerprint technology is expected to remain the dominant biometric identifier across all applications due to high familiarity, low overall cost factor.

The last issue to mention is about widespread consumer concerns over mobile payment systems about any possible security breaches that may arise due to the cases when a mobile phone is separated from its true owner or when strategic personal data is transferred from a mobile phone to a merchant (Reed, 2014) Provided that, the abovementioned technological changes to be positive for all involved parties, adequate legal preparation should be taken before the technology prevalently approved.

References

- Acuity. (2009). The Future Of Biometrics Market Analysis, Segmentation & Forecasts: Insight Into The Trends, Drivers & Opportunities That Will Shape The Industry Through 2020 - Includes Detailed Market Forecast 2009—2017.Usa.
- Biometric Technology Today. Mastercard And Zwipe Launch Fingerprint Payment Card As Alipay Looks To Biometrics. Vol.2014, Issue 11, 1.
- Bkm. (2014). Türkiye'nin Büyümesi İçin Kart Kullanımı Önemli. İstanbul.
- Brisk, P. (2014). Examining Mobile Payments – Now And In The Future. Cotignac. New Zealand.
- Caldwell, T. (2014). A Year In Biometrics. Biometric Technology Today. Vol.2014, Issue 11, 9-11.
- Cloud-Based Contactless Mobile Payments Scheme Backed By Visa And Mastercard. (March 21, 2014)
- <http://www.out-law.com/en/articles/2014/february/cloud-based-contactless-mobile-payments-scheme-backed-by-visa-and-mastercard/> (April 11, 2015).
- De Reuver, M., Verschuur, E., Nikayin, F., Cerpa, N., & Bouwman, H. (2014). Collective Action For Mobile Payment Platforms: A Case Study On Collaboration Issues Between Banks And Telecom Operators. *Electronic Commerce Research And Applications*, <http://dx.doi.org/10.1016/j.eierap.2014.08.004>
- European Payment Council Secretariat. (2014). Overview Mobile Payments Initiatives. Brussels.
- Fisher, D.M. (2014). Game Changer: Why Host Card Emulation Could Help Banks Reclaim Lost Ground In Digital Payments. *Aba Banking Journal*, Vol.106, No.8, 20-23.
- Hp. (2014). Hp-Rfi Australian Payments Research. Australia.

- Juniper Research. (2015). The World In 2020 - A Technology Vision. United Kingdom.
- Nfc Trials, Pilots, Tests And Live Services Around The World. [Http://Www.Nfcworld.Com/List-Of-Nfc-Trials-Pilots-Tests-And-Commercial-Services-Around-The-World/](http://www.nfcworld.com/List-Of-Nfc-Trials-Pilots-Tests-And-Commercial-Services-Around-The-World/) (April 23, 2015).
- Reed, B.L. (2014). Mobilizing Payments: Behind The Screen Of The Latest Payment Trend. *Journal Of High Technology Law*, Vol.14, No.2, 452-480.
- Sang Un Chae, J., & Hedman, J. (2015). Business Models For Nfc Based Mobile Payments. *Journal Of Business Models*, Vol.3, No.1, 29-48.
- Thompson, E. (July 21, 2014). O2o Commerce (Online To Offline) Signals Demand For Increase In Mobile Payment Security. Omlis. [Http://Www.Omlis.Com/Omlis-Media-Room/Online-To-Offline-O2o-Commerce-Signals-Demand-For-Increase-In-Mobile-Payment-Security/](http://www.omlis.com/Omlis-Media-Room/Online-To-Offline-O2o-Commerce-Signals-Demand-For-Increase-In-Mobile-Payment-Security/) (April 19, 2015).