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Master thesis

E-BANKING: A COMPARISON STUDY BETWEEN GREEK AND FOREIGN
FINANCIAL INSTITUTIONS, PERSPECTIVES, WEAKNESSES AND INNOVATIONS

by

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Dedicated to
the ones who believe in me

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Abstract

The objective of this study is the definition of e-banking, the comparison between the available e-banking services in Greece and other developed foreign countries emphasizing on internet related banking methods, the identification of weaknesses in these systems, the introduction of new e-banking methods and the perspectives of the future of e-banking in Greece. The conclusions refer to the reason for the current state of e-banking services in Greece, the level of progress Greek banks have made compared to the ones abroad and suggestions made by the author about the implementation of new methods and forms of e-banking in Greece.

Keywords: e-banking, Greek banks, foreign banks, innovation, security, weaknesses

TABLE OF CONTENTS

<u>CHAPTER 1: INTRODUCTION.....</u>	1
1.1 Introduction.....	1
1.2 Methodology.....	2
1.3 Structure of the study.....	3
<u>CHAPTER 2: AN INTRODUCTION TO E-BANKING.....</u>	4
2.1 Introduction.....	4
2.2 Forms of e-banking.....	4
<u>CHAPTER 3: E-BANKING IN GREECE.....</u>	7
3.1 Introduction.....	7
3.2 National Bank of Greece	7
3.3 Alpha Bank.....	9
3.4 Eurobank.....	12
3.5 Piraeus Bank.....	14
<u>CHAPTER 4: E-BANKING IN FOREIGN MAJOR FINANCIAL INSTITUTIONS.....</u>	17
4.1 Introduction.....	17
4.2 Deutsche Bank AG, Germany.....	17
4.3 BNP Paribas SA, France.....	18
4.4 Barclays Bank PLC, United Kingdom.....	19
4.5 JP Morgan Chase Bank National Association, USA.....	20
4.6 Banco Santander SA, Spain.....	21
4.7 UBS AG, Switzerland.....	22
4.8 UniCredit SpA, Italy.....	23
4.9 ING Bank NV, Netherlands.....	25
4.10 Nordea Bank AB, Sweden.....	25
4.11 The Toronto-Dominion Bank, Canada.....	27

CHAPTER 5: SECURITY, WEAKNESSES AND INNOVATION.....29

5.1 Introduction.....29
5.2 Security measures.....29
5.3 Weaknesses.....31
5.4 Innovation33

CHAPTER 6: RESEARCH AND RESULTS.....36

6.1 Introduction.....36
6.2 Research methodology.....36
6.3 Data analysis.....37
6.4 Conclusions and suggestions.....46

REFERENCES.....48

APPENDICES

Appendix A: LIST OF ABBREVIATIONS.....51
Appendix B: QUESTIONNAIRE SENT TO FINANCIAL INSTITUTIONS IN GREECE
AND ABROAD.....52
Appendix C: E-MAIL TEXT TO THE GREEK MINISTRY OF EDUCATION.....56
Appendix D: E-MAIL TEXT TO THE EUROPEAN MINISTRIES OF EDUCATION.....58

TABLE OF FIGURES

Figure 1: Map of individuals(aged 16 to 74) using the Internet for Internet Banking in 2013	Page 1
Figure 2: Table of individuals(aged 16 to 74) using the Internet for Internet Banking in 2013	Page 2

CHAPTER 1

INTRODUCTION

1.1 Introduction

Everything flows[Τὰ πάντα ῥεῖ], which metaphorically means that everything changes as time goes by. Thus, with the implementation of new technologies in the financial system, the banking system couldn't remain stable. New methods emerged for the processing of financial transactions and electronic databases replaced the majority of books and documents kept by banks worldwide, thus with the help of computers and the the global communications network, the era of electronic banking had just began.

Greece was not the first country to participate in this transactional revolution, but the Greek banks have progressed and provide a wide variety of e-banking services. The question is, how advanced is the e-banking sector in Greece compared to the ones in the other developed countries? What is the strategy that banks wish to follow towards this direction?Is there any space available to improve the electronic services that banks have to offer and at what extent?Why is the level of internet banking services usage among individuals in Greece in such a low place compared to the rest of the European countries? This level is mentioned in the research below by the European statistics service.

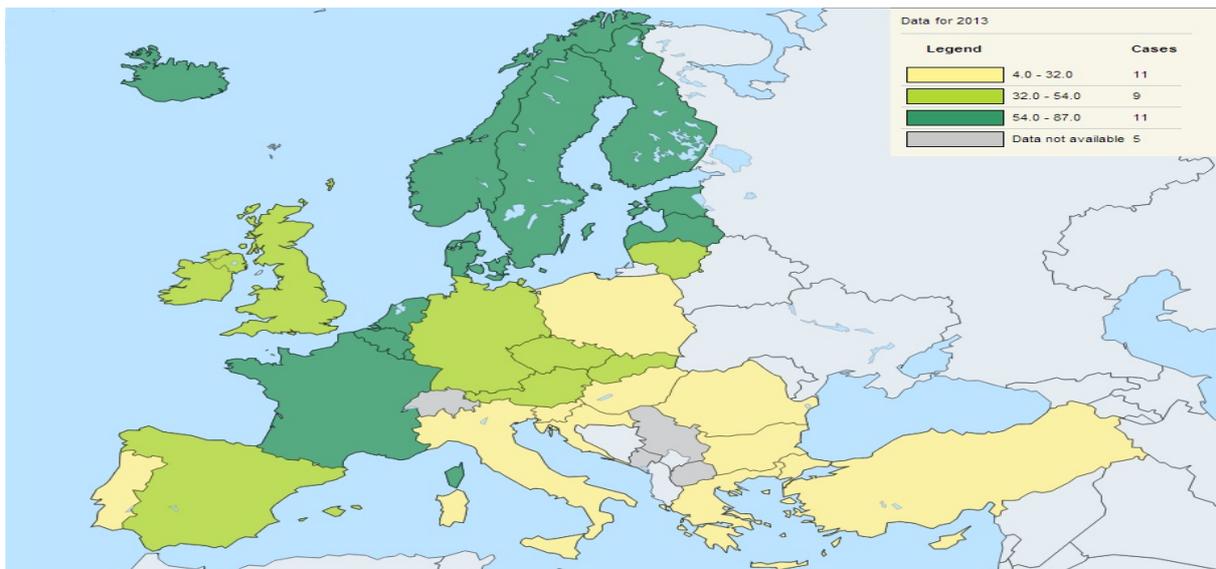


Figure 1.1 Map of individuals(aged 16 to 74) using the Internet for Internet Banking in 2013
Eurostat 2013

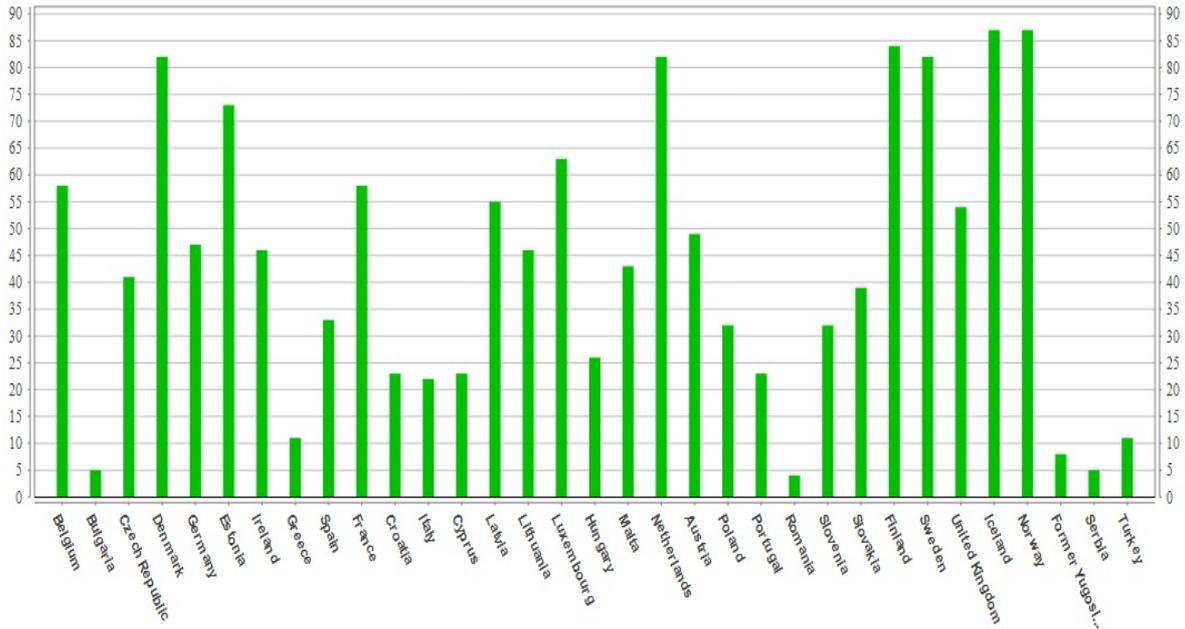


Figure 1.2 Table of individuals(aged 16 to 74) using the Internet for Internet Banking in 2013 Eurostat 2013

This comparison study among so many banks is unique. Researches have been made about internet banking services, concerning the financial institutions' point of view(Papandreou A, 2006), but the main difference is that this study contains a research about the updated status of e-banking services as a whole, because a new term is required to characterize the total of all new services that banks offer nowadays and to learn what makes those services special concerning the new age of banking innovation and the strategy that banks are planning.

1.2 Methodology

In order to answer the main questions of this study, a common questionnaire has been sent to 6 banks in Greece and 174 banks in countries throughout the world, letters with a common question were sent to 29 ministries of education throughout Europe and information was collected from the selected financial institutions using the internet. The purpose is the effort to discover the abilities that banks have in Greece and abroad, to uncover the plans banks have for e-banking services as a part of their corporate strategy and to find out if there is a possible correlation between mandatory education and the use of new alternative banking methods.

The additional data will be collected from various multilingual sources, which will be translated by available online tools, from the internet and from the questionnaires, in order to extract the final conclusions.

1.3 Structure of the study

This study is divided in six chapters. Specifically:

- Chapter one is the introduction with a brief synopsis of the methodology and the structure of the study
- Chapter two is about the e-banking services and the technology that characterizes them
- Chapter three describes the currently available services of e-banking in Greece, as far as the four major financial institutions of the country are concerned
- Chapter four briefly refers to the e-banking services of the most valuable, in terms of assets, banks from ten different countries in Europe and North America
- Chapter five briefly refers to the most up-to-date security, innovation and weaknesses issues concerning the modern e-banking services
- Chapter six is an analysis of this study's results

CHAPTER 2

AN INTRODUCTION TO E-BANKING

2.1 Introduction

In this chapter the term of “e-banking” will be defined and the methods that characterize it will be mentioned.

The term “e-banking' is defined as a sector of banking activities, which provide to a client the ability to execute real time on-line financial transactions through electronic means **a)** without his physical presence inside a branch of a financial institution and/or **b)** with the use of hardware(machinery) or software(programs) provided by a financial institution, without a financial institution employee inserting the transaction commands.

2.2 Forms of e-banking

In this section the mean forms of e-banking will be mentioned, briefly described about the procedures followed by using them and analyzed according to the definition given in the introduction of this chapter.

The most widely known form of e-banking is the ATM. It is a machine that a client can use mainly to withdraw cash by directly charging his account and some additional services may be provided accordingly. The main trait of this form is that a card issued by a financial institution is mostly needed, which enables the machine to identify the client with the use of a password consisted of numbers called PIN. The customer's account can be charged either by the financial institution's ATM or any other ATM that has a service compatible with the card's issuer, no matter what type of smart card is inserted(e.g. debit card, credit card). The APS is a form which requires a machine similar to the ATM, but differs to the point that it does not require a smart card for it to function. It can accept cash and by using the software platform it contains, a series of transactions may be completed. A downside this form has is that the identity of the customers who use it cannot be verified always, if a transaction is completed by using cash only.

Internet banking or online banking is the form that financial transactions are executed

through a platform in an internet web page that a financial institution provides. The identification of the client and the execution of the transactions are made by a combination of passwords provided by the financial institution. The required information are the user name of the client and his password, in order to access the transaction platform of the financial institution and a digital signature, which is provided by various ways, such as a TAN or other electronic devices. In order to approve the transaction most of the times a single use password is required, which is given either by a list of TANs, by a TAN generator provided to the client by the financial institution, by various devices that provide digital signatures and identification of the client or by devices that scan and decrypt messages in the bank's internet banking platform. Another new form of internet banking is services provided by a financial institution using an internet web page, which allows its users to carry out or receive payments, simply by creating an account at that web page. In order to use these services, the user must have a smart card of any form or an internet banking service, which is compatible with the service.

Mobile banking is a relatively new form of e-banking, which is characterized by executing all available financial transactions using a mobile mini computer or phone through an application provided by a financial institution. The way all transactions are executed is most of the times similar to the procedures followed when internet banking is used, which are by entering a user name, a password and a TAN or any other identification device. An advantage this form has is that it can use a smartphone's GPS, which enables the user to position himself according to the nearest ATM or financial institution branch, it can use the NFC technology to transmit data to the nearest payment POS device and complete the necessary payments and also it can use the mobile device's camera to scan a QR code, which gives all the necessary details about the execution of the transaction, or even its touchscreen to identify certain characteristics of the client.

Phone banking is a form where orders of a transaction are given via a telephone device to the financial institution employee or an automated answering machine system. This type of e-banking can also have a real time face to face communication with an employee by using a camera. Additionally, for the completion of a transaction some banks require a TAN as in internet and mobile banking.

The Electronic Funds Transfer at Point Of Sale(EFT/POS) system is an electronic payment system, which enables the customer to charge directly his bank account or individual

card account, by using a smart card that is linked with them. Nowadays, the identification and the completion of the transactions are made by the insertion of the card into a special EFT/POS machine and the customer's PIN, by using a new generation of cards that transmit all necessary transaction data, by using the customer's smartphone or by using a software platform. Although outdated, the old alternative method of completing a transaction, was by simply issuing a receipt with the card's identification numbers and the customer placing a signature on it.

Interactive TV banking is a method that offers the subscribers of a digital TV operator the option to perform financial transactions with a cooperating financial institution, by using a software platform that is accessed through their television. The processes that are being used are quite similar to the internet banking ones.

A smart card, concerning banking transactions, is a card which has abilities concerning the purpose it was made for. For example, if it provides access to the cardholder's bank account it is a debit card. If it has a credit limit then the card is an account by itself and it is called a credit card. If it has a debit limit, according to how much a customer has charged it and is an account by itself, it is called a prepaid card. Also, some smart cards have other kinds of properties, such as converting alternative currency to cash and this signifies the diversity of these cards. The main question here is, why are smart cards a form of e-banking? Because, these cards provide online access to the cardholder's account by using software or hardware oriented platforms, they may stand by themselves as accounts which can be charged by electronic means and mainly because the new generation of these cards have an integrated microprocessor inside, which generates unique transaction numbers that can be inserted in a transaction platform provided by a business on the internet, that verify the rightful holder of the card and the legitimacy of the transaction, thus it has elements of internet banking transaction methodology, but can be used on a variety of software or hardware transaction platforms.

CHAPTER 3

E-BANKING IN GREECE

3.1 Introduction

In this chapter the current condition according to the available e-banking services offered by the four major financial institution in Greece will be mentioned.

The main characteristics of these financial institutions is their market value capitalization and market share in Greece, by means of loans and deposits. These four banks are the National Bank of Greece, Piraeus Bank, Eurobank and Alpha Bank, which have a systemic role in the Greek banking system, according to the HBA. It should be noted that all of these banks offer credit cards and EFT/POS services to their clients, so the main traits of the rest of the e-banking services will be presented.

3.2 National Bank of Greece

In this section the case of National Bank of Greece(NBG) will be analyzed, according to its currently offered e-banking services. This financial institution offers its e-banking services by using the term “i-bank”. It categorizes its services into “retail” and “corporate”, but also provides an individual online service called “Simple Pay”. The retail section provides services which include internet banking, mobile banking, phone banking, ATM and APS, while the corporate one includes internet banking and ATM.

Retail internet banking requires a visit to a branch, where an account will be required by the client and an “i-code” device will be provided along with a user-id to access the internet banking, phone banking and mobile banking services as well. The “i-code” is a portable device which provides “one time” passwords in order to complete transactions, briefly a TAN generator. After this step, the user is authorized to create his own password by using the i-code device in the bank's transaction platform. This service offers information concerning the client's deposits, loans, credit cards, share portfolio, mutual funds as well as salary statements. It provides access to a wide range of transactions including money transfers to NBG accounts, domestic and EU banks, credit card payments, payments to public

corporations and tax authorities, payments to various companies and organizations, share trading, foreign currency exchange rates, chequebook ordering and standing orders. It also provides the issuing of a virtual prepaid MasterCard, which enables the client to complete online purchases via the internet. Security measures available to the client are password changing, i-code device blocking and the management of related accounts in possession of the client, as well as a notification service, which provides instant notification about transactions concerning NBG issued cards to the user via SMS. The security protocol, ensuring the confidentiality of the transactions, is the SSL communications protocol using TLS 1.0 128 bit encryption.

Retail phone banking services are similar to the internet banking ones, yet with the difference of contacting with the bank's help center and talking to an automated system which receives voice prompts in order to execute a transaction or allow the customer to communicate with an employee. The bank also offers the receipts of the completed transactions either by fax or SMS.

Retail mobile banking can be accessed via an application, which a user can freely download by using a smartphone or a tablet. The application can be used individually with its standard features, which include locating the nearest to the user ATM or bank branch by using the smartphone's GPS, information about contacting with the bank's support center or any of its branches and monitoring of the ASE and CSE. If a user desired to execute financial transactions through the mobile banking platform, he could be provided with a user-id and an i-code device, which are used in the same manner as with the internet banking service. It provides information concerning the customer's accounts and credit card status, funds transfer to NBG accounts, bill payments to a limited list of companies, NBG credit cards payments, stock price alerting, stock transactions from ASE and CSE, barcode scanning and OCR for payments.

Retail ATM banking includes services such as information about the customer's accounts, cash withdrawals, deposits of cash and cheques, payments to various companies, organizations and public services, credit card payments and money transfers to NBG accounts. Concerning its compatibility it requires a card issued by NBG or by any other bank which participates in the DIAS, Cirrus, Maestro or VISA interbanking system.

The APS service enables the client to make deposits to NBG accounts, payments concerning NBG loan installments, NBG credit card accounts and bills from various

organizations, while being always free of charge.

Corporate internet banking requires an application by the administrator of the corporation to a branch, where he will be provided with a special “i-code” device for corporations. This service includes money transfers to Greece and abroad, chequebook ordering, share trading, standing orders, e-Factoring (factoring services including tracking of invoices and debt per client), payroll payments and payments to tax authorities. This service offers the “job position administrator”, which is a feature that enables the management and supervision of each job position that has access to the corporation's internet banking, without the mediation of the bank.

Corporate ATM banking is a service that enables the administrator of the corporation to execute all available transactions that are offered by the ATM network, by using a special card that is issued concerning the corporation's accounts.

The “Simple Pay” service is an online service, which is provided by NBG through an internet web page and allows the payments of bills or any other dues to anybody who owns a debit or credit card by VISA, MasterCard, any other card issued by NBG or even by the direct charging of the customer's account in NBG or by using the internet banking of NBG. This allows to anybody who may not be an existing customer of NBG to take advantage of the internet banking services through an individual platform, just by registering online to the service, without going to a bank branch.

The bank, in order to promote its e-banking services, has opened the so called “i-bank stores”, which provide only e-banking services and has employees that guide the clients and educate them through specialized seminars that are organized by the bank during which the use of e-banking and general internet education are provided.¹

3.3 Alpha Bank

This section will describe the e-banking services that Alpha Bank provides to its clients, under the term of “Alpha e-Banking”. Their services are divided into two categories, the “personal” and the “business” one.

Personal “Alpha web banking” is the internet banking service of the bank. In order to register for the service an account is needed and an application must be filled in at a branch,

¹ National Bank of Greece, 2014, viewed 20 June 2014, <https://www.nbg.gr>

via the internet or via phone, which enables the use of phone and mobile banking services as well. Afterwards a user-id and a password will be provided in order to access the transaction platform. In order to complete all transactions(except providing information about the client's deposit accounts, credit cards, loans, stock and mutual fund portfolio, money transfers between the client's deposit accounts, credit cards or credit cards of third parties in the bank), such as money transfer to third parties, the “Additional password device” is needed, which is a portable device TAN generator and produces one-time six digit password numbers that verify the legitimacy of the transaction. The transactions that can be executed using this service is money transfers to Alpha Bank accounts, in Greek and foreign accounts, standing orders to Alpha Bank deposit accounts, payments to loans, credit cards issued by Alpha Bank or other domestic banks, Greek public sector and utility bills, various companies and organizations. The transactions are encrypted by using TLS 1.0 128 bit encryption.

Personal “Alpha mobile banking” provides access to the customer's accounts and informs about their balance and transaction history, enables the money transfers between the client's accounts, payments to Alpha Bank credit cards, loans, public sector fees and various companies and organizations. The WTLS protocol ensures the encryption of all transaction data and the bank uses additional security systems, such as firewalls. that control, protect and record all access to the bank's systems. With the “Tap 'n Pay” service, the mobile banking users that have a credit card and a smartphone that supports contactless technology, may pay by using their smartphone, just by approaching it to a contactless technology POS machine.

Personal “Automated Banking” is the bank's ATM services that are being provided to its clients. The services offered are withdrawals from bank accounts, deposits of cash or cheques, money transfers to Alpha Bank accounts, payments to Alpha Bank loans, credit cards, various companies and organizations. In order to use the ATM network of Alpha Bank a card issued by the bank or any other institution that is compatible with VISA, VISA Electron, American Express, MasterCard, Maestro, Plus or Cirrus interbanking systems. It also offers a series of cards that provide “contactless” payments up to €25 without using a PIN and over €25 by using a PIN. The “Automated Cash Transaction Centers” is the APS network of the bank, which provides services by using cash, such as deposits to Alpha Bank account and payments to various companies and organizations.

Business “Alpha Web Banking” is the service that provides internet banking solutions to the bank's corporate customers. The authorized representative of the corporation must fill in

an application AT a branch or via the internet in order to gain access to the transaction platform. A user ID and password will be provided, along with an “Additional password device”, similar to the personal internet banking one, in order to complete transactions. This service can have two user levels per subscription that authorize the execution of a transaction. Every transaction is characterized as a “job”, that is prepared by the “authorized user” or the “assistant user” and must be authorized by the “authorized user” in order to be executed. The variety of transactions available is the money transfers to Alpha Bank accounts, standing orders for fixed amount money transfers, bill payments to various companies and organizations and information concerning the corporation's account statements.

Business “Alpha mass payments” is a service that provides the mass execution of transactions such as payrolls, supplier payments and customer proceeds. The service may require up to two levels of authorization/signatures in order to execute a transaction. An application in order to use this service can only be filled in at a branch, where a User ID and a password will be provided.

Business “Alpha e-Commerce” is a service that enables shops on the internet to provide an electronic payment system via the bank's special payment platform to their customers in order to complete a purchase by using their credit, debit or any other smart card compatible with VISA, VISA Electron, American Express, MasterCard, Maestro and Diners inter-banking systems. It is also a tool that enables the corporation to monitor and process all completed transactions. The corporation can use this service only after filling in an application at a branch.

Business “Alpha Web International Trade” is a service that enables the monitoring of all international trade related transactions that are being processed by the bank's international trade office and the electronic transmission of all necessary documents, concerning the corporation. This service is free and in order to access it an application must be filled in at a branch.

Business “Alpha Global Cash Management” is a service that provides to multinational corporations the ability to manage the accounts they have in Alpha Bank and its subsidiaries throughout the world, monitor the cash flows, manage the liquidity and the treasury of the corporation. In order to use the service, the corporation should communicate via e-mail with

the bank's service office, where further instructions would be provided.^{2 3 4}

3.4 Eurobank

In this section there will be a brief description of Eurobank's currently offered e-banking services and some of their most important traits. Their services are divided to retail, professional and companies (up to € 2.5 mil.) and corporate banking (over € 2.5 mil.).

What the bank calls “m-Banking” is the mobile banking service and it is free for all the internet banking users of the bank. The services offered are money transfers to Eurobank and domestic banks, information about the client's accounts and investments, payments to loans, credit cards, prepaid cards and various companies. It also provides an ATM and branch locator, payments by using barcode scanning, Eurobank news feeding, various tools (e.g. exchange rates, loan calculator) and the option of getting support from an employee if requested. The service is also available for corporate clients.

Retail “e-Banking” is the internet banking service, which requires from a client to have a bank account, a user id and a password in order to access the transaction platform of the bank. In order to execute transactions a device called “e-Token” is needed, which is a device that connects to a USB port of the client's PC and enables the client to use his personal unique “digital certificate” that is provided by the bank, in order to digitally sign every transaction that is executed through that PC. This “digital certificate” may be installed either on the user's PC or the e-Token device, according to the bank's policy of transaction money amount limits. The services provided by “e-Banking” are account balance and activity information, money transfers to Greek and international accounts, payments to credit cards, loans, various companies and share buying and selling in real time. The safety protocol used by the bank is the SSL 128 bit. The bank also offers a service through an internet web page called “LivePay”, which enables all users that own a credit or prepaid card, that is compatible with Visa, MasterCard, Maestro, Prepaid Visa interbanking systems, to make payments to various companies and organizations without being obligatory for them to register for the service.

Retail “EuroPhone Banking” is the phone banking service and it requires an “e-Banking” application to a branch. Its services include information about the client's accounts,

² Alpha Bank, 2014, viewed 21 June 2014, <http://www.alpha.gr/>

³ Alpha e-Banking, 2014, viewed 21 June 2014, <https://secure.alpha.gr>

⁴ Alpha Bank Tap n' Pay, 2014, viewed 20 August 2014, <http://www.alphabankcards.gr/tapnpay/>

money transfers to domestic and Single Euro Payments Area banks, payments to loans, credit cards and various companies, transactions concerning the stock market, chequebook ordering and various transactions currently offered by the bank's customers' service.

Retail “Eurobank ATM” offers cash withdrawals and deposits, bill payments to loans, credit cards, various companies, money transfers between the client's bank accounts and the bank's ATM network allows to all customers who own cards compatible with the DiasNet, Cirrus, Maestro and MasterCard interbanking systems to perform withdrawals from their accounts. Retail “Automated Transaction Centers” is the APS service of the bank, which do not require a card to use and offer payments to loans, credit cards and various companies, deposits to Eurobank and other banks.

Concerning the “professional and companies(up to € 2.5 mil.)” e-banking services, for the time being the bank offers its ATM network, internet banking, phone banking, mobile banking and a platform concerning franchising planning to all concerned companies.

With its internet banking, all companies can execute transactions that are included in the retail internet banking section, but also transactions that concern chequebook ordering, salary payments, importing and exporting goods(by sending and receiving all necessary invoices concerning the transactions using a platform called ΜέλλονLine).

The ATM network supports the companies, as the bank provides them with a special “Eurobank business card”, which can be used for purchasing goods and bill payments to various companies, concerning the corporation.

The “EuroPhone Banking” of this category offers services that include amongst others information about accounts, bill payments to loans, credit cards and various companies, money transfers to accounts Greece and abroad, chequebook ordering, standing orders and transactions concerning imports.

The “Euro Franchising Plan” is a service that allows to all franchisor companies the ability to monitor their franchisees' financial limits, automate their collections and payments system and improve the transaction system between their franchisees. With this service the bank becomes an intermediate and improves the monitoring and financing of these companies.

Concerning the “Corporate banking(over € 2.5 mil), all of the above professional services are offered, but also there are more options. A service called “eFactor” allows the constant monitoring of all factoring related transactions of the company. A subsidiary corporation of Eurobank called “be-business Exchanges SA”, offers services concerning a

system of automatic sales and purchases(e-Procurement), a system of creating auctions for the company's demands(e-Auctions) and a system that creates and monitors electronic invoices(e-Invoice).⁵

3.5 Piraeus Bank

In this section the e-banking services of Piraeus Bank will be mentioned and their most important traits as well. Their e-banking services are entitled “electronic banking” and are offered to “Individuals” and “Companies and professionals”.

Individual “Webbanking” requires an account and an application to be filled in at a branch, where a user id and a password will be provided, in order to access the transaction platform. For additional security measures some transactions require a TAN number called “extraPIN”, which is provided either by SMS to the client's mobile phone either by a TAN generator device called “extraPIN generator”, which generates every minute a unique number that can be used to verify the client's identity. The transactions that can be carried out through the platform are information about the client's accounts and opening of a new one, money transfers to domestic and foreign bank accounts throughout the world, bill payments to loans, credit cards, companies and organizations, information about cheques and chequebook ordering and transactions concerning domestic and foreign stock markets. Additionally, the user can transfer money from an account to an ATM of the bank and withdraw cash without having a card, but by using a unique code that is sent through the internet banking platform. The client can also issue a prepaid card and instantly buy a car insurance by filling in the required fields of the online application. Another service offered is the “winbank alert” that informs the client via SMS, e-mail or by phone about the transactions executed concerning his accounts, cards or the portfolio. The security protocol used is the SSL 128 bit. Also if a user wishes to be informed about the balance of a credit card, the “winbank for cards” platform is used, which requires only some information of the card in order to access the service.

The phone banking service of the bank has similar services and transaction methods by using the “extraPIN” device and it requires just a debit card, a bank account and an application via phone.

Individual “mobile banking” offers transactions such as information about the client's

⁵ Eurobank, 2014, viewed 22 June 2014, <http://www.eurobank.gr>

accounts, bill payments to companies and organizations, money transfers to domestic, foreign bank accounts and a service that uses a bank's ATM in order to withdraw cash without a card. It also provides a nearest ATM and branch finder and a communication, with the bank's help desk, tool.

The ATM network of the bank provides transactions that include information about the accounts, cash withdrawals and deposits, bill payments to various companies and credit cards issued by the bank, money transfers between the client's accounts to the bank and cash withdrawals without a card using mobile or internet banking.

The “Easypay” service includes the APS network of the bank and an internet web page. The APS network of the bank provides information about the clients' accounts, payments to loans, various companies, Piraeus bank and other banks issued credit cards and cash deposits to Piraeus bank accounts. The internet web page service requires the client to be registered in order to use it and by paying through a credit, debit, or any other form of smartcard, one can execute transactions such as payments to various companies.

Concerning the “professional and companies” internet banking service, an application is required and each user gets a “job position” with unique codes. In order to complete some transactions, an “extraPIN” number is required, which is received either by SMS or by the “extraPIN” generator as above. Each “job position” may have a specific level of authorization to execute certain transactions at certain amounts of cash and the final authorization of each transaction is approved by one or more “administrators” of the company. The transactions available are information about the company's accounts, payments to loans, credit cards, various companies and public organizations, chequebook ordering and monitoring, POS monitoring, money transfers to domestic and foreign bank accounts, portfolio management and prepaid card issuing.

The “professional and companies” mobile banking provides the client with the ability to be informed about the company's accounts, give authorization for transactions requested by other “job positions”, order chequebooks, pay companies and credit cards, transfer money to domestic and foreign bank accounts and manage the company's stock portfolio.

Concerning the ATM network, the “Cash for Business” card can be issued, which enables the client to withdraw cash, monitor the accounts' balance and purchase goods concerning the company.

Additional services are a platform that allows the company to monitor all its factoring

related transactions, through its subsidiary company “Piraeus Factoring” and an online application that enables someone to acquire a prepaid virtual card, even without being a client of the bank.

The bank offers a “paycenter platform” service to all companies that wish to make online sales through a platform that is linked to the company's web site and enables their customers to make purchases online by using their smartcards.

Also, the “VirtualPOS by phone” is a service that enables the company to make sales and getting payments from credit, debit and other forms of smartcards by using a special platform through the internet, without having to use a POS machine. ⁶

⁶ Piraeus Bank, 2014, viewed 23 June 2014, <http://www.piraeusbank.gr>

CHAPTER 4

E-BANKING IN FOREIGN MAJOR FINANCIAL INSTITUTIONS

4.1 Introduction

In this section there will be a brief description of the e-banking services offered by the top banks, in terms of assets as of February 2014, of 10 developed countries in North America and Europe. The challenging part of this chapter is to understand the terminology each bank uses concerning its e-banking services, because the marketing sector of each financial institution tries to incorporate in each client's language and culture the meaning behind the words that they are accustomed to. The e-banking services concerned are about internet and mobile banking, while the rest of the services promoted by each bank will be mentioned as well.¹

4.2 Deutsche Bank AG, Germany

Deutsche Bank AG has a variety of e-banking services including internet banking, ATM, a variety of smartcards, phone banking, mobile banking and some additional services.

The “online banking” is the internet banking service and requires an account, which can be opened either by visiting a branch or by filling in an online application form. The access to the banks transaction platform can be authorized with the use of a PIN or with a special software provided by the bank called “WebSign”. The encryption protocol used is SSL 128 bit. Each transaction requires a TAN number provided by a list or by SMS to the clients mobile phone, a requirement which can be disabled each time a client enters the transaction platform. Some of the available transactions include money transfers, payments to companies, loans and credit cards, portfolio management, information about the customer's accounts and loans. The use of mobile banking and phone banking can be enabled with the activation of internet banking and may provide similar services. The enhancement of the internet banking experience provided to the client, whether a company or an individual, can be made with a use

¹ Accuity, 2014, viewed 01 September 2014, <http://www.accuity.com/useful-links/bank-rankings/>

of a series of “online banking” and accounting software tools that have been designed according to the customer's needs. One of these tools is the Home Banking Computer Interface / Financial Transaction Services (HBCI/FinTS)² which is a common online banking standard in Germany³ and with the use of HBCI smartcard reader software and hardware, a PIN and a TAN, multi-banking transactions can be executed via a single transaction platform. For corporate clients the Electronic Banking Internet Communication Standard (EBICS)⁴ can be used, which enables a multi-banking electronic management of the corporate customers' accounts in Germany. Other services includes an accounting service that enables the tax advisor of the company to obtain electronically all information needed about the company's accounts as well as a service that contains professional information about investments and an advanced banking and post-trade transaction platform. The ATM banking services include a variety of transactions such as cash withdrawals, money transfers to DB accounts, bill payments, account information and cash deposits. Its worthy to note that the bank is a member of the “Global ATM Alliance” along with banks such as BNP Paribas and Barclays, which are mentioned in this study, which is a group of banks that provide no fees concerning the withdrawals(except all currency conversions), transfers and balance information from all the ATMs that belong to all participating banks.^{5 6 7 8}

4.3 BNP Paribas SA, France

The bank offers a wide variety of e-banking services for individuals and companies, some of which will be briefly mentioned below.

The client has an account, he has an option of applying for the e-banking services through the bank's web page, where a customer number and a password(which is a 6-digit code) are provided. Concerning the password, it is inserted in the bank's web page by using a special “keypad”, that is designed in a way to provide extra security and also can be changed by the client and the encryption protocol used is SSL 128 bit. This registration enables the

² FinTS, Die Deutsche Kreditwirtschaft, 2014, viewed 01 July 2014, <http://www.hbci-zka.de/>

³ Banks Germany, 2014, viewed 01 July 2014, <http://banks-germany.com/information/internet-banking/hbci-method>

⁴ EBICS, Die Deutsche Kreditwirtschaft, 2014, viewed 01 July 2014, <http://www.ebics.de/>

⁵ Deutsche Bank(India), 2014, viewed 01 July 2014, <http://www.deutschebank.co.in/>

⁶ Deutsche Bank, 2014, viewed 01 July 2014, <https://www.deutsche-bank.de>

⁷ Bank of America, 2014, viewed 01 July 2014, <https://www.bankofamerica.com/>

⁸ Deutsche Bank online and brokerage, 2014, viewed 01 July 2014, <https://meine.deutsche-bank.de/trxm/db/>

access to internet, mobile and phone banking services. The transactions that can be executed via the internet banking service include money transfers to domestic and international accounts, payments to credit cards, loans and various companies, credit card and insurance online applications, stock market transactions and tools are provided concerning the client's accounts. The phone and mobile banking services are quite similar but less compared to the internet banking ones. The bank also offers an extensive list of tools for corporations, which provided a better management concerning e-banking services and include the “Connexis cash management”, “Connexis trade finance” and “Centric” systems. The first is the corporate internet banking platform of the bank and it enables, through a vast list of transactions, the management of the company's accounts in BNP Paribas and third party banks, the second is a tool that enables the monitoring and management of the company's international trade transactions and the third is an application platform that helps the company to monitor and control its treasury and business operations and obtaining market information. The bank also has a list of services concerning electronic markets trade, global treasury and derivative clearing systems available for all interested corporate clients.^{9 10 11 12}

4.4 Barclays Bank PLC, United Kingdom

The bank emphasizes on the security of its systems and offers an internet security software, a “PINsentry”, which is a device that requires the client's card(debit, cash or authentication card) to provide 8-digit TANs in order to complete all available internet and mobile banking transactions and an online and mobile banking guarantee, which protects the client from fraudulent actions. For individuals, the access to the internet and mobile banking platform is granted by using the client's “passcode” and “memorable word” or the “PINsentry” device and some of the transactions available are money transfers to accounts, the setting up of standing orders, payments to credit cards, loans and various companies and information about the client's accounts, always with the encryption of all data with SSL 128 bit. The “Barclays Pingit” is a mobile banking service that allows to all individuals and companies the receiving

⁹ BNP Paribas, 2014, Les services en ligne de votre banque, viewed 03 July 2014, https://www.secure.bnpparibas.net/banque/PA_CanalnetApp/documentum/canalnet/public/PDF/pdf_GuideUtil_09_2011_20111028015026.pdf

¹⁰ BNP Paribas Corporate and Investment Banking, 2014, viewed 03 July 2014, <http://cib.bnpparibas.com/>

¹¹ BNP Paribas, 2014, viewed 03 July 2014, <http://www.bnpparibas.com/>

¹² BNP Paribas.net, 2014, viewed 03 July 2014. <https://www.secure.bnpparibas.net>

of payments, without them necessarily having an account in the bank, just by registering to the service, getting a “shortcode” and a “QR code” and the received payments can be sent to the client's selected UK bank account. The “telephone banking” of the bank offers similar services, yet it requires a “membership number” and a “passcode”. For “premier” customers the bank offers a money management service in internet banking called “Barclays money tools”, which allows the client to monitor and manage the accounts in a more efficient way, an online storage space called “Barclays Cloud It”, which contains documents uploaded by the bank concerning the client's accounts and used by him at his own will and a new technology contactless debit card. For business clients, the internet banking services are similar to the ones provided to individual and premier clients, yet they may demand extra authorization signatures in order to complete the transactions. For more specialized businesses, the “Barclays.Net” service offers a complete solution of internet banking integrated services that allows the management of international trade payments, accounts in Barclays and other banks and payments on behalf of third parties. For corporate clients, the bank offers the available internet banking service, the “Bacstel IP” service, which is a delivery channel that enables payments and collections, the “Direct Corporate Access” service, that enables mass and advanced features payments, the “Global Trade Portal” service, which enables the advanced monitoring of the corporation's imports and exports, the “Host to Host” service, that enables the centralized monitoring of the corporation's treasury management and bulk payments and an easy way of communicating with its cooperating banks, the “SWIFT for corporates” service, which allows the use of the SWIFT network in order to communicate with banks worldwide and the “Virtual Account services”, which enables the management of multiple accounts on behalf of the corporation's clients.¹³

4.5 JP Morgan Chase Bank National Association, USA

In this section the e-banking services that the bank offers as “Chase Bank” will be mentioned.

The bank categorizes its services to “personal”, “business” and “commercial”. First of all, opening an account in the bank gives access to every e-banking service that is offered and in order to use internet and mobile banking, an online application is required, where the customer creates a user ID and a password. For the personal part, Chase Bank offers a variety

¹³ <http://www.barclays.co.uk/> 10/07/2014

of services that include internet banking, which is protected by SSL 128 bit, mobile banking, smartcards and ATM. The online and mobile banking enables transactions that include money transfers, bill payments, repeating transfers, information about accounts and cheques and even depositing cheques online simply by scanning them. Also there is a feature that enables money transfers to others, simply by filling in the e-mail or the mobile phone number of the recipient in the required field. The “business” online and mobile banking enables the transactions offered in the “personal” part, management of cheques, management of the customer's account by multiple users with the option of monitoring their activities and payroll management. The bank also offers services that enables the payment from customers through the company's website and even by using a mobile POS software and ACH payments, that provide mass payments to vendors and various individuals. The “commercial” banking section has all of the above features and tailor suited services that concern treasury management, international trade and other specialized services.^{14 15}

4.6 Banco Santander SA, Spain

The bank offers services to individuals, businesses and institutions. The e-banking services come under the “multichannel agreement” between the client and the bank, which enables the use of the “Supernet”(internet banking), “Supernet Mobile”(mobile banking) and “Superlinea(phone banking) services.

In order to use the internet and mobile banking a username and a password chosen by the client are required, along with an electronic signature to confirm the transactions and in order to use the phone banking the ID and a 4-digit password are required, along with the electronic signature. The internet banking service for individuals offers transactions such as money transfers, bill and loan payments, opening and management of accounts and portfolio management, while being protected by SSL 128 bit.

For businesses, the internet banking has features like the ones in the individual sector, but also featuring the management of factoring, leasing and international trade. There is also the business “iZettle” mobile POS service with a special device and software, which enables payments from various smartcards in any place. With the “Santander trade” service, a company can manage online its import and export operations. For institutions the internet

¹⁴ JP Morgan Chase and Co, 2014, viewed 10 July 2014, <https://www.chase.com/>

¹⁵ Chase Online, 2014, viewed 10 July 2014, <https://chaseonline.chase.com/>

banking services have an international treasury management program, an online bids service and a grant and subsidiaries service.^{16 17}

4.7 UBS AG, Switzerland

This bank has a variety of solutions concerning individuals, companies of any size and even banks. The main traits of the services offered to individuals and companies will be mentioned, as they are promoted by the bank.

The ATM services include the “UBS Bancomat”, which provides withdrawals and account information, the “UBS Bancomat Plus” that can also accept deposits and the UBS Multimat, which enables money transfers, account information and domestic or foreign payment orders, by using the “UBS customer card” or “UBS Maestro Card” and the customer's personal code.

In order to log in to the “e-banking” platform, which is the internet banking service, there is a variety of options, but it is obligatory to have a “contract number” and a PIN, that are provided by the bank. First of all a code is displayed in the bank's internet banking platform and in order to verify the identity of the client and later the completion of the transactions there are three ways of doing this. The first is by using a card reader with an “Access card”, where the two join together and by entering the bank's displayed code the device decrypts it and generates another code which is inserted in the bank's platform. The second way is by using the “Access card display”, which is a smartcard with a built-in keypad and display that works by itself in a similar manner. The last way is by using the “Access key”, which enables the connection between the “Access card” and the client's PC, which provides confirmation to the required transactions, just by pressing a button on it, after verifying the codes given by the bank. With this service a client may transfer money, get account, credit card and market information, open new accounts, pay bills, trade securities and contact directly with an assistant of the bank. It is protected by SSL 256 bit.

In order to access the mobile banking platform, the “Access card” with the “Card reader” can be used and for new technology smartphones that support NFC technology, the “Access card” and the “Access card display” have built-in antennas that provide a wireless

¹⁶ Banco Santander, 2014, viewed 11 July 2014, <https://www.bancosantander.es>

¹⁷ Bancon Santander(Puerto Rico), 2014, viewed 11 July 2014, <https://www.santander-ebanking.com/ICBankingWeb/Login.aspx>

exchange of access data. The mobile banking service provides transactions such as account and credit card information, money transfers, trading securities, payments to various companies manually and even by scanning the payment slips on the bills.

For businesses there is a plethora of services available, yet concerning the “online services” such as internet banking, it has features that are provided to individuals and also integrated tools that enable the monitoring of all purchases made by the company's business cards, the prediction of future cash flows and the ability to connect to external software programs. There is also a client interface in the internet banking called “UBS Trade Finance Access”, that enables the execution of trade transactions electronically. The mobile banking service for businesses offers a feature that is enabled with the use of “SumUp PIN+” device, which is a mobile POS system and provides instant payments in any place. Also, with the use of UBS multibanking services, clients may manage their accounts in UBS or other third party banks.^{18 19}

4.8 UniCredit SpA, Italy

Knowledge, specialization and innovation characterize the identity of this bank. Such innovative practices are incorporated in its e-banking services as well that are available to individuals and companies of any size as well.

The internet banking service to individuals enables a series of transactions such as money transfers, payments of loans and obligations to various companies and public authorities, account information and stock trading and is protected by SSL 256-bit encryption. In order to access the internet banking platform a customer code and a PIN are required and to authorize the execution of the transactions a code is required which can be obtained by three ways. The first way is by using a “password card” that contains 40 password numbers, a “Unicredit pass TAN generator”, which is a device that generates unique TANs and by using the “Mobile token tool”, which is a TAN generator software application in the client's smartphone. The mobile banking service, which is available to businesses as well, has similar features to the internet banking concerning the logging in to the service and the authorization of the transactions and offers services such as stock trading, account, loan and investments monitoring, as well as a nearest ATM and branch finder tool. For private banking clients, there

¹⁸ UBS, 2014, viewed 14 July 2014, <http://www.ubs.com/>

¹⁹ UBS online service, 2014, viewed 14 July 2014, <https://ebanking-ch1.ubs.com/workbench/Index.do?login&>

is the online consulting service, where all necessary documents are provided to the client for signature either by the internet either by their mobile phone.

For small and medium sized companies the bank offers single and multi internet banking services. As far as the “singlebank internet banking service” is concerned, it is the internet banking for companies that is similar to the one offered for individuals and also enables payments to tax authorities and salaries, the arrangement of job positions and authorities of its users and there is a tool that allows the monitoring of the company's clients and storing of its invoices electronically. The “multibank internet banking services” include the “Banca via internet CBI”, where CBI stands for “Corporate Banking Interbancario” and is a “telematic” banking service that allows working with all current account transactions activated at institutions linked to it and requires a code of membership, a PIN and a device that generates passwords every 60 seconds to authorize transactions, the “UniWeb 2.0” that offers the standard CBI services, the ability to communicate with all CBI compatible banks and an advanced banking platform and “UniWeb 2.0 Plus” is an advanced version offering a cash management tool specially designed for companies that have international activities. The bank also offers the “TLQ7 service”, which is a “remote banking” service that allows the direct communication of the company with all banks it has accounts to and perform any banking operation. The bank also has a treasury management service called “TLQ Enti”, that allows among others the mass payments of salaries, payments to tax authorities, sending money orders and monitoring the daily cash flows and POS entries of the company. For corporations, except the internet banking service there are tools that enable the monitoring of global trade operations, also an international cash management platform to manage its accounts using the support of the internet banking service and an electronic invoice service. The phone banking service available to individuals and companies enables transactions such as money transfers, account information and payments to various companies.

The ATM network of the bank enables withdrawals, deposits of cash and cheques and utility payments. It is noteworthy to mention that there is a series of cards, credit and prepaid, offered by the bank and they have a contactless feature on them that enables the payment of up to €25 of goods just by approaching it to a POS reader without using its PIN. Also there is a service called “Servizio informativo genius card web” that enables the monitoring of the prepaid cards issued by the bank, just by using the client's customer code and a PIN given by

the bank.^{20 21 22}

4.9 ING Bank NV, Netherlands

This Dutch bank identifies itself as a “bank for everyone”, which is a characteristic of its services as well, offered to individual and business clients as well.

The internet banking service requires a username and a password. given by the bank after registering to the service that enables the use of mobile banking as well, while sometimes when the bank requires it, a PAC is needed in order to access the SSL 256-bit encrypted platform, which is sent by SMS to the client's mobile phone or from a list provided by the bank. In order to authorize the transactions a TAN is required, which is sent by SMS or from a list provided by the bank. The service offers among others account information, money transfers, payments to various companies through the “FiNBOX” service that allows the payment of electronic invoices from the cooperating companies. When shopping online, the “iDEAL” service provides online payments by the client through the internet banking platform of the bank and a TAN to authorize the transaction. The mobile banking service needs a TAN only to activate the service and a PAC to verify the identity of the client who creates a mobile PIN in order to access the platform again. There are available transactions such as account information, money transfers, credit repayments and payments to various companies. For international businesses there is a series of tailor made solutions for international cash management and trade transactions. The bank also has a series of custom made cards with contactless technology, that provide instant payments without the use of a PIN. The ING group has a variety of phone banking, internet banking and mobile banking services as well in many foreign countries.^{23 24 25}

4.10 Nordea Bank AB, Sweden

The bank's mission of becoming a “great European bank” acknowledged for its people and

²⁰ Unicredit, 2014, viewed 15 July 2014. <https://www.unicredit.it/>

²¹ Consorzio CBI, 2014, viewed 15 July 2014, <http://www.cbi-org.eu/>

²² Banca via Internet Unicredit, 2014, viewed 15 July 2014, <https://online-private.unicredit.it>

²³ ING Direct, 2014, viewed 16 July 2014, <http://www.ingdirect.com.au/>

²⁴ ING, 2014, viewed 16 July 2014, <https://www.ing.nl>

²⁵ Inloggen mijn ING, 2014, viewed 16 July 2014, <https://mijn.ing.nl>

creating superior value for its customers and its shareholders, is important in order to create innovative e-banking services. These services are available for private and corporate clients.

For private clients the “Nordea via Internet” is the internet banking service that requires the “Personnummer” client number to log in the platform, which is protected by SSL 256-bit encryption and offers transactions such as money transfers, stock trading, payments to various companies, account management, monitoring of loans, investments and salary payslips and also similar transactions are available through mobile banking, which also supports payments of bills by scanning QR codes and phone banking as well. For the authorization of the transactions the options are the “e-kod” device, which connects with the client's smartcard that is provided by the bank and by inserting a code the bank gives in its platform the device decrypts it and gives the final authorization code in order to execute the transaction and the “BankID” service, which provides electronic identification of the client, is comparable to physical identity documents. This is used by installing an application to the user's PC or mobile phone and provides authorization by inserting the client's bank provided card in a “BankID” device and connecting it to the user's PC via a USB cable or without connecting it and by just providing the authorization codes. With the “E-betalning” service a client may pay through the internet and by using this option at the online store that is compatible with the service and is immediately transferred to his internet banking platform where transactions are made as usual. The “e-faktura” service enables the receiving and payment of bills from companies that cooperate with the bank and also there is an option of communicating with them. The “E-identifiering” service is a tool that provides electronic identification of the client and enables him to digitally sign documents through the internet, which helps the daily transactions with public services and companies as well. For business clients, except the services offered to the private ones, the “E-lön” service provides electronic salary payslips to the company's employees and the “E-market” service that provides access to the international trade markets and also trading tools and market analysis information. The “Trade Finance Net Services” is the tool for companies that need an advanced management tool of their international trade needs. There is also the option of using the “Swish” service, that enables all registered to the service companies to receive payments directly in their accounts from individuals, just by using a smartphone application.^{26 27 28 29}

²⁶ BankID Develops and streamline your business, 2014, viewed 17 July 2014, <http://www.bankid.com/>

²⁷ Nordea, 2014, viewed 17 July 2014, <http://www.nordea.se/>

²⁸ Nordea, 2014, viewed 17 July 2014, <http://www.nordea.com/>

²⁹ Nordea Bank AB, 2014, viewed 17 July 2014, <https://internetbanken.privat.nordea.se>

4.11 The Toronto-Dominion Bank, Canada

In this section the e-banking services of TD Canada Trust will be mentioned, which is the personal, small business and commercial banking operations sector of the Toronto-Dominion bank in Canada, as well as some of the main services offered for commercial client, which are part of a vision to “become a better bank”.

The internet banking service is called “EasyWeb” and the UserID and password, which are needed to use the service, can be obtained via an online registration process and some of the transactions available are money transfers, utility payments to various companies, information about accounts, ordering foreign currency and investment transactions, using the SSL 128-bit encryption. The phone banking service is called “EasyLine” and allows transactions such as the ones offered in internet banking and also more such as opening of new accounts, ordering cheques, and applying for loans and credit cards. With the mobile banking service the client may get information about his accounts, pay bills and send money through the “Interac e-Transfer”, which is a service that allows sending money to users just by inserting their mobile phone number or e-mail address. The ATM network of the bank enables the withdrawing and depositing of cash, payment of bills, money transfers between accounts and getting information about the client's accounts. For businesses, except the e-banking services offered for private customers that are about similar, there is a variety of solutions such as a “Wire payment service”, that incorporates with the “Web business banking” platform and allows the international transfer of funds, an EFT transfer collection and crediting system, that allows the management of the company's account receivables and payments, the EDI service, which allows an advanced electronic management of the company's payments, the “Bill payment creditor service”, which enables payments from the company's customers using the bank's electronic and physical network. Also, the bank offers advanced EFT/POS solutions, so that companies may accept card payments at the point of sale, online, on the company's computer and over the phone. With the use of the “Powerpay Phone”, “Powerpay Web” and “Insync(Service by PC)” services, a company may manage its payroll needs through the internet using advanced tools. Through the “Online Mart” service, a company may receive online payments through the bank's payment platform and it also helps them build their online store. With the “WebBroker” service all investments may be managed online with an advanced trading tool. Also the cards offered by the bank may use contactless

technology for instant payments.^{30 31 32 33 34}

³⁰ TD Canada Trust, 2014, viewed 17 July 2014, <http://www.tdcanadatrust.com/>

³¹ TD Waterhouse, 2014, viewed 18 July 2014, <http://www.tdwaterhouse.ca/>

³² TD, 2014, viewed 18 July 2014, <http://www.td.com/>

³³ TD Canada Trust, 2014, viewed 18 July 2014, <http://www.onlinemart.ca/>

³⁴ TD Commercial Banking, 2014, viewed 18 July 2014, <http://www.tdcommercialbanking.com/>

CHAPTER 5

SECURITY, WEAKNESSES AND INNOVATION

5.1 Introduction

In this section the technological advance in e-banking services will be briefly mentioned, along with the most important facts concerning security measures and the weaknesses they have.

5.2 Security measures

As far as Greece is concerned, in May 2006 there was a meeting between the Hellenic Telecommunications and Post Commission, the Hellenic Bank Association, representatives of Greek banks, the Hellenic Authority for Communication Security and Privacy and the Greek Police Cybercrime Unit during which they discussed ways of preventing the leakage of customers' personal data on the internet to criminals, with which they could engage in illegal financial transactions. The suggestions made, as referred by the HBA¹, were:

- 1) the requirement of a “digital signature” in order to complete a transaction,
- 2) the creation of a “mechanism” which stops e-mail sending to banks' clients from “suspicious web addresses” and warns them about phishing e-mails,
- 3) “the shutting down of web sites that were created for defrauding clients”.

However the use of online banking in Greece could be more safe and additional security measures could be taken, such as methods of biometric authentication of the client, considering the fact of a rise in online fraud². The bank may be responsible for the security measures offered when using e-banking services, but the clients should have a responsible behavior as well. In order to have safer transactions when using internet banking (and some of these rules apply to a safer use of mobile banking services as well):

- a complex security password is required

¹ Hellenic Bank Association, “Συνεργασία των τραπεζών με τις εταιρείες παροχής υπηρεσιών Internet για τον περιορισμό της απάτης στο Διαδίκτυο”, viewed 20 August 2014, <http://www.hba.gr/2Tomeis/2TomeisDetails.asp?Mpage=8&Id=75>

² Dapp, T (2012), *Growing Need for security in internet banking*, Deutsche Bank AG

- all transactions should be executed by using a “unique code”
- the personal computer of the user should be “kept up-to-date and protected by security software”
- the client should not provide personal data to anyone when being contacted from someone who claims to be from the bank and avoid following links from suspicious e-mails
- the client should access his accounts by using a personal computer of trust and always “log out” from the platform when all transactions are finished
- a “notification” service about the executed transactions should be enabled and the accounts should be monitored regularly
- the user should ensure that the transmitted data is encrypted.³

For mobile banking services there has been a research(Sanchez A, 2014), which shows that “70% of the apps did not have any alternative authentication solutions, such as multi-factor authentication”, while the 40% of the sample “did not validate the authenticity of SSL certificates presented”. This is a problem that some banks have realized and made it part of their security measures.^{4 5 6}

When using an ATM the client should:

- inspect the used ATM for suspicious alterations or hidden cameras
- have the card in hand when approaching the ATM
- “shield” the transaction
- swiftly put the cash out of sight
- always take the transaction receipt
- use “well lighted” ATMs at night⁷

A major problem that online transactions have is fraud and the acquisition of the desired personal data by criminals. Each bank has a different policy concerning its security measures, but common characteristics of the internet and mobile banking services is a

³ Munson, L (2013), *8 tips for safer online banking*, NakedSecurity, viewed 10 August 2014, <http://nakedsecurity.sophos.com/2013/10/03/8-tips-for-safer-online-banking/>

⁴ Kitten, T (2014), *HSBC requires dual authentication*, Bankinfosecurity, viewed 10 August 2014, <http://www.bankinfosecurity.com/interviews/hsbc-requires-dual-authentication-i-2189>

⁵ Sanchez, A (2014), *Personal banking apps leak info through phone*, viewed 10 August 2014, <http://blog.ioactive.com/2014/01/personal-banking-apps-leak-info-through.html>

⁶ Ducklin, P (2014), *Just how safe is that mobile banking app?*, Naked Security Sophos, viewed 20 August 2014, <http://nakedsecurity.sophos.com/2014/01/10/just-how-secure-is-that-mobile-banking-app/>

⁷ Montaldo, C, *Use your ATM safely*, viewed 20 August 2014, http://crime.about.com/od/prevent/qt/atm_use.htm

firewall protection software and the constant monitoring of the transactions by a specialized service that is provided by bank. For this reason the major financial institutions of the USA participated in a research concerning the strategies that could prevent online fraud and protect their clients.⁸

5.3 Weaknesses

All systems have their weaknesses and the e-banking services have their weaknesses too, even if these flaws do not come from the banks that offer them.

An example could be found in the SSL/TLS that contained a “bug”, meaning a flaw in software programs, called “Heartbleed”, which was a serious security flaw that caused a “leaking of memory contents” and enabled the “potential stealing” of all user names, passwords and personal data transmitted from the user through the internet. Although the “bug” was discovered and fixed, a survey showed that even visitors of bank web sites were vulnerable to it and posed a serious threat in the security measures of the online banking services⁹ ¹⁰.It also contained serious security flaws that allowed the almost immediate decrypting of data to hackers using BEAST attacks for TLS 1.0 and earlier versions.¹¹ ¹²

An important aspect of internet banking security is the protection of the user's PC as well. If a virus that contains “keylogger” software infects the user's PC, it is possible for the attacker to obtain and access the personal information of the client. A “keylogger” is a program that records all keyboard commands the PC user issues, web navigation history, private conversations and even captures screenshots of the user's activity.¹³

Another problem with internet banking is “phishing”, which is a scam that targets bank customers and focuses on stealing their personal data, either by using a fake site or by sending fake e-mails from the targeted financial institution. Such a problem occurred in 2005 with

⁸ Fraud prevention strategies, Bits fraud reduction steering committee, BITS financial services roundtable, April 2003

⁹ Mutton, P (2014), *Half a million widely trusted websites vulnerable to Heartbleed Bug*, Netcraft, viewed 20 July 2014, <http://news.netcraft.com/archives/2014/04/08/half-a-million-widely-trusted-websites-vulnerable-to-heartbleed-bug.html>

¹⁰ The hearbleed bug, 2014, Codenomicon, viewed 20 July 2014, <http://heartbleed.com/>

¹¹ Goodin, D (2011), *Hackers break SSL encryption used by millions of sites*, The Register, viewed 20 July 2014, http://www.theregister.co.uk/2011/09/19/beast_exploits_paypal_ssl/

¹² Vulnerability Note VU#864643, 2011, Carnegie Mellon University, viewed 20 July 2014, <http://www.kb.cert.org/vuls/id/864643>

¹³ Oxford Dictionaries, 2014, viewed 20 July 2014, <http://www.oxforddictionaries.com/definition/english/keylogger>

Nordea Bank's customers and since they had a paper list of one time TANs, the “phishers” acquired a significant number of TANs from the customers and the bank had to shut down temporarily its web banking service due to this problem¹⁴. For this reason the customers should also be informed about understanding the basics of internet security and the trusted web pages, because there is always the danger of fake certificates and the possibility of fraud remains high in the untrusted ones.¹⁵

Concerning mobile banking a major problem that exists is that by using free Wi-Fi hotspots sometimes the exchanged data might not be encrypted, which leads to leaks of personal information such as passwords of the users and criminals sometimes use malicious software, which have been counted to tens of thousands in 2014 disguised sometimes as games, to monitor all activity in the mobile phone of the client, which leads to the loss of personal data as well.^{16 17}

The cryptography of data and the use of passwords may be a strong indicator of security, but the question of how strong a password can be, is a matter of utmost importance. There are common characteristics that most people have when choosing their passwords and even though hackers may not have direct access to them, if they manage to get personal information about the target, they may be able to exploit common factors that people use in order to choose and easily remember their secret codes, no matter how strong they might seem. By using these factors, they can combine numbers and characters attached to them in “Brute force attack” programs, which are programs that generate and test passwords until succeeding in finding the correct one. Criminals use these programs with the help of modern technology GPU and by organizing many computers together, that can be used either by consent of the user or not (in this case called “Zombie computers”), in order to obtain the desired password with more speed and power than ever, even more when taking into consideration “Moore's Law”, concerning the “continuous increase of transistors in integrated

¹⁴ Phishers target Nordea's one-time password system, 2005, Finextra, viewed 20 July 2014, <http://www.finextra.com/news/fullstory.aspx?newsitemid=14384>

¹⁵ Poeter, D (2011), *Fake Google Certificate puts Gmail at risk*, viewed 20 July 2014, <http://www.pcmag.com/article2/0,2817,2392063,00.asp>

¹⁶ Faris, S (2014), *How hackers use Wi-Fi to steal your passwords*, Tech Page One, viewed 20 July 2014, http://techpageone.dell.com/technology/hackers-use-wi-fi-steal-passwords/#.U_DtnPmSw8g

¹⁷ Gephardt, D (2014), *How safe is your mobile banking app?*, KSL.com, viewed 20 July 2014, <http://www.ksl.com/?nid=148&sid=28945907>

circuits, which leads to more computing power”.^{18 19 20 21 22}

The security weaknesses that ATMs have are a problem, which cause significant amounts of money stolen each year. The most common scams are by using “hidden cameras”, thus acquiring the customer's PIN, “skimmer attachments”, which record the card's details, “card traps” that allow criminals to acquire cards after the clients have gone and even by distracting the client.²³

5.4 Innovation

Innovation is vital, if a bank wishes to excel in its existing e-banking services, by offering more services, a better security level and more options for the clients.

Except the internet banking service there are banks that are exclusively internet based, called “direct”, “online”, “internet” or “virtual” banks. These banks have no physical branches and their services are focused on e-banking, something which could lead to innovation, at least in countries that do not have such financial institutions.

The major EFT companies proceed in innovative solutions, such as the Visa “v.me”, which provides online payments just by registering to the service and using a username and a password to authorize a payment, the Mastercard secure code/Verified by Visa service, which provides an additional security measure password when using a debit or credit card through the internet, a series of contactless technology cards, which have an antenna that transmits the required data to the EFT machine and does not require a PIN to execute a payment for small amounts of money, a series of cards that have a built-in keypad and a LCD screen that generate TANs for one-time payments and do not require an additional device to work.^{24 25}

¹⁸ Gray, R (2013), *Most common and hackable passwords on the internet*, The Telegraph, viewed 20 July 2014, <http://www.telegraph.co.uk/technology/internet-security/10303159/Most-common-and-hackable-passwords-on-the-internet.html>

¹⁹ Brute force attacks, Wordpress.org http://codex.wordpress.org/Brute_Force_Attacks

²⁰ Zombie Computer: Don't be a zombie in a botnet, 2013, Antivirus.com, viewed 20 July 2014, <http://www.antivirus.com/security-software/definition/zombie-computers/index.html>

²¹ Moore, Gordon E. (1965). *Cramming more components onto integrated circuits*, Electronics Magazine. p.4

²² [Excerpts from A Conversation with Gordon Moore: Moore's Law](#), 2005, [Intel Corporation](#), viewed 10 August 2014,

http://large.stanford.edu/courses/2012/ph250/lee1/docs/Excerpts_A_Conversation_with_Gordon_Moore.pdf

²³ Martin, 4 ATM scams you need to know about, Money, Dot Zinc Limited, 2014, viewed 30 August 2014, <http://www.money.co.uk/article/1006306-4-atm-scams-you-need-to-know-about.htm>

²⁴ VISA, 2014, viewed 10 August 2014, <http://www.visa.gr/>

²⁵ New Mastercard has LCD screen and keyboard, 2012, BBC, viewed 15 July 2014, <http://www.bbc.com/news/technology-20250441>

There is a survey that supports an opinion of an emerging “distinct” tablet e-banking service “channel”, which has different characteristics from the mobile and internet banking ones. The survey supports the “distinctive” traits of a tablet, its unique characteristics and the increasing popularity of its users, something that should be taken in serious consideration from the interested innovative financial institutions, which should provide a “distinct” service for all its tablet customers, with its unique features adapted to the tablet's capabilities.²⁶

Another innovative technology that could be used for a more secure e-banking experience is by using biometric characteristics of the client that could use a voice recognition, fingerprint, retina or a three dimensional face scanner application in order to authorize transactions and verify the identity of the client. This technology could also be implemented in modern ATMs, internet banking, phone banking and even by credit card companies. Some banks have already started using fingerprint scanning in order to increase their security measures.^{27 28 29 30 31 32}

With the use of GPS technology and the use of a smartphone's camera, banks can increase the experience users from mobile banking have by enabling an easy access to the client's accounts just by scanning their credit/debit card and the area surrounding them, which shows them the nearest ATMs.³³

By using the NFC technology a smartphone can become as a “mobile wallet” enabling the direct charging of the client's account while purchasing goods and it is a technology used not only by banks. These transactions can be achieved simply by approaching the smartphone

²⁶ Ryan, P (2013), *The Table is a distinct channel and banks must design a new user experience for it*, 2013, Bank Innovation, Bank Innovation and Royal Media, viewed 20 July 2014, <http://www.bankinnovation.net/2013/03/the-tablet-is-a-distinct-channel-and-banks-must-design-a-new-user-experience-for-it/>

²⁷ Clark, S (2014), *St George adds fingerprint security to mobile banking app*, NFCworld, SJB Research Ltd, viewed 25 July 2014, <http://www.nfcworld.com/2014/08/27/331023/st-george-adds-fingerprint-security-mobile-banking-app/>

²⁸ Bolluyt, J (2014), *Touch ID can enable biometric banking, better mobile payments*, TechCheatSheet, Wall St. Cheat Sheet, viewed 01 August 2014, <http://wallstcheatsheet.com/technology/touch-id-can-enable-biometric-banking-better-mobile-payments.html?a=viewall>

²⁹ Pramis, J (2013), *Eyeverify developing an eye-scanning unlock tool for your phone*, Digital Trends, viewed 15 August 2014, <http://www.digitaltrends.com/mobile/eyeverify-retinal-scan-lock/#!bE7I6S>

³⁰ Microsoft working on high quality 3D face scanning using Windows phones, 2014, www.3Ders.org, viewed 15 August 2014, <http://www.3ders.org/articles/20140415-microsoft-working-on-high-quality-3d-face-scanning-using-windows-phones.html>

³¹ Voice/Speech recognition, 2014, findBIOMETRICS, viewed 15 August 2014, <http://findbiometrics.com/solutions/voicespeech-recognition/>

³² Clark, S (2014), *Sensory adds voice and face security to phones*, NFC world, SJB Research Ltd, viewed 16 August 2014, <http://www.nfcworld.com/2014/07/02/330116/sensory-adds-voice-face-security-phones/>

³³ Boden, R (2014), *Westpac NZ unveils augmented reality banking app*, NFC world, SJB Research Ltd, viewed 16 August 2014, <http://www.nfcworld.com/2014/08/05/330829/westpac-nz-unveils-augmented-reality-banking-app/>

to the payment machine of the store.³⁴

The use of alternative or digital currencies, such as Bitcoin, has created a need for the implementation of new services in the e-banking sector. Specifically, in many countries Bitcoin ATMs have started to appear, which provide a service that allows customers to buy and sell Bitcoins, simply by using cash and their smartphones. It is a revolutionary new way of drastically reducing the cost of currency converting costs and it is a currency available worldwide without “intermediaries” or regulation. Yet, there are still security and law problems to be solved and it is mainly used by new technology “enthusiasts”, but it has a great potential of development for the future and banks could have the means and the technology to take the lead in this new emerging industry.^{35 36}

³⁴ http://www.tsys.com/tms/resource-center/wp_mobile-wallets-utilizing-nfc-technology.cfm

³⁵ Bowlin, D, *Status – Mobile wallets utilizing Near Field Communication technology*, 2014, Total Systems Services, viewed 25 August 2014, <http://www.news.com.au/technology/online/australias-first-bitcoin-atm-days-away/story-fnjwnfzw-1226863275076>

³⁶ BitCoin ATM Map, 2014, Coindesk, viewed 30 August 2014, <http://www.coindesk.com/bitcoin-atm-map/>

CHAPTER 6

RESEARCH AND RESULTS

6.1 Introduction

In this chapter the results of the study will be presented. The results will be based on the answers given by the financial institutions that participated in the research, the theoretical analysis concerning the innovation, the weaknesses and the current status of the e-banking services that Greek financial institutions currently offer in order to make the required proposals as well as the results of a research that was conducted concerning the education of countries in the EU. There will be an explanation about each question the questionnaire contains, the information that was required to obtain and the research about the banking education.

6.2 Methodology

A questionnaire was created in order to provide information for this research. This questionnaire was sent by mail, e-mail or by completing the contact forms some banks had in their internet web pages. The main problem was the selection of the sample, according to the geographical distribution, the market share each financial institution holds and the country of origin. Also, considering the theoretical part, there has been an effort to categorize the e-banking services under common designation in order to be understandable, considering the fact of each country's and bank's individual marketing policy about the services offered, which could enable the comparison between Greek and foreign banks.

For this research the sample was selected according to the largest financial institutions from the most developed and biggest GDP size countries, which have the largest asset value worth. The questionnaire contained 10 questions, which were formulated in a way to find out the hidden strategy and information each financial institution has about e-banking services. With the information that should have been collected, there could be a comparison between the Greek and foreign financial institution e-banking perspectives, analyzed and compared as far as the area where each country belongs. These areas are North America, Central and South

America with Africa, Europe, Asia and Oceania. The areas are divided according to geographical proximity, economic development and size of sample per country, thus a total of 180 banks were selected.

The questionnaire was designed with a multiple choice format, which means that the form of the questions were a selection of one or more answers that were provided. The answers that would have been collected would be statistically analyzed either by mentioning the frequency of answering options, either by calculating a weighted average number per answer, where a scale of 1 to 5 was required according to the answers given.

Also messages were sent by e-mail and by filling in electronic forms to 29 ministries of education in Europe, to discover if there is a mandatory educational program concerning the banking industry, up to the level of high school education, in order to find if there is a correlation between the use of e-banking services in European countries and education.

6.3 Data analysis

In this section, the data that has been collected will be analyzed and there will be an effort to answer the questions of this study.

The theoretical comparison between Greek and the selected sample of foreign banks shows that the offered e-banking services are mainly common, but there are some differences concerning the variety of transactions offered, the technology and security measures involved, as well as the level of specialization. There are also differences between the selected Greek banks, as each one of them has either a more or less advanced level of e-banking services compared to each other. Also, the marketing policy of each bank includes or excludes certain transactions from commonly labeled “internet” or “online” banking services for business and retail clients, while offering them in different transaction platforms by using a different label, or even by offering them through subsidiary companies.

Similarities between Greek and foreign banks

- The services offered include ATM, internet banking, mobile banking, phone banking, varieties of credit/debit/smart cards for retail and business clients
- The internet and mobile banking available transactions are quite similar, concerning

the management of the clients' accounts and portfolios

- There are security measures involved in these services, which are considered as safe, while in internet and mobile banking services TAN generators and USB authentication devices are used and the transmitted data is encrypted and monitored by the banks' systems too
- There is support for the management of accounts in the international network of the banks
- Mobile banking services can make use of a smartphone's technical advantages, such as GPS, NFC technology and QR code scanning
- ATM services offer a variety of transactions
- Some banks offer distinguishable specialized services for corporate customers
- Some banks offer online applications for products of any form such as deposit accounts, cards and even insurance programs
- Mobile and internet banking services offer instant informing of transactions through SMS
- There is online support and the option to speak with a bank employee through the internet, even though this service is still in a primal stage in Greece
- Virtual and new technology POS machines are available in Greece and abroad
- Some banks require registration to additional services in order to obtain access to the management of business solutions, both in Greece and abroad

Differences between Greek and foreign banks

- There is no multibanking support in Greece
- The cryptographic transmission of data in Greece is only 128bit, while some foreign banks offer 256bit
- A customer of foreign banks can choose between security transaction levels, while the devices concerning e-banking of some foreign banks are considered to be more technologically advanced, have more capabilities, the client may choose between different devices offered in the market and they have more security levels than the ones in Greece

- A Greek bank has specialized e-banking branches, while something similar was not found abroad
- Mobile and internet banking services of foreign banks enable a better customer experience as they provide advanced account management tools
- The services offered for business customers are more specialized than the ones in Greece
- There is no TV banking in Greece and although the selected foreign bank sample does not include this kind of service too, it is offered in other major foreign financial institutions
- There is no mobile banking service in Greece that allows payments to non-clients by using an e-mail
- There seems to be a close cooperation between foreign tax authorities and foreign banks concerning the completion of transactions with e-banking services, while Greek banks don't advertise such a service.

Concerning the messages sent to ministries of education in Europe in order to find out whether there is a correlation between education and the use of e-banking services, the answers received were from 11 out of 29 ministries and the results are that:

- 1 did not provide any information at all and made suggestions to look elsewhere
- 1 country had an optional banking educational program that required the school's cooperation
- 2 said clearly that there was not a relevant program organized by the ministry
- 7 did not have any information concerning the matter, thus pointing out that there was no such program available by the ministry, but without ruling out the option about individual schools' initiatives concerning the fact

It seems that there is no correlation between the use of e-banking services and mandatory state education. It is also interesting that there is such an educational program in Greece for high school students, which means that there is a relevant interest^{1 2}. Thus, the use

¹ Karageorgou, E (2008), *ΜΑΘΗΜΑΤΑ ΤΡΑΠΕΖΙΚΗΣ ΚΟΥΛΤΟΥΡΑΣ ΑΠΟ ΤΗΝ ΕΝΩΣΗ ΤΡΑΠΕΖΩΝ ΣΤΑ ΣΧΟΛΕΙΑ*, Capital.gr, viewed 25 August 2014, http://62.1.43.74/Eti/UplFiles/sinergasies/article_sen.pdf

² ΤΙ ΕΙΝΑΙ ΤΟ ΠΡΟΓΡΑΜΜΑ ΤΡΑΠΕΖΕΣ ΣΕ ΔΡΑΣΗ, 2014, Hellenic Bank Association, viewed 20 August

of internet banking is due to other factors, that could be cultural characteristics, leaving the field open for further research in the future, which could lead to the understanding of the procedures that promote a more frequent use of new banking methods.

Concerning the questionnaires sent to the banks, from the sample selected the answers received were from 15 banks. Specifically:

- 3 banks filled in the questionnaires and responded accordingly
- 10 banks did not wish to participate in the survey
- 1 bank required the questionnaire to be sent in physical form, which happened without receiving a response
- 1 bank required my physical presence in one of their branches, which was not possible to happen

Because the positive answers were not as many as expected and are less than at least 10% of the sample selected, there can not be an effective analysis of the answers, but there can still be an explanation for the questions asked and a sample of the answers that have been collected. The questions are described below.

Question 1: *Which e-banking services have the most potential to develop in the future?*

Please rate the 5 most important ones, on a scale of 1-5, with 1 being the highest:

a. Internet banking

b. Phone banking

c. Mobile banking

d. ATM

e. Interactive TV Banking

f. APS

g. Credit/Debit Card

h. Smart Card

i. Other(please specify)_____

This question was designed with the purpose of finding out which e-banking service has the most potential to develop in the future, according to the information and analysis the banks have. It should be noted that every financial institution answered that mobile banking has the most potential for future development and in all cases it was mentioned as their first option. The other forms of e-banking were internet banking, ATM, interactive TV banking and APS. An interesting fact was that one financial institution stated that virtual consulting has a development potential.

Question 2: *How could your existing e-banking services be improved?*

- a. *Introduce better and/or new Security measures*
- b. *By expanding the variety of available transaction options*
- c. *Improve the existing transaction software*
- d. *Improve the existing transaction hardware*
- e. *Other (please specify) _____*

This question's purpose was to determine the current level of development in the existing e-banking services and to compare it with the answers given by the Greek banks. It would also unravel the strategy that was designed by each financial institution about the introduction of new technologies or simply the upgrading up to a point the existing provided services. A financial institution stated that their services would be improved by “making it more intuitive for the clients”, which means that they want to provide services that are easy to use and have an intuitive design that is easily understood by the client, an important aspect of their strategy, which clearly states that everything used by a client must be easy and fairly comprehensible in order to reduce the total cost of banking services according to customer support and increase the e-banking users³. Another bank stated that their services would be improved by “introducing new digital benefits for customers that go beyond today's banking offers”, which probably concerns their current marketing strategy.

Question 3: *Which are the greatest problems the e-banking sector faces today about its expansion? Please rate on a scale of 1-5, with 1 being the highest:*

³ Ravi, K (2009), *Customer experience strategy – a winning proposition for retail banking*, Intuitive customer experience, viewed 20 July 2014, <http://intuitivecustomerexperience.blogspot.gr/>

- a. Customers' lack of confidence and/or poor education*
- b. Local laws and regulations*
- c. Inadequate technological support*
- d. Poor marketing and information provided by financial institutions*
- e. Fraud*

In this question there was an effort to determine the financial institutions' opinion about the problems the e-banking sector faces. There would be a calculation of a weighted average number per answer, but because of the small sample this is not possible. The answers that were given were various and all financial institutions had different opinions about the problem.

Question 4: *What is the percentage of transactions available in your e-banking services, compared to the ones available in a physical bank branch?*

- a. 0%-20%*
- b. 20%-40%*
- c. 40%-60%*
- d. 60%-80%*
- e. 80%-100%*

This question would determine the level of completeness in the e-banking services that were offered and a comparison between Greek and foreign banks would be made. It would show the autonomy a customer would have by using only e-banking services. The received answers varied from 40%-60% to 60%-80%.

Question 5: *Which 4 methods are the safest (least probability of fraud) for e-banking services?*

- a. Internet banking*
- b. Phone banking*
- c. Mobile banking*
- d. ATM*
- e. Interactive TV Banking*

- f. APS*
- g. Credit/Debit Card*
- h. Smart Card*
- i. Other(please specify if any)_____*

The level of security per e-banking service is important and the opinion of the banks would reveal the facts, because of the fraud statistical information they have. Answers varied from the equal probability of fraud to phone banking and ATM being the safest. An interesting answer was about the “cardTAN”, a new form of e-banking security method that provides TAN numbers by a device that requires the customer's card and scans an encrypted pulsating message in the internet banking platform of the bank.

Question 6: *Which 5 e-banking services do customers tend to show the most interest for the past 4 years? Please rate on a scale of 1-5, with 1 being the highest:*

- a. Internet banking*
- b. Phone banking*
- c. Mobile banking*
- d. ATM*
- e. Interactive TV Banking*
- f. APS*
- g. Credit/Debit Card*
- h. Smart Card*
- i. Other(please specify if any)_____*

The market trends are important and the demand of specific e-banking services would reveal the preference that customers show not only interest for, but trust as well. The results varied too, but all financial institutions answered that internet banking was the second most popular form of e-banking amongst customers, which states that it is a trusted e-banking service and maintains a steady popularity throughout the years. In order to acquire the desired information from a different source, the terms of the choices above were entered in a search engine to show the trends concerning the user search popularity and the results showed that internet banking and mobile banking were on a rise, while ATM, APS and cards' services

remained steady and the interactive TV banking had a low interest level⁴. Yet, the online banking service is still more popular than mobile banking, which is raising its popularity rapidly.⁵

Question 7: *a) Cross selling products by e-banking impersonal services is more effective compared to the traditional personal approach by an employee in a bank branch and b) e-banking tightens the cooperation and personal bonds between clients and the financial institution. Do you:*

1. Agree with a) and b)
2. Agree with a) and disagree with b)
3. Disagree with a) and agree with b)
4. Disagree with a) and b)

The required subject was to have the financial institution agree or disagree with one or more of the statements given in this question. The real meaning behind this question was whether a bank wants a customer to be self sufficient with his transactions via e-banking methods, which would mean that he would hardly ever come again to a bank branch. An important revenue provider for banks is by cross selling products, along with their other provided services. A bank's internet site may provide the required information, but all financial institutions agreed that e-banking is not good enough compared to an employee in a bank branch. This could mean that banks do not wish to provide the whole range of their services to the customer via e-banking, which could mean reduced revenues from other products they offer.⁶

Question 8: *A common problem of e-banking is that a customer with accounts in various banks is obliged to keep different passwords, cards, telephone numbers in order to complete a transaction. In case a service/system existed with which a customer could manage all of his accounts in different financial institutions via all available e-banking methods the system/service could offer, what would your level of interest be in participating in that*

⁴ Google Trends, 2014, Google.com, viewed 01 August 2014, www.google.com/trends/

⁵ Hornbliss, J (2013), *Online banking still whoops mobile banking*, Bank Innovation & Royal Media, viewed 25 August 2014, <http://www.bankinnovation.net/2013/04/online-banking-still-whoops-mobile-banking/>

⁶ Kicking it up a notch: Taking retail bank cross-selling to the next level, Deloitte, 2013, viewed 30 July 2014, http://www.deloitte.com/assets/Dcom-UnitedStates/Local%20Assets/Documents/FSI/us_fsi_KickingItUpaNotch_7913.pdf

service/system, assuming that this service would be held responsible for all the security measures concerning the transactions and the participating banks' cost would be low or nonexistent?

- 1. Very high and would help in creating that system/service*
- 2. Significant level of interest and possible participation in the future, but would not help in the project's creation*
- 3. Low level of interest, but would not object to the idea of its existence and a possible participation in the future*
- 4. No level of interest and no participation in the future*

This question took into consideration an innovative idea, that would allow the unification of all e-banking transaction systems of the banks, via a single service which would provide a single transaction and access platform, which would allow an internet multibanking management. The responses that were given showed little or no interest at all about its existence, but probably there would be a consideration of participating in the future. Even though multibanking platforms exist and are offered by some banks, the use of an individual, non-related to banks individual service could be used.

Question 9: Undisputedly an important aspect of the proper usage of banking services(including e-banking) is the level of understanding the customers have about the banking system. A proper "banking education" and awareness of the customers' rights and obligations could minimize the impact of fraudulent transactions, introduce new transaction methods to the public and develop a better relationship between banks and the customers. Do you:

- 1. Agree with this statement and we are currently educating the public with seminars and/or cooperating with the local authorities for the proper informing of the public*
- 2. Agree with this statement but we don't organise educational activities for the public and/or the local authorities are not interested in such activities*
- 3. Disagree with this statement because the customers already have adequate education concerning their banking behavior and are obligated to a responsible behavior with the beginning of the business relationship between them and the bank*
- 4. Disagree with this statement for any other reasons not mentioned*

The answering financial institution should either agree or disagree with this statement, taking into consideration the reasons given by the answers. The purpose for asking this question was to understand if banks promote the introduction of new transaction methods to the public and to understand if the customers' lack of trust in these methods is because there is no educational system that provides the required information for them.

Question 10: *The payment methods through the currently offered e-banking services can end all illegal economic activity, money laundering and financing terrorism. Do you:*

- 1. Agree, the security measures taken are enough to provide all required information needed for the tracking of all illegal transactions*
- 2. Partially agree, it may provide difficulties for criminals, but they will always find ways to engage in illegal economic activities*
- 3. Partially disagree, because of the vast number of transactions that cannot be inspected and the existing technology available which cannot track such activity*
- 4. Disagree, e-banking methods enhance the illegal economic activities*

Financing terrorism and other illegal activities is a new common problem that derives from new banking methods and all financial institutions are currently facing⁷. The desired information was to see if banks have the technology and all other means necessary to detect these new kinds of transactions and if they have the required level of information concerning the fact. The answers collected concerning this subject were mixed.

6.4 Conclusions and suggestions

The e-banking services in Greece are advanced, concerning the retail section and satisfactory, concerning the business section, compared to the ones offered abroad, although the most important transactions are offered by these services. The main problem arises considering the low level of usage of these services among customers of any age in Greece and the problem does not seem to have any correlation with the educational system of the country or the level of specialization of the existing e-banking services, thus leaving unanswered the question to

⁷ Sean Paul Ashley, *The Future of Terrorist Financing: Fighting Terrorist Financing in the Digital Age*, Princeton University

another research in the future. Even though the majority of the biggest financial institutions do not wish to participate in academic surveys, the research findings show that an increasing interest in the mobile banking sector seems to be emerging, while internet banking services are still on the lead and developing as well. There can be an implementation of new e-banking services in Greece, concerning the variety of transactions and capabilities they have, but it seems that the existing low interest level of Greek clients towards these services is a deterring factor for the banks to invest in, while still being under the effects of the domestic financial crisis. For this reason there could be an adaption of a more aggressive marketing strategy in Greece in order to encourage bank clients to use in more frequent scale the existing e-banking services, thus reducing all unnecessary transaction costs and bank branch crowding and this is something the Greek government and the Bank of Greece could help as well by adjusting the domestic transaction rules. Greek banks have the means to satisfy the needs of their clients, but they must consider a more direct approach towards their customers, if they want to encourage them to use their new banking methods, even by discouraging the traditional visit to the branches, in order to achieve a higher level of banking services in the future and better economic results. There could also be an implementation of better security measures, because although the volume of transactions isn't as high as the one in foreign countries, the technology that criminals use can be distributed worldwide and possible fraud can be a permanent danger. A multibanking support and more specialized services could be implemented as well, such as an advanced cheques deposit system using internet and mobile banking, at least for the business clients in Greece. A new technology implementation considering digital currencies could be researched as a potential for development in Greece as well, at least for specialized Greek or foreign customers. The option of developing the virtual banking sector in Greece could also be discussed, yet such matters are regulated by the Bank of Greece.

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APPENDIX A

LIST OF ABBREVIATIONS

ACH	Automated Clearing House
APS	Automated Payment System
ASE	Athens Stock Exchange
ATM	Automated Teller Machine
CSE	Cyprus Stock Exchange
DB	Deutsche Bank
EDI	Electronic Data Interchange
EU	European Union
GPS	Global Positioning System
HBA	Hellenic Bank Association
LCD	Liquid Crystal Display
NBG	National Bank of Greece
NFC	Near Field Communication
OCR	Optical Character Recognition
PAC	Person Authentication Code
PC	Personal Computer
PIN	Personal Identification Number
QR	Quick Response
SMS	Short Message Service
SSL	Secure Sockets Layer
SWIFT	Society for Worldwide Interbank Financial Telecommunication
TD	Toronto-Dominion
TLS	Transport Layer Security
UK	United Kingdom
USA	United States of America
USB	Universal Serial Bus
WTLS	Wireless Transport Layer Security

APPENDIX B

QUESTIONNAIRE SENT TO FINANCIAL INSTITUTIONS IN GREECE AND ABROAD

1) Which e-banking services have the most potential to develop in the future? Please rate the 5 most important ones, on a scale of 1-5, with 1 being the highest:

- a. Internet banking
- b. Phone banking
- c. Mobile banking
- d. ATM
- e. Interactive TV Banking
- f. APS
- g. Credit/Debit Card
- h. Smart Card
- i. Other (please specify) _____

2) How could your existing e-banking services be improved?

- a. Introduce better and/or new Security measures
- b. By expanding the variety of available transaction options
- c. Improve the existing transaction software
- d. Improve the existing transaction hardware
- e. Other (please specify) _____

3) Which are the greatest problems the e-banking sector faces today about its expansion ?
Please rate on a scale of 1-5, with 1 being the highest:

- a. Customers' lack of confidence and/or poor education
- b. Local laws and regulations
- c. Inadequate technological support
- d. Poor marketing and information provided by financial institutions
- e. Fraud

4) What is the percentage of transactions available in your e-banking services, compared to the ones available in a physical bank branch?

- a. 0%-20%
- b. 20%-40%
- c. 40%-60%
- d. 60%-80%
- e. 80%-100%

5) Which 4 methods are the safest(least probability of fraud) for e-banking services?

- a. Internet banking
- b. Phone banking
- c. Mobile banking
- d. ATM
- e. Interactive TV Banking
- f. APS
- g. Credit/Debit Card
- h. Smart Card
- i. Other(please specify if any)_____
- j. All of the above(equal probability of fraud)

6) Which 5 e-banking services do customers tend to show the most interest for the past 4 years?Please rate on a scale of 1-5, with 1 being the highest:

- a. Internet banking
- b. Phone banking
- c. Mobile banking
- d. ATM
- e. Interactive TV Banking
- f. APS
- g. Credit/Debit Card
- h. Smart Card
- i. Other(please specify if any)_____

7) a) Cross selling products by e-banking impersonal services is more effective compared to the traditional personal approach by an employee in a bank branch and b) e-banking tightens the cooperation and personal bonds between clients and the financial institution.

Do you:

- 1. Agree with a) and b)
- 2. Agree with a) and disagree with b)
- 3. Disagree with a) and agree with b)
- 4. Disagree with a) and b)

8) A common problem of e-banking is that a customer with accounts in various banks is obliged to keep different passwords, cards, telephone numbers in order to complete a transaction. In case a service/system existed with which a customer could manage all of his accounts in different financial institutions via all available e-banking methods the system/service could offer, what would your level of interest be in participating in that service/system, assuming that this service would be held responsible for all the security measures concerning the transactions and the participating banks' cost would be low or nonexistent?

- 1. Very high and would help in creating that system/service

2. Significant level of interest and possible participation in the future, but would not help in the project's creation
3. Low level of interest, but would not object to the idea of its existence and a possible participation in the future
4. No level of interest and no participation in the future

9) Undisputedly an important aspect of the proper usage of banking services(including e-banking) is the level of understanding the customers have about the banking system. A proper "banking education" and awareness of the customers' rights and obligations could minimize the impact of fraudulent transactions, introduce new transaction methods to the public and develop a better relationship between banks and the customers. Do you:

1. Agree with this statement and we are currently educating the public with seminars and/or cooperating with the local authorities for the proper informing of the public
2. Agree with this statement but we don't organise educational activities for the public and/or the local authorities are not interested in such activities
3. Disagree with this statement because the customers already have adequate education concerning their banking behavior and are obligated to a responsible behavior with the beginning of the business relationship between them and the bank
4. Disagree with this statement for any other reasons not mentioned

10) The payment methods through the currently offered e-banking services can end all illegal economic activity, money laundering and financing terrorism. Do you:

1. Agree, the security measures taken are enough to provide all required information needed for the tracking of all illegal transactions
2. Partially agree, it may provide difficulties for criminals, but they will always find ways to engage in illegal economic activities
3. Partially disagree, because of the vast number of transactions that cannot be inspected and the existing technology available which cannot track such activity
4. Disagree, e-banking methods enhance the illegal economic activities

APPENDIX C

E-MAIL TEXT TO THE GREEK MINISTRY OF EDUCATION

Ονομάζομαι Κωνσταντίνος Παντελίδης. Είμαι μεταπτυχιακός φοιτητής στη σχολή "Στρατηγική διοικητική λογιστική και χρηματοοικονομική διοίκηση" του Πανεπιστημίου Μακεδονίας της Θεσσαλονίκης και την παρούσα περίοδο συλλέγω δεδομένα για τη συγγραφή της διπλωματικής μου εργασίας με τίτλο "E-banking: a comparison study between Greek and foreign financial institutions, perspectives, weaknesses and innovations", η οποία επιβλέπεται από τον καθηγητή κ. Παπαναστασίου Ιωάννη.

Ένα μέρος της έρευνάς μου αφορά την εκπαίδευση που παρέχεται στους πολίτες σχετικά με τη γνώση που αφορά τον τραπεζικό τομέα της χώρας, αναφορικά με το τι σημαίνει, τι παρέχει, τι υποχρεώσεις-συμπεριφορά πρέπει να έχει ο πολίτης-πελάτης έναντι τους καθώς και τα δικαιώματά τους. Με ενδιαφέρει να με ενημερώσετε αν και κατά πόσο συμμετέχουν ενεργά τα χρηματοπιστωτικά ιδρύματα της χώρας στην εκπαίδευση των πολιτών με την υποστήριξή σας ή αν

γίνονται πρωτοβούλως ενέργειες απο τις ίδιες, αν συνεργάζονται οι τράπεζες και τα σχολεία για τη σωστή ενημέρωση των μαθητών/μελλοντικών πελατών(π.χ. γίνονται εκπαιδευτικές εκδρομές σε τράπεζες/επισκέπτονται τραπεζικά στελέχη τα σχολεία και αν ναι σε τι βαθμό) και αν έχετε σχετικά στοιχεία να μου τα αποστείλετε για να εξάγω τα σχετικά συμπεράσματα και να κατανοήσω τη σχέση μεταξύ τραπεζών και εκπαίδευσης, αλλά όχι στα πλαίσια ενός επαγγελματικού προσανατολισμού. Το ζητούμενο είναι να εντοπίσω τις ενέργειες που γίνονται για την ενημέρωση των μη σχετικών με οικονομικές επιστήμες πολιτών, ώστε να έχουν σωστή τραπεζική "συμπεριφορά".

Ο λόγος που σας τα ζητώ είναι για να διενεργήσω τη σχετική σύγκριση στη διπλωματική μου εργασία σε σχέση με τις τράπεζες του εξωτερικού, το θέμα της ενημέρωσης των πολιτών εκεί, να παρατηρήσω τις σχετικές διαφορές και να εντοπίσω τα προβλήματα στον εγχώριο τραπεζικό τομέα. Θα σας παρακαλούσα να με ενημερώσετε στο προσωπικό μου e-mail kpantelidis@hotmail.gr.

Σας ευχαριστώ για το χρόνο σας και την άμεση ανταπόκριση,

Κωνσταντίνος Παντελίδης

APPENDIX D

E-MAIL TEXT TO THE EUROPEAN MINISTRIES OF EDUCATION

My name is Konstantinos Pantelidis. I am a postgraduate student in "Strategic managerial accounting and financial management" at the University of Macedonia in Thessaloniki - Greece and I am currently gathering data for my master thesis entitled "E-banking: a comparison study between Greek and foreign financial institutions, perspectives, weaknesses and innovations", which is being supervised by professor Papanastasiou Ioannis.

A part of my research includes the education that is being provided to the general public concerning the banking system of the country, the public's rights, their obligations and their required behaviour towards the financial institutions. I would like to be informed if the financial institutions of your country participate in the educational system with your support or if they voluntarily organize such events by themselves, in order to educate the students/future clients(e.g. educational trips to banks/bankers visiting schools and if so how frequent) and if you have any data concerning these facts I would appreciate if you sent them to me, in order to extract certain conclusions and understand the correlation between banks and education, but not concerning professional orientation. The challenge is to identify the steps taken for the education of the non-related to the economic sciences citizens, in order for them to have the right "banking behaviour".

I am asking you of this information, because I want to compare in my master thesis the education provided in various foreign countries and Greece concerning banking issues, identify all differences and detect the problems in the domestic banking sector. I would like to be informed in my personal e-mail address "kpantelidis@hotmail.gr" until August the 1st 2014.

Thank you for your time and immediate response.

Konstantinos Pantelidis