Internet Banking in Greece
-Trends and Practices-
A research and analysis in availability and use of internet banking

Dissertation submitted in accordance with the requirements of the University of Greenwich for the degree of MSc in Finance and Financial Information Systems

By

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Kavala, 2009
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ACKNOWLEDGEMENTS

First of all I would like to thank my parents, without their continual support I could not have reached at this point of my studies. Moreover, I would like to thank my supervisor Dr Vasilios Chatzis, who helped me to defeat the disappointments of the whole process and to overcome the technical difficulties of the dissertation.
ABSTRACT

The evolution of innovative technologies has changed radically the way and services of banking sector worldwide. Internet banking is a new trend in Greek banking sector, while new banking strategies and challenges for the bank managers and economists have emerged. The basic factor of the transition to electronic means for banking is the customer behaviour and satisfaction. Citizens should adopt new habits in conducting bank transactions and be familiarised with the web. This transition, however, is neither easy nor fast. Issues like online bank services, usefulness, easiness, effectiveness, trustfulness, security and protection of personal data are some of the matters of interest for the online banking right now.

These issues are addressed in this project through a questionnaire survey which has been handed out to Greek Internet users. The banking industry in Greece is at its adaptation point. This research explores the characteristics of customers of online banking in this country, in order to form a profile picture of the target groups. The findings are useful for the bank managers and economists, so as the online banking evolution in Greece to take place successfully.
1. INTRODUCTION

The fundamental changes in the fields of technology in the past few years and more precisely the last decade influenced in catalytic degree the economy and had great consequences, obviously, and triggered changes in technology. All these changes were the stimulation for the creation of new needs and requirements that should have been satisfied for the smooth operation of the community. In order to correspond in these changes, banks had to adopt the new technology and the Internet, hoping that the guarantee of pioneering place in the sector of applications of new technological methods and Internet can ensure them one effective defence in the escalated changes as well as competitive advantage. More specifically, banks collaborate and usually outsource to specialised companies that are activated in the branch of telecommunications and Internet or are incorporated with such companies for their dynamic entry in the new markets.

The benefit of financing services is supported substantially by the treatment and the transmission of information, where technology plays fundamental role. The use of new technological applications keeps pace with the creation of new financing products and services and their alternative networks of distribution and contributes in the growth and the distribution of electronic banking.

The basic purpose of this work is to ascertain the process with which a bank can create competitive advantage. Substantially, various ways which might help a bank stand out in the market are analysed. At the same time the services of e-banking are explored, taking into consideration that wide spectrum of the public that deals with and uses electronic banking and prompting that percentage of individuals, that still ignores its profits.

Fundamental objectives that are placed at the undertaking of diplomatic work:

- The shifting of information from the banking branch in order to make a deep research to draw a spherical conclusion.
- Present the benefits of e-banking and its effect to the bank that uses this service for its transactions.
- Search the confrontation of Greek banks in the phenomenon e-banking.
- Present statistical data with regard to the utilisation of electronic banking.
- Compare the provided services of the banks and realise which bank covers mostly the needs of modern users.
• The presentation of conclusions and opinions after the research.
• Finally the deposit of proposals for the services of e-banking and opinions for the confrontation of electronic banking as a mean of the more rapid management of transactions. (See following diagram)

Figure 1. The research framework
2. LITERATURE REVIEW

Internet Banking or Online Banking describes the secure financial transactions that take place in secure websites via Internet. Those websites can be operated either by the customers’ retail or virtual bank, credit union or building society. Internet banking is taking advantage of the new technological innovations and gives banks the chance to attract more customers by facilitating their transactions. For instance opening an account, paying bills, or transferring money between different accounts and a lot of other, more complicated financial transactions are allowed to be done over the banks properly shaped and secure Internet site.

There are two kinds of banks that offer Internet banking: brick-and-mortar and Internet-only or virtual banks. Brick-and-mortar banks are those that except their virtual appearance also have a physical one. This means that the bank apart from the traditional way of transacting in its branches has also adopted the new technologies of transacting via Internet. Some of them choose to have the same name established through their physical appearance and make online banking part of their services, while others prefer to separate their physical from their virtual appearance by adopting other name or policy in the virtual world of Internet. The term Internet-only or virtual bank refers to the banks that have a very small or nonexistent physical branch network. Even they lack physical appearance virtual banks provide their customers with almost the same financial services a brick-and-mortar bank can provide without lacking in trust.

“Internet banking represents an electronic and remote distribution channel for delivering financial services on a virtual level” (Bradley and Stewart, 2002). It has been defined as “the use of the Internet as a remote delivery channel for banking services” (Furst et al. 2002). According to Kuhndt et al. 2003 and Alakeson et al. 2003 Internet Banking is “the use of Internet to underpin key processes and integrate different channels, and transform the main brand into an e - brand”. Internet banking is anchored in new technologies and apart from traditional services, for instance transferring funds between different accounts or opening an account, also incorporates innovative banking services, such as electronic payment of bills which allows users to pay their bills over their bank’s website.

The growth of technologies in the past few years and the ascendant course of banking branch have created in the citizens the perception that with the provided services of banks they are capable of managing their personal time exploiting the new financing products without wasting time. E-banking is not a new service of banks but constitutes innovation for many people who did not have the possibility of the essential acquaintance (Furst et al. 2002).
Nevertheless, e-banking is a value added service for Greek Bank organisations. Although popular, these kinds of services are not used extensively and the users only deal with a fraction of the capabilities that it can offer.

This was also the case with the ATMs (Automatic Teller Machines), at least until they became popular. At the beginning, only some bold consumers made use of them; now they are commonly used and they are an essential component of every bank. Banks efforts to support Internet banking service, forced them to introduce more services such as phone banking and Internet support which raise the question if all this time and money actually pays off long term.

In relation to other technological developments, the average consumer has accepted the Internet and e-commerce in a more intense speed. Previous research has found that when electricity was invented in 1873 it took 46 years until it was adopted worldwide. For telephones it took 35 years, 22 years for radio and 16 years for Personal Computers (PCs). The amazing thing with the World Wide Web is that it has taken a mere 6 years (Pyun et al. 2002).

In the area of Stock Exchange behaviour, banking sector had particular blossom the last two and a half years in Greece, with its prospects to remain even today rather positive (Georgiadis, 2005). The stocks of banks as the National Bank, the Alpha Bank, the EFG Eurobank, the Emporiki Bank, the Bank of Piraeus, as well as the Agricultural Bank of Greece, are demonstrating important rise in their prices (Georgiadis, 2005). As a result there was enough capital, mainly from foreign institutional investors, that have been placed in the stocks in question. The attention of investors remains focused, for many years, on fundamental sizes of those banking institutions (as income from interest, net profits, capitalised sufficiency, etc.), so that these constitute criterion for their investment decisions. Meanwhile, from the beginning of 2005, the adoption of International Accountant Models from all the companies that are inserted in the Stock Exchange, constituted the course of economic sizes and banking sector.

The whole condition has evolved, since the entrance of Greece in the ECU. Having to follow specific rules and regulations in the Single European Market and the ECU, the Greek Banking system had to adapt the environment and conditions they had to follow. In this way, a more flexible and market oriented banking system took place and got harmonised with the European Union regulations and the Second Banking Directive (Thornton, 1992). Currently, the Greek Internet banking system can be characterised as a highly competitive market.

In the financial services industry the existence of e-commerce has came out stronger
than in the banking sector because of the exchange rate of information that needs to take place in real time. A bank can communicate to its customers and vice versa through modern telecommunication technology and present each other with common information as well with the opportunity of performing interactive retail banking transactions – deposits, money transfers, paying bills, checking the balance, organising loan payments and many others. Besides that, users have not followed B2C (Business-to-Consumer) e-commerce and e-banking in the same degree (Hoffman et al. 1999), mostly due to safety concerns and trust-related issues (Lee and Turban, 2001).

According to the results that have been announced until today, the Greek banks remain in orbit of improvement of their income and their profits, with simultaneous denotation of their net interest margins. At the same time, the increase of Gross Domestic Product (GDP) was among 2.8% - 2.9% in 2005, considerably higher than the one in Euro zone (1.5%-1.6%). The real growth rate of the GDP in Greece in 2008 was 2.8% (World Factbook, 2008). Indubitably this development is supposed to turn banks in to profitability during 2009.

More precisely, positive prospects present some faith to the house market of Greece, while the housing loans are in constant increase because of the strengthened demand for the market of residences in periods, as the current one, of low interest-rates. This sector is traditionally dominated by the National Bank, followed by the EFG Eurobank, Alpha Bank and the Bank of Piraeus, that even if they entered the past few years in the market of residences in question, nevertheless they would have achieved a more important share of the market.

However, it is “common secret” that retail banking constitutes of the sector that makes the “difference” to the income and profitability of Greek commercial banks, not only at the current period, but also for the last few years. Both the consuming loans and the credit cards present particularly high rhythms of rise (from 25% up to 40% at the first months of 2005 in an annual base), so that they maintain the margins of profit of banks in question in particularly satisfactory levels, while the yield spreads the loans in question that are higher among categories of lending.

In the domain of retail banking the most particularly distinguished is the EFG Eurobank, which many years ago was the first bank to penetrate aggressively, this sector of loans, while today it has created a big enough portfolio of loans and credit cards, it appears discreetly not to pursue further extension. Retail banking was later penetrated by the National Bank, Alpha Bank and the Bank of Piraeus.

In the area concerning loans to small, medium sized and large enterprises, Greek
commercial banks continue to develop their portfolios each every year, but with slower rated in comparison with the development observed in the housing faith and in retail banking. It should be mentioned that the Greek banking system remains centralised –nearly monopolised- compared to the other countries of the European Union, as the 5 larger Greek commercial banks (Alpha Bank, EFG Eurobank, Emporiki Bank, National Bank and Piraeus Bank) obtain the 70% of all the Greek banking system. At the same time, the domestic commercial banks are activated as “traditional” banking institutions, with their main income emanated from interest on loans and other services (Pyun et al. 2002).

As far as the progress of deposits is concerned, it should be mentioned out that the shares of the market of commercial banks are already “consolidated” and very small differentiations are expected in the short-term and the long-term period. The National Bank possesses the biggest portion, while the other commercial banks follow with smaller or bigger differences.

The majority of banks have used the bigger part or the total of their deposits for the issuing of all kinds of loans, with the unique exception, possibly, of the National Bank, in which the indicator loans to deposits is shaped roughly in the percentage of 70%, element which offers it margins for “cheap” financing of further growth of portfolio of its loans.

Despite the mentioned growth, in general terms, the banking penetration in Greece remains lower compared to the European standards. For instance, the housing loans as percentage of GDP are fluctuate at about 20% for Greece, compared to 34% for the Euro zone, while in the level of consuming loans and credit cards - or even more “sophisticated” products, as reciprocal capital - the differences between Greece and European standards are much greater.

The same ascendant progress presented the banking branch for one more year with the banking profits constituting the 50% of profitability of the Greek Stock market.

Exceptional records had the banking sector in 2007 with an important increase of the total of the asset 25.3% as well as the proper funds 20.5%. The turnover was extended with high rhythm of 37.2% and the profits pre taxes 34% (Pouloudi, 2002).

In conclusion, the big commercial banks in Greece cover today a favourable period with regard to the growth of their economic sizes, exploiting the needs of domestic market (households, enterprises, etc.) for bigger credit extension, but also their international prospects, that are located mainly in the Balkan economies.
2.1 Basic characteristics of the Greek Banking system

A recent research on the demographic profile that make use of Internet Banking Services in Greece showed that users with more than 2 years of enrolment to banking services are more familiar with electronic payments (Aggelis, 2006). The majority of customers live in big cities (especially women). This is due to the small Internet penetration in the Greek countryside. Finally, the majority of customers are young people (21-40 years old). Those customers are more familiar with Internet, e-banking and technology.

A research of Forrester (2003) predicted that the online transactions of a typical European bank would exceed 40% of all transactions, while the transactions in traditional branches would be below 10% in 2008 (Figure 2). It is interesting to investigate if this prediction is true for Greek banks.

Some researchers focused on the profitability of Greek banks due to the Internet Banking. Eichengreen and Gibson (2001) studied 25 Greek banks and concluded that profitability peaks in the beginning and a decline soon after, as the assets of the bank grows. Recently, Athanassoglou and Brissimis (2004) found out that economies of scale existed for all banks during the years 2000 – 2002.

Financial institutions constitute of the main financing organism in each economy. In our country the first credit institution that was founded was Ioniki Bank (1834) and followed National Bank of Greece (1841).

The institutional frame for the financial institutions (banks) in our country began to be
shaped substantially with the Greek law *N.5076/1931* “Join-Stock Corporations and Banks”.

Beyond this, various approaches have been attempted for the definition of Bank. A first approach accepts that a Bank is the enterprise that main by offers credit work. Another approach determines the Bank as the enterprise that proceeds in the concentration of social savings and channels it with profit to various branch of the economy. In general, “*Bank is an economic enterprise that is considered as intermediaries between those who have the capital and desire to invest it and those who need to lend for financing their activities*” (Kiohos and Papanikolaou, 1994).

The main operation of a Bank is the interest-bearing lending. It lends capital which it owns or capital emanating from deposits of customers.

Despite their different starting line all the approaches lead to the same conclusion that the banking enterprise activates itself mainly in the marketing of money and that the activation in other financing work does not differentiate its main characteristic. The significance of modern bank or modern financial institution can be mainly focused in the general public acceptance of a wide variety of services.

The significance, the foundation, the operation and the work of financial institutions (banks) in our country are regulated by the first banking directive (77/780) and mainly by the second banking directive (89/646) of the European Union that have been incorporated in the Greek banking legislation with the Law *N.2076/1.8.1992*. The two banking directives as well as others that are reported in the activity of credit institutions have been unified in the directive 2000/12/ (European Parliament).

In Greece most banks have already ensured their electronics presence in the Internet and have incorporated the new way of realisation of selected banking transactions in the already existing networks of distribution of services. However, the growth of electronic banking in Greece has still not followed the rhythm of penetration of other European states, mostly because of the narrow usage of computers and IT in the Greek households and society. Equally important role has played the high cost of Internet access (HBA, 2000).

**Customers' information**

The customers' information, except of course, from those that deal with electronic banking, comes mainly from the Mass Media and from the personnel of the banks.

The Media, with the force that obtain in the mass information, constitute central point for the citizens' information. So as to be this information correct, it presupposes that the representatives of the Media should have acquired very good knowledge of the subject.
According to Hellenic Banks Association (2000) the union of Greeks Banks already examines the ways to distribute informative material and precise information to the representatives of the Mass Media, in order to inform more often and with more reliability their public.

For the information of the customers from the personnel of the banks, there are two approaches. In the first approach the acquainting undertakes specialised executive of electronic banking that is administratively governed in the corresponding organisational unit. In the second approach, which is most usual and more realistic, the acquainting is undertaken by executives of the bank departments, that the object of their job is the promotion of products and services to the customers. Certain condition, of course, is the education of these executives, which in order to have the better possible results should make the executives use the alternative networks themselves.

At last, it is essential for the customers to be given direct clarification and relative information of two of fundamental importance terms of electronic banking, the “electronic money” (digital money) and the “electronic signatures” (digital signature). There two aspects will make them realise the flexibility and the security issued of e-banking. The terms are defined and discussed in Chapter 3.

2.2 Productivity of the Banking system

2.2.1 Advantages and disadvantages of e - banking from the side of customers

Advantages:

*Facility*: The network infrastructure of electronic banking has high up-time and does not follow office working hours. The websites can be available 24-7 and will only stay offline for maintenance at a minimum time period, which is usually well thought and previously well advertised to customers. Simple things like ordering a new cheque book or to cancel a bank card, paying a bill or transferring money to other accounts it is sufficient to visit the online web-banking page.

*Portability*: All the services that a bank provides are available any moment in any place provided that the suitable material (hardware) exists. Many services that a customer could interact with the retail bank could be done in the online system.
**Speed of transactions**: The banking network places process and execute transactions with the same speed or even faster from the ATMs (Steinhagen and Kerrebroeck, 2006). It is only limited by the level of acquaintance of the user with the system and it is improved over time of usage.

**Effectiveness**: A lot of banking network places takes advantage of new technologies like GSM (*Global System Mobile*) messaging in their mobile phones, email alerts and live Stock Exchange transactions. The portability of the Internet in smart phones makes the whole process even more effective for the customer on the move.

In countries, where the payments' system is more developed and standardised, the orientation of banks is turned progressively in the benefit of additional services to the enterprises (corporate sites), field in which the range of choices is particularly extended.

However, as factors of banking market point out, in the future the services of electronic banking will be more individualised, in order to be adapted to the particular needs of customers.

**Disadvantages**

**Time-consuming registration of customers**: In order to be enrolled on the online system of a bank, customers are supposed to give elements of their identity and to sign a form in the bank department or if it is an exclusively electronic bank, the forms will be dispatched by post so as to be supplemented and be sent in the bank again. Usually, after the completion of the forms, it may take up to one week for the bank to process the application and approve the demand, in which case the customer receives the initial username and password on a signed for envelope.

**Difficulty in use**: The banking network places may appear difficult to be used by someone who doesn’t have experience with web-browsing applications. The opening of an online account or the online issue of a loan can frighten somebody because of lack of knowledge on the new technologies.

**Mistrust of the user**: A lot of users do not entrust electronic banking. Instead it is preferred to interact with the employee that will process their account, while the electronic transaction of money causes doubts and insecurity. The lack of familiarisation with the internet banking is more often present to older generations which they still prefer to wait in the queue of the bank and have their transaction be taken care by a real person.

**Other uncontrolled factors**: The e-banking website usage relies on technology that the
user needs to be familiar with. A firewall or an Anti-virus program might block the website from using a legitimate certificate for a completion of a transaction, or even block popup windows that may inform the users for the usage of the system. So no matter how user-friendly the online system can be made, the users need to have some basic technical knowledge to help a customer representative understand their problem and point them to the right direction.

2.2.2 Advantages and disadvantages of e - banking from the side of banks

Advantages

Reduction of the functional cost of the banks: The decision of a bank to begin providing services of electronic banking will have as a result to decrease its cost of operation considerably (Bodart, 2004), while the transactions that the customers realize in a banking branch cost the bank much more than the automated online transactions of electronic banking. According to elements of McKinsey & Consultants for the American market, the cost of formal banking transaction via bank branch is on average $2.5, via telephone reduces in $1, via ATM in $0.24, while via Internet it is hardly $0.1 (Laudon & Traver, 2003).

Enlargement of cliental base: The adoption of electronic banking from a bank, gives the bank the possibility of acquiring more channels of distribution for its products and services. Moreover, the benefit of online services does not limit the bank geographically. So, there exists the possibility of attracting customers that do not have access in a bank branch and extending that way its cliental base. Therefore, candidate customers of the banks are not only those that can visit a bank branch but the entire world. As result economies of scale have been created while as the number of the users of e-banking increases, the cost per transaction decreases, as the infrastructure for the all users is the same.

Reinforcement of the devotion of customers: A lot of banking analysts support that via services of electronic banking the devotion of customers is strengthened while the relation between customer and bank is placed in a new base. Consequently, the customers that have been familiarised with the electronic services that a bank offers are much more hesitant to change bank. In order to attract customers, Internet banking Web services
should be improved and of high quality. According to relative research, devotion of e-banking customers is affected by satisfaction and trust in a bank, which are directly determined by its Web site and service’s quality (Floh and Treiblmaier, 2006).

**Disadvantages**

*High initial cost of installation:* As it happens with all the new technologies, the initial cost of installation is high. The investment that the bank should make in order to buy the required equipment and educate the personnel on the new technologies is big and it should be undertaken with caution and be compatible with the general enterprising strategy of the bank.

*Security:* The electronic attacks and the unauthorised access in the banking electronic systems are frequent. Therefore, the security of these transactions and the protection of their clients are subject of paramount importance for the banks. While no electronic system is 100% effective in security, the banks should ensure the financial elements of their customers with a certain way, from hacker attacks and electronic frauds (Sylla, 1998). In order to render the banks, electronic banking secure for their customers, they should invest in equipment that includes firewalls and systems of active follow-up, as well as in human potential, engaging special advisors on safety issues of networks. Once a customer creates an account (Bodart, 2004), it is nearly impossible for banks to identify whether the nominal account holder is conducting a transaction or it is just someone else that had access on the credentials that granted them entrance on the system. The whereabouts of the transaction are also difficult to trace and the information handled here is so large that most of the banks cover legally just by acknowledging the customer that it is entirely their responsibility once they open an online account.

Characteristics of those kinds of attacks are that someone with the relative knowledge with a small effort, a lot of damage may take place. A few minutes of downtime on the online system can cause a big financial damage for a company to try to look-up unfinished transactions and clear up other potential problems. Another concern is that the attacker is not limited by national borders and even when the bank identifies an attacker a different law might be enforced by the country of origin. The international laws in electronic crime are very flexible and might take a lot of time for a solution (Tebrugge, 2006).
2.3 The benefits of e-banking

Electronic banking has been a reality. The majority of banks worldwide offer services via the Internet and other means that are included in the frames of electronic banking. Nowadays, with the exploitation of new technologies, banks have the opportunity to provide a big part of their products with much lower cost than with the traditional banking procedure. While this happens, the required number of employees in the institution is decreased, the costs are limited and, additionally, the total cost of management of network is improved. Moreover, the possibility of a dynamic increase of the number of customers exists, while it takes place, with the best possible way, the direct and continuous publicity of the new products of the banks.

Internet banks have the potential to be far more superior in performance versus non-Internet banks. An exception to this phenomenon was de novo Internet banks, which were less profitable and less efficient than non-Internet de novos (DeYoung, 1999). Very few Internet only banks operate in Europe. The absence of an established brand name and security issues seem to be important obstacles (Bikker and Wesseling, 2003).

According to predictions, banks that invest in Electronic Bill Presentment and Payment (EBPP) services will grow faster than their competitors (Taylor, 2003). Banks that charge fees for Web banking or make security checks needlessly complex will find the growth in Web usage tailing off.

In this case, the client database and the projection of product differentiation by the presence of local shops (internationalisation). Apart from the profits, mentioned above, the bank benefits from it are also particularly important to the quality of services that are offered in combination with the direct and easy service of its customers. This is achieved, particularly, with electronic banking provided that the profits from the use of that kind of services are obvious, such as:

- Facility of use and availability of services 24 hours per day, 7 days per week, 365 days per year.
- Access in the electronic services of the bank, independently from the locality in which the user is found (the house, the office, abroad), in general from any point a constant access in Internet exists, even in case the users are on the move and use their mobile phones in order to have access. Although some banks force the corporate customers to have access to their banking system though a single PC with the use of certificates, which are going to
be covered further on.

- Speed in the realisation and completion of transactions concerning the traditional ways (transactions via network of conventional banks).
- High level of safety of transactions, better than any safety level provided today by the traditional way.
- More efficient management of all kind of transactions a user can realise (investment, lending, payments etc). Every customer has a total view of accounts and their transactions via the screen of their computer, as well as access in historical elements that concern previous movements and transactions.
- Access in a wide spectrum of information, which covers the various needs of banking customers, both the private individuals and the enterprises of independent size and branches of the economy, in which they are activated.
- Reduction of cost of transactions and consequently more economic completion of exchange activities.

Global Business Insights predicted in the past, that 45% of Greek national banks would be offering Internet banking by 2004 (Diego, 2000). The main growth will be observed by smaller banks that enhance their services to online banking. The larger national banks did not intend in the begging to offer such services, but on the other hand they intended to clear off a lot of request by corporate customers by providing them access to online services. (Mathioudaki, 1995).

### 2.4 Starting Line and Development of Electronic Banking

In October 1995 the first electronic bank was presented in America, Security First Network Bank, which without allocating network of conventional banks served its customers only through Internet. The new bank was drawn and developed by a relatively small financial organisation, Cardinal Bancshares Organisation, and which was financed by two American banks, Huntington Bancshares and Wachovia Corporation (Anguelov et al. 2004)

The reason why those two banks invested so heavily in Cardinal Bancshares is that they were the first banks that managed to realise their transactions with a simple way, all day long, all year round and without geographic restrictions. They, also, recognised the big advantage of Cardinal Bancshares to have drawn the most advanced architecture of secure
information systems. During the last few years of the previous decade an important increase in the foundation and operation of electronic banks was recorded, while, at the same time, the number of traditional banking branches was reduced. This tendency though, did not continue. The undeniable advantages of these new banks appeared to have been overestimated. It is commonly accepted the fact that the rhythm of increase of the clients of the new electronic banks has been impressive. In order to cover some of the needs that the electronic banks could not serve, should finally address once again to the traditional banks.

At the same time, the traditional banks, that through their branches promoted their products and services and served the transactions of their customers, felt “threatened”, when realised that part of their customers turned into the banks of this new form. Traditional banks should do something to react to the new situation and began to develop alternative, networks of services, in the models of electronic banks. There were enough cases where they were forced to proceed in radical revision of information systems in order to correspond in the demands of their customers (Furst et al. 2002).

Finally, traditional and electronic banks began to converge in a way of operation that fairly focuses on the cooperation between the networks of the natural and the electronic world. The electronic networks can excellently serve repeated banking/financing work, inform, notify the customer, facilitate the customer’s personal financing management, while the network of branches remains irreplaceable in the approach of customers for the analysis of their needs, the explanation of complicated products, the education of the stuff in new products and networks and finally in the service of all transactions that still require the natural presence of customer in the bank.

Constituting the exception that does not abolish but confirms the rule, there are exclusively electronic banks, which address mainly in concrete parts of clientele (niche) and remain successful in the sectors that they are activated.
2.5 The influence of e-banking in the behaviour of consumers

Chronological development in the behaviour of the consumers

2000

In this year, the consumers are removed from e-banking. The big majority of customers consider that e-banking as a service, is not important in their relation with a bank. Julian Badcock (2000), analyst of economic services of Deloitte, claims that “the customers don't appreciate the Internet or interactive services as a key factor in the measurement of their satisfaction with the supplier of banking services” (BBC News, 2000). An “interactive environment” and the sentiment of everyone's confrontation as an important customer, was more likely to make consumers feel satisfied from their bank. More than 50% think that it is important to have fast and easy access in a local bank department. In conclusion, 90% of the customers, at this moment, show no interest for the reception of economic services with alternative ways.

The different view of Bank and Customer

The different prospect of banking superior employees and their customers is inflexible. While the banks consider that the 24 hour access is the key of success, the consumers give more gravity in the interactivity of the services and their individualised confrontation. The executives of banks consider that the importance of departments is decreased, while the customers disagree.

One country that has been an exception in adopting Internet banking was Finland. That was so, because remote banking work was not something new for the Finns. Since the early 80's they have been able to make their banking work in their PCs from the house, using their own telephone lines, foreseeing the banking work in the Internet today. Not only technology, but also meteorological conditions and the Finns' way of life helped in this early development and adoption of e-banking. This premature beginning is the main reason for the excellence of e-banking in Finland. “You can buy technology, but you can't buy the behaviour of the customers” and “Technology needs to be in the back seat and not at the steering wheel”, says BO Harald Nordea (Economist Intelligence Unit, 2005).

Although, banking via Internet and mobile telephones is still in initial stages, there are explicit clues that are used by “good customers”. According to researches carried out by
banks, the customers of this category are of superior educative level; they use more than one product and leave bigger profits in the bank from the average customer.

2007

The size of the service sector compared to manufacturing to most of global economies is in steep increase. The service sector contributed in 2005 by 74% of the working force in the USA and 67% in Canada (Ahmad, 2006).

According to a research in America: 60% of Internet users (age 28 until 39) have tried the online banking services, opposite to 38% of Web users (age 18 until 27).

Generations' gap: Through the research, the results show that men are keener to use online banking than women. Almost 49% of men with Internet connection have tried the banking services, 10% more than the women users of Internet that were replied the same way.

Higher socio-economic place: Similarly to other Internet consumer activities (online game, e-commerce etc.), families with annual income above $75,000 are more likely to use e-banking. Also it seems that people with superior or maximum level of education who live in the suburbs are the majority of the users of online banking.

The basic demographic factors influence the tendency of consumers to e-banking. More acquainted users of the Internet use e-banking with ease and prefer it to the traditional banking. The banking customers that are using the Internet one year or less are 19% less possible to use e-banking than those who have five or more years of experience. The households with income less than $50,000 are 10% less likely than the households that have income more than $100,000. The persons who are older than 65 years old are 18% less likely to make banking transactions on-line that those who are 25 to 34 years old.

The users of a dial up Internet connection are 18% less likely to realize on-line banking transactions than the broadband users. Moreover, the broadband users have double probability to submit application for the products of economic on-line services than the subscribers of a dial-up connection.

The percentage of American and Canadian consumers that prefer to collaborate with the enterprises that provide them with self-service systems include Internet, kiosks of payment, ATMs, and terminals of self-service of retail sale, amounted 11% units from the previous year, in 86%, as it came from the research in question. Moreover, 56% of the research participants stated that are keener to use a self-service device than the past years. The results were drawn from a research which was undertaken in a sample of 3,000 people in the
Europe, Australia, the United States, Canada and China and was directed by BuzzBack Market Research (Contact Management, 2008). Either depositing in a bank, or shopping, travelling, or interacting with a supplier of sanitary care, customers expect to find self-service stations and most of them will agree that this is a value added experience.

**2010 FORECAST**

According to a research of Cash Edge (Sanjeev and Scholten, 2008) in more than 400 e-banking users, 85% of those who were asked would only collaborate with enterprises that would offer e-banking services. Also 82% would use more online services if they were provided, 87% collaborate with more than one financial institution, and 71% would not use their cheques or cash, but would prefer to transfer the capital online. The use of online services has also created the requirement of faster function. Furthermore, 74% expect to be in position to use a new account the same day they sign for it. The concern about security still exists. Nevertheless, almost 50% reported the security as their basic concern for the implementation of banking transactions via the Internet. Finally, 14% claim that they have limited their use mainly for security reasons.

**3 SECURITY IN E-BANKING**

**3.1 Electronic money (digital money)**

Electronic money substantially is the electronic replacement of cash; a “cuneiform” writing, as it has been said, for the upcoming new season of the banking system. Electronic money is easily stored, transferred and, mainly unhampered. Electronic money is actually numbers that represent and substitute cash (DeYoung, 2005).

According to Lynch et al. (1996), there are six instructive conditions for the reliability and solvency of electronic money:

1. **Independency**: the safety of the electronic money should not depend on the existence of natural locality.
2. **Safety**: the electronic money cannot be re-employable.
3. **Secrecy**: the electronic money should guarantee the secrecy of the person that uses it.
it. It should not be given the possibility of discovery/recovery of relationship between the person and the transaction that has been registered.

4. **Transaction not checked by a computer:** the businessmen, which accept the electronic money, do not need to depend from a connection with the network for the completion of a particular transaction. Electronic money is independent from the means with which is trafficked in.

5. **Transferability:** the electronic money is essential to be possible to be transmitted in an easy way in everyone.

6. **Divisibility:** a quantity of electronic money should be subdivided in smaller sums without losing its initial value.

### 3.2 Digital signatures

Digital money today is a reality because of the cryptographic technology, known as digital signatures. Substantially, the electronic money can be one of the key elements in cryptic applications of digital signatures (Stinson, 1995). The fundamental aim of digital signature from the viewpoint of law is the non repudiation of a transaction or statement of will. The digital signatures, in general, use techniques of asymmetrical cryptography, which is supported mainly by the use of a pair of keys, the private and the public key. The public key is dispatched in the co-contractor or is publicised more generally.

The danger from the use of digital signatures concerns mainly the individuals (relying parties), who consider digital signatures as their main safety measure, so as to evaluate the trustiness of the signing party, based on the verification of its public key. A solution in these problems gives the “trustworthy third entities” or “Certificate Authorities” that certify that the public key of the signing party belongs to it and is unidirectional connected to its private key that remains private. Therefore, the trustworthy third entities publish digital certificates, which are electronic files that include the public key that is used for the verification of the signature and data that confirm owner’s identity. In electronic banking, the digital signatures are not only used in the transactions with the customers, but also in internal processes, while a great development of relative network and mobile applications is expected.
3.3 Safety of Electronic Banking

The guarantee of secrecy of electronic transactions constitutes a fundamental aim for each bank and the investments in this sector have been and continue to be of great importance. At the same time, hesitancy from the side of public view is observed in the use of electronic services, with the main reason being the ignorance on issues of safety. In order to achieve this aim and to face any potential threats, the collaboration of banks and users is judged essential.

Regulations will probably make banks to review the security in their systems and be more proactive especially in other automated services such as the mobile phone banking and Interactive Voice Response systems (Glen, 2007). Various challenges have to be faced for there matters one of them is the security of new smart phones and the vast difference in the software used by each company. Therefore, banks should find the best possible ways to balance both human intervention and state-of-the-art technologies.

The banks focus their efforts on the guarantee of transaction with the final user, in all the stages that are included up to its successful completion. The identification of the bank, the final user, but also the guarantee of secrecy of their “discussion” is essential. There is also certain additional safety measure, which strengthens further the efforts of banks in the confrontation of exterior threats.

3.4 Identification of the Bank

Each bank selects a recognised supplier (Trusted Third Party), which is in position to certify its identity in the Internet. A supplier of such type of certification is sometimes a company called VeriSign or The USERTRUST Network. For the final user it can easily be recognised thanks to the appearance of a small icon in form of a padlock in the status bar of particular and secured pages (HTTPS protocol). So, the user can confirm that the information sent is transmitted to the correct site and not to an identical fraud. The main reason for the necessity of the identification of the Bank over the Internet is the growth of online fraud, especially at the early beginning of online banking. The lack of such certification had caused U.S.A. a loss of $9,75 million due to online fraud in one year (Brunker, 2000).
3.5 User's identification

As an ATM allows a transaction via the card and a code, in the same way electronic banking requires the identification of the user, before allowing access to their accounts. For the identification of users of electronic banking, banks follow a common practice, using the personal user's code (username) in combination with a personal secret code (password). The user should receive the two personal codes separately. Common practice constitutes also the blocking of the personal code after certain invalid efforts, while the continuous invalid efforts are considered suspicious.

In the case of e-banking, things are somehow more complex in the subject of corporate/banking responsibility, but here exists, of course, a stricter control from the bank regarding the level of safety of transactions, compared to the electronic use of credit cards. Practically, the bank imposes a line of additional safety mechanisms that do not exist in the case of credit cards, which makes the system substantially unbreakable if the use of this mechanisms is correct from the side of the customer (e.g. use of list of TAN code, Transaction Authorization Numbers). Nevertheless, if the customer is a rendered victim of fraud from websites falsification of identity, meaning that the user provides data in node that pretends to be that of the bank, the bank claims that (provided that the customer was relatively informed and acted except of its own network) is absolutely not responsible. In the terms of use of list of TAN codes of a known bank is clearly reported that only the intended user should know the TAN numbers. The bank will not take responsibility for transactions that took place from an other person that might have stolen the TAN codes from the original user.

In other words, the bank covers its own share of responsibility by offering this additional (obligatory) safety measure, but lies in the user to safeguard its correct application.

In any case, it is marked that today the level of training of the personnel of banks and, respectively, the information of their customers as far as the disposal and use of new appliances of production of TAN codes is concerned, is at least not acceptable. As an example, the supply of TAN appliances is debited to the customer as additional optional service (as that is to say the credit cards), without, however, providing a manual for usage, nor the analytic technical specifications, or even the analytic terms of use where the limits of responsibility of each part (bank and customer) are determined. This is possibly owed to the fact that the distribution and the use of similar processes in the electronic transactions are still very premature in Greece and as a result the corresponding interest is limited, not only from
the side of customers, that usually does not seek further information, but also from the bank’s side, that doesn't want to shoulder the weight and the cost of “educating” the customers in these new systems.

3.6 TAN Codes-Purpose

TAN numbers (Transaction Authentication Number) are some sort of codes required for the completion of a transaction. These numbers are generated by the bank, and linked up with a unique user. On each transaction one set of the TAN codes is “consumed”. The digital certificate constitutes the means that provide the possibility in its holder to sign digitally all the electronic transactions that are executed through electronic banking. The certificate, when it is installed on a computer, it offers the possibility of identification of the user and allows transactions and transports of money between accounts only from this particular user. Additional levels of security are usually required in transactions that include transports of money and not for transactions of informative character. The philosophy is similar to the one that is followed in the teller's office in the bank, where the employee requires from the customer the demonstration of an identity, when he asks for money transport. Now, it should be mentioned the reason that makes the TAN code essential in each e-banking transaction. Contrary to the credit cards, in e-banking each bank has the absolute control of policy and mechanisms of security that wishes to apply.

Thus, it can impose the authorisation of each monetary transaction separately by correlating it with a special code. Practically it is realized with the issuing of a list of additional code authorisation in the customers of e-banking, something like one-use password, personal in each certified customer.

The advantage of TAN codes is that, in general, those are codes that are not stored anywhere in the system of the user-customer, but on the contrary, are found in printed form; hence it is impossible to be stolen electronically from their system. Equivalently, in the e-banking system of the bank where there are copies of these codes, there are suitable meters of guarantee of confidentiality taken in very high level, so as to make their theft, physic or electronic, substantially unfeasible. As a consequence, even if the main code (username/password) of the user-customer is stolen and some third party acquires access in the e-banking account, a money transaction should not be possible because of the absence of the corresponding valid TAN code.
3.7 Code TAN-MAC function mode

The theory of operation of TAN code is based in the verification and encryption of transactions via disposable codes, which are the only encryption models whose inviolability cannot be intervened online and the only security risk is the physical copying of these codes by someone from the possession of the legitimate user. That's why they are still used today in certain types of military communications and even banking systems.

In the case of TAN codes, codebooks aren't used for encryption but simply for the issuing of legitimacy codes. This form is often reported as MAC - *Message Authentication Code*, which accompanies each message and is used for the discrimination of the genuine by the factitious messages. In order to be ensured the crypto security of the “genuine” code, there is a common list of secret codes in both sides of the communication. In effect the process is a codebook with disposable codes that are being used and compared for the control of each message.

Nevertheless, the basic problem is the transport and storage of those codebooks with a secure way to the two parts that communicate. In the TAN code this is ensured by the bank, requiring the personal identification and delivery of the TAN list in the customer in person, and in particular in forms that are not-storable in the customer’s PC.

However the process of publication and personal receipt of TAN list is often time-consuming and awkward, as it cancels part of the e-banking significance. For the guarantee of crypto security of the MAC system and their direct cross-correlation with the content of their message, are simultaneously applied onto two additive stages of treatment and a unique secret key, so that the use of the special codebook as the initial model of one-time-pad claim is not needed. Concretely, the content of the message pass through a process of treatment that is named Hash Algorithm “Irreversible” or “One-way” (One-Way Hashing Function). This process corresponds to the total data of the message in one of unique recognition code of concrete size (e.g. 128 or 256 bits), from which the content of the initial message cannot be exported with no way because of the mathematic attributes of that particular interrelation. Moreover, it is almost impossible this interrelation to create the same recognition code for two different messages.

Afterwards, this code is encrypted with the unique secret encryption key before being transmitted in the channel of transmission. This process is named Keyed - HMAC (*Hashed Message Authentication Code with Key*) and substantially makes unnecessary the use of codebooks of one-time-pad type for this aim, maintaining exceptionally low theoretically (but
not impossible henceforth, as in the one-time-pad) probability of violation of the crypto
security system.

With the Keyed - HMAC system, it is ensured that, firstly, no one can “distort” the
initial message without “cancelling” the concrete authentication code of the message and,
secondly that no one else can produce genuine authentication codes provided that he / she
does not obtain the corresponding secret key. In practice, this model is applied in the
communications as one easy and fast alternative solution against the application of the most
complicated and specialised models of digital signatures.

3.8 Appliances of TAN codes' creation

In proportion with the application of Keyed - HMAC for the replacement of
codebooks, there are ways to replace printed out TAN lists with corresponding appliance of
production personal code by the customer. These codes must always be isolated from the PC
which is used for access in the e-banking system, in cross-correlation with their corresponding
mechanism of comparison from the bank's system. Practically this is materialised with a
combination of the following three tools:

- A generator of pseudo random numbers (PRNG).
- A circuit of high precision timing (CLOCK).
- A secret electronic key of the bank (KEY).

The precise way of operation is very complicated in order to be explained completely
to a non expert, but the basic process is the following:

The *Pseudo Random Number Generator* (PRNG) needs one initial code in order to
begin and then it can produce numbers which are “sufficiently random” so that they are not
foreseeable with no way if somebody does not know the initial code (Lynch and Lundquist,
1996). This is competence of the bank, that is to say initialise these appliances so as to be the
only one, able to “produce” the sequence of these numbers. Moreover, the CLOCK circuit can
be used in order to initialize the appliance once again in regular time intervals, which are also
known to the bank without the need of further communication or connection with the
appliance of the customer. This is because the CLOCK or “clock” of the TAN appliance is
synchronised with that of the system of the bank. For that reason the CLOCK circuit of each
TAN appliance should be of high confidentiality, with minimal divergence (e.g. 60 seconds
maximum) during the appliance's life (e.g. 3 years). With the two mechanisms, described above that is to say the initializing code circuit PRNG and the CLOCK circuit for the periodical reinitializing, the TAN appliance can produce henceforth “random” TAN code, foreseeable only from the corresponding system of the bank.

However, the bank should as an additional meter of safety be able to check the genuineness of TAN codes that the user-customer imports, in order to exclude the case that somebody “finds out” the details of designing and initializing PRNG circuits and CLOCK of the TAN appliance and manufactures a non-certified appliance for the production of a false but verifiable code. For this reason, the result of PRNG/CLOCK is combined with the third element of the mechanism (also known as the “secret KEY”), which is available only to the bank and is stored in the TAN appliance, without existing access in this from the user-customer.

In certain cases in the above process, there is also a second phase, which includes the production of an additional smaller code of control (CHECK) after each TAN code. This happens in order to inform the user-customer for the success and validation of the completion of the transaction in the system of e-banking. In other words, the customer is the one that now compares the CHECK code control that the system of e-banking returns in order to realise that the transaction was completed successfully. Finally, for the guarantee of the appliance there is internally a natural mechanism of “self-destroy” of the TAN appliance in case of forced violation.

For instance, if somebody tries to opens the device in order to “read” the equivalent electronic circuits, the important information [e.g. (KEY)] will be erased automatically and permanently by TAN appliance, in order to make their recuperation impossible. Moreover, as part of the above mechanisms, the bank recognizes each TAN appliance with a unique serial number, that is found in the back of the device, and that “locks” the particular appliance with the account of the corresponding customer-user.

**3.9 Practical use and restrictions of TAN codes**

Nowadays, the TAN appliances that is been disposed by the Greek banks incorporate all the mentioned basic mechanisms with suitable way, but not always identical. For instance, in certain cases TAN appliances produce disposable codes only after demand of the user (press of incorporated key), while other produce continuously codes that are renewed
automatically every 60 seconds, even if they are used or not. In general there is no difference in the level of security that they offer, however those TAN appliances do have a concrete interval time (or number of produced code) of “secure use”, beyond which the “randomness” of their codes is not considered secure anymore. Usually this interval is 3 years or 2 million TAN codes. In this case, the appliance is either replaced with a new one or initialized once again by the bank with a new code and it is ready for use for another 3 years.

3.10 Additional Safety Measures

- **Import of entry elements:** Since the appearance of viruses, which had the possibility to record the typing of the users, certain banks adopted the use of virtual keyboard for the registration of the user or the registration of certain character of their PIN – *Personal Identification Number* (e.g. 1st and 3rd letter of their code). Thus, even if the one of the two code identifications was stolen, the exclusive use would have no force and the user would remain sure.

- **Automatic log out of the user:** In most applications of electronic banking, the completion of transaction is allowed in a certain time limit (usually five to fifteen minutes), after the expiration of which, the system logs out the user automatically.

- **Obligatory codes' change:** The majority of banks compel the users of their electronic banking service in direct change of their personal code with another of their choice, which are stamped more easily in the memory. Usual practice also constitutes the automatic code de-activation after a concrete time interval, in which the user has not realized any transaction.

- **Digital Personal certificates:** A digital personal certificate is an electronic document which uses a digital signature to bind together a public key with an identity — information such as the name of a person or an organisation and is issued by a trusted authority (Canetti, 2004). The concept is that one end of the communication line verifies that the person on the other end of the line is indeed the one intended and not someone else impersonating them. Even thought a username and a password can be stolen from a computer, with the use of a key logger for example, a money transaction needs to be verified with the use of a Digital Personal Certificate. Digital Personal Certificates cannot be duplicated as are unique to each PC. So even if the certificate is stolen, it will not work correctly on any other computer rather than the one initialised it the first time. When there is a technical problem, a new certificate is issued and bound to a new or formatted computer.
3.11 Processes

In accordance to the essential technological infrastructure, the guarantee of electronic transactions forces banks to the adoption of strict processes, in relationship with the growth, offer and management of the electronic services. It is a common banking practice that is also followed in the services of electronic banking, to protect the applications and the systems from processes that require combined actions of two or more persons from different departments. At the same time all the new applications are drawn and materialised under particularly strict control processes before being delivered. Finally, a lot of banks select the collaboration with independent exterior institutions for the control of operation of the processes they follow.

The traditional model implies the transmission of data in only one network, which is considered to be secure (Dumiak, 2008). According to another approach data can go in any network that has been checked before for its security. This means that data can only be kept on bank computers and not anywhere else. The obvious challenge is to take care of security on the lower possible data level. Therefore the concern should not be in the case of transportation medium between Virtual Private Networks or over the Internet, but should focus on the integrity of the data during transfer.

3.12 The role of the user

Banks by themselves are not in position to ensure absolutely the security of transactions, either electronic or natural. The attention and the undertaking of preventive measures from the side of the user in combination with the essential benefits from the bank can ensure the success of the transaction.

Each user of services of electronics banking will be supposed to keep in mind that:

1. Code entry in banking is strictly personal and in no case should their householder share them with no one else. It would be good if each user learns the code by heart and does not have it in written form, while exists the danger to be stolen, and to change them regularly. It is also good not to use codes that have been selected for entry in electronic banking, in other, not secure sites.
2. It is essential the control of the address of the web page, in which data are imported, while
it can constitute copy of the certain banking site, aiming at the manipulation and the acquisition of personal elements. In this case where the electronic address is not obvious, one more way to confirm the identity of the web page is via an icon (padlock) shown on the status bar, which is presented in the secure banking WebPages.

3. It is essential the installation of program in the computer that would protect it from the threat of viruses. As the continuous appearance of new forms of viruses is observed, the frequent renewal of relative programs is also essential.

4. Particular attention should be given in the case of the user not owing the computer (airports, Internet café etc) and mainly in the means of storage.

5. Wireless communication (Wireless Access Points) public or from home use should generally be discouraged in case someone is monitoring the line from a distance. Many users have unprotected wireless access routers.

### 3.13 Digital Certificates

A Digital Certificate is nothing more than a file on a computer. The main characteristic of this file is that it cannot be stolen, copied or duplicated and used in a different computer rather than the one which was issued for. The digital certificate or signature can verify two things at once. First that the message transmitted has not been altered, and secondly that the message had a particular sender. It cannot be impersonated. In most of the cases it is used in websites to verify to the user that the website that receives important information such as credit card number is the intended one. Another use is used in emails to verify that the person sending the email is the one mentioned on the sender list. Those messages cannot be altered nor intercepted and read from any other than the recipient.

A digital Certificate formally contains the following information:

- A public key.
- Full name and address.
- The date of expiry of the Digital Key.
- The name of company (Certificate Authority, CA) that published your Digital Certificate.
- The serial number of Digital Certificate.
- The digital Signature of CA.
The applications, the networks, and the computers can use a digital identity in various ways: The encryption (or the data scrambling – given encoding) is a way to protect the information transmitted from one computer to another. The encryption is mainly met in secure websites where a digital certificate of the website is used to encrypt the transmitted data. Anyone can use the public key to encrypt the data. So even if someone is monitoring the line, they will only be able to get the encrypted message. On the other hand, the legitimate receive has a private key will provide one-way decryption of the message received. In that sense the message can be copied, but the text will be garbled.

The ratification of customers is the term that is used in order to describe how customers prove their identity. In applications where a simple username and password are not enough to identify the user, other supplementary methods are needed to identify the user. An online user has to present the identity, the passport or an authorisation of control in such way which will not be possible (or extremely difficult) to be duplicated from another computer or user. When being on-line, the computer application makes use of digital certificates. Certain websites can ask visitors to present their digital certificates before giving access to secured web-pages where others are restricted from accessing registered particular information in the website.

According to Katos and Stefanidis (2003), a digital Signature, as a handwritten signature, shows that a person created or agreed with the document that contains the signature. A digital Signature protects both ends of the communication line and it is more sophisticated from a handwritten signature because additional checksum checks take place and guarantee 100% that the message originates from the person intended and that the information cannot be changed deliberately or accidentally. In many cases where the message due to technical problems cannot be transmitted at once, the certificate collapses and the transmition needs to take place once again. Moreover, by signing a document, the customer cannot later renounce that the signature was counterfeit as it cannot be duplicated (it cannot be repudiated).

A Digital Certificate can be acquired from an enterprise called Certificate Authority (CA). Also, the enterprise or organisation can publish a Digital Certificate via the Centre of Digital Certificate with a CA.
In the World Wide Web the connection between computers is usually conducted with protocols which do not use cryptography like HTTP (Hypertext Transfer Protocol). However, there is a possibility for the data to be encrypted when personal data and information needs to be secured. All companies which deal with e-commerce use the SSL (Secure Sockets Layer) protocol. When a user visits a page with secure layer protocol, an item with a yellow lock appears in the browser. When this padlock is double clicked, one can see the Digital Certificate and the origin of the website. Also the address of the web site changes from HTTP to HTTPS (S-Secure).

The common structure of a Secure Sockets Layer (SSL) Digital Certificate is the following:

4 BANKING ANALYSIS & PROVIDED SERVICES

A research, as far as security in Greek e-banking websites is concerned, took place so as to check the secure measures Greek Banks take. The initial hypothesis is that all the Greek Banks take adequate safety measures in their e-banking sites so as to secure their customers and themselves.

After the treatment of the data collected by the use of statistical program SPSS 17.0 and a simple ANOVA analysis, the following results came out.

In this research the SSL protocols of all the websites of the Greek Banks are presented the results, focusing on the more important characteristics of them that worth to be commented.

4.1 Analysis of the Greek Banks

Piraeus Bank – Winbank

Piraeus Group which is one of the most well organized banks of the decade is proud to present the renowned Winbank to the world of Internet, in order to accomplish even the most organised and demanding users. With an extremely friendly environment and providing all the essential information for all the possible activities, gives the user the assurance of transactions. The bank’s website is one of the most competitive in the market, and this could be the reason that the bank ranked first. The bank also provides the opportunity of remittances in other countries but on the other hand is presenting an inability in dealings concerning credit cards.

www.winbank.gr

Euro Bank

When referring to the Eurobank Bank it is thought of most reliable presences in the area of e-banking, due to the unique services provided. Some of its most singularly characteristics is the opportunity of serving its costumers even by telephone. Concerning the e-banking services, users have the opportunity of submitting the registration form in the service electronically. In this point the certification must be given to the up-to-date safety system which provides to the user any information about their account.

www.eurobank.gr
**Alpha Bank**

The access on the electronic services of Alpha Bank is an easy procedure for everyone who decides to use Alpha Bank’s system. The above mentioned system is extremely informative and facilitates the users in any transaction. Those who emphasize on expeditious services will choose the online Alpha Bank services, provided that such an option will serve them secure businesses.

www.alphabank.gr

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**Marfin-Egnatia Bank**

The recently developed Marfin Egnatia Bank has managed within a short period of years to consolidate the position of credit institutions in Greece and the wider audience includes fourth on the preferences of the public. With the on line service Egnatia Teller helps businesses and individuals to conduct their transactions. All those who carry out their transactions through the e-banking of Egnatia Bank have the ability of download all the necessary documents.

www.marfinegnatiabank.gr

---

**Cyprus Bank**

Bank of Cyprus has managed to hit the audience with well-designed website offering all the services that cover the average user. One of the negative elements that one could criticise is that the website has been developed in English, which excludes the general public to make everyday transactions. Apart from the above, Bank of Cyprus has established a website highly accessible.

www.bankofcyprus.com

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**Agricultural Bank-Atebank**

With very personal nature of the site, Agricultural Bank manages to reach the rural classes and to encourage the public to conduct transactions quickly and easily. May not have the advantages of a large bank but retains the friendly character with a direct impact on all approach and more customers. It, however, keeps well in the first places on offer electronic services.

www.atebank.gr
**Geniki Bank**

The on line system of the Geniki Bank was considered friendly and easy to use. The site is quite informative to the user but also reveals a weakness in the services offered. The site does not provide an opportunity for appointment or standing orders for internal bank transactions. Nevertheless, it provides high levels of encryption to ensure order in trade.

[www.geniki.gr](http://www.geniki.gr)

**Millenium Bank**

The new version of the former Bank Novabank which had made the first steps in the market with two systems of e-banking. The one is the Novanvestor which covered financial transactions and the other is Novabanker for e-banking transactions. The user has the opportunity here for payments of loans and credit cards and transfer funds to different accounts. Once again the bank faces the problem of no fixed definition mandates.

[www.novabank.gr](http://www.novabank.gr)

**National Bank**

The electronic banking through the processes of the National Bank gives the user a high potential for the total of all known services. All transactions supported and guaranteed by the additional encryption offered and with the use of digital certificates. A Flaw is the lack of standing orders and a lack of opportunities for transfers to other banks.

[www.nbg.gr](http://www.nbg.gr)

**Citibank Bank**

Citibank is leaving available to its customers a host of the best known services with a special feature that continually raises the general classification and in the minimum bureaucracy. It shows that in case of losing codes, members of the bank are authorized to re-code in the same time. Nevertheless there is not an option to pay VAT (Value Added Tax) and IKA (Social Insurance Institute) which facilitates nowadays very small and large businesses.

[www.citibank.gr](http://www.citibank.gr)

**Attica Bank**

A very good approach to electronic reality will face somebody who wishes to navigate through the site of the Attiki Bank. The personal nature of the bank is illustrated by the first
few minutes in the navigation site. An informative website that blinds unknown user when concerns the available services, after facing one loan options with limited accessibility. In addition, users are dealing with limited management of credit cards.

www.atticabank.gr

**Emporiki Bank**

A smart move was made by the creators of the site Emporiki Bank, who have managed to give to the public a clever site with potential options for the most demanding users. A weakness is presenting in remittances payment for which an inclusion in the system is requested. Some of the features of the service is the on line application for credit card theft and trade show traffic for some weeks.

www.emporiki.gr

**Aspis Bank**

Aspis Bank offers great potential transaction and continuous updating of the customers on payments and obligations. Great is the bid of the bank, with some restrictions, on the possibility that gives to the users for standing orders. Despite the potential of the bank with a good offer of electronic services is the latest in consumer preferences.

www.aspisbank.gr

The table that follows in the next pages includes generally a bank analysis of the Internet services provided by the Greek banks. The services are characterised for the state of the services by a mean user. After having a spherical idea of the current situation of all the websites of the online transactions by the Greek Banks, followed a closer and more careful look in each website focused on certain characteristics that are mention below:

- Manageability, account activity, DEKO (Public Participation in Public Organisations) payments, Foreign Remittances, Remittances, Credit Cards, Printing, Checks, Loans, Fixed Commands, Stock Market, Downloads, Internet status, Management and supply’s.

Having a close look on the table, one can easily conclude that all banks have a good website environment, friendly to the user and the majority of the banks have account activity enforcing some with restrictions. Half of them support DEKO Payments. Most of the banks support Foreign remittances but all of them remittances. Only two of them lack of credit cards’ services, and with some limitations all provide printing availabilities. As far as services
which have to do with checks, loans and fixed commands the majority of the banks do not have adequate equipment in their sites, while in Stock market and downloads the services cover customers needs. Internet status is good enough in all Greek e-banking websites, while management and supplies condition is mediocre.

Here follows the model that it is going to be used on the questionnaire to target the e-banking in Greece. The questionnaire itself can be found on the Appendix. This statistical analysis aims to calculate various connections with the widespread field of e-banking and other variables, such as age, the proportion of users in the community and the number of transactions they make etc. For this, a questionnaire of more than 25 questions, was used, that about 100 people have filled in, and the results were treated with the software package SPSS.

**Figure. 3** Factors and data analysis diagram

In the next two pages various information of the provided services are presented for the banks in the research.
<table>
<thead>
<tr>
<th>Management and supply's expenditure</th>
<th>Internet Status</th>
<th>Downloads</th>
<th>Stock Market</th>
<th>Fixed commands</th>
<th>Loans</th>
<th>Checks</th>
<th>Printing</th>
<th>Credit Cards</th>
<th>Cash withdrawals</th>
<th>Remittances</th>
<th>Foreign payments</th>
<th>Account activity</th>
<th>Manageability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>Expensive</td>
<td>Mediocre</td>
<td>Good</td>
<td>Mediocre</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes up to 1 year</td>
<td>Yes</td>
</tr>
<tr>
<td>Mediocre</td>
<td>Excellent</td>
<td>Mediocre</td>
<td>Mediocre</td>
<td>Mediocre</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes up to 3 months</td>
<td>Yes</td>
</tr>
<tr>
<td>Mediocre</td>
<td>Mediocre</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes up to 6 months</td>
<td>Yes</td>
</tr>
<tr>
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<td>Mediocre</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes up to 3 months</td>
<td>No</td>
</tr>
<tr>
<td>Mediocre</td>
<td>Mediocre</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes up to 3 months</td>
<td>No</td>
</tr>
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</table>

PROVIDED SERVICES

- PIETAUS BANK
- WIN BANK
- EUROBANK
- ALPHA BANK
- MARFIN EGONATIA BANK
- CYPRUS BANK
- ATM BANK
- ATE BANK
- PROVIDED SERVICES
<table>
<thead>
<tr>
<th>Bank</th>
<th>Management</th>
<th>Internet Status</th>
<th>Downloads</th>
<th>Stock Market</th>
<th>Fixed commands</th>
<th>Loans</th>
<th>Checks</th>
<th>Printing</th>
<th>Credit Cards</th>
<th>Remittances</th>
<th>Foreign Remittances</th>
<th>Payments</th>
<th>Manageability</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENIKI BANK</td>
<td>Mediocre</td>
<td>mediocre</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Friendly</td>
</tr>
<tr>
<td>MILLENIUM BANK</td>
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<td>mediocre</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Easy navigation</td>
</tr>
<tr>
<td>NATIONAL BANK</td>
<td>Mediocre</td>
<td>mediocre</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Few options</td>
</tr>
<tr>
<td>CITIBANK</td>
<td>Mediocre</td>
<td>mediocre</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Easy navigation</td>
</tr>
<tr>
<td>ATTICA BANK</td>
<td>Mediocre</td>
<td>Very good</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Very good design</td>
</tr>
<tr>
<td>ASPIS BANK</td>
<td>Mediocre</td>
<td>mediocre</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Very good design</td>
</tr>
<tr>
<td>EMPORIKI BANK</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Very good design</td>
</tr>
<tr>
<td>DEKO BANK</td>
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<td>mediocre</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Very good design</td>
</tr>
<tr>
<td>PROVIDER SERVICES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Restrictions</td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Blocks</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Full support</td>
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<td>Support</td>
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<td>Internet explorer</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5 STATISTICAL ANALYSIS OF THE SURVEY

5.1 Age, knowledge and usage of e-banking

The first table matches age with the knowledge of e-banking. Is more than clear that young people are much more keen on this technology, a thing that nonetheless could all be certain of, as it’s something expected and of course the same can be said for the fact that elder people don’t know many things about e-banking that much.

Specifically, talking with numbers, one can see that the vast majority of people who know are aged between 18 and 24 (in fact this percentage takes half of ‘the whole pie’) and then follows the age spectrum of 25-35. The fact that people with age more than 45 and less than 18 are not well-informed for this service can be seen as something normal and, nonetheless, expected.

The majority from our sample do not use e-banking services. At the beginning of this research, this was something expected. It is truth that it was expected less people not to use e-banking, than it was found through the survey. It is not strange, due to the fact that e-banking is new in Greece and people have not been well informed or educated yet, in order to use it. The majority of the people that use e-banking are about 18-24 years old. These people are more familiar with the use of the Internet, than humans from any other age. They are mainly students or have just finished their studies, and this may be the reason they are educated on Internet banking, from their professors at the university or their teachers at the college.

Not everyone that knows e-banking uses it also, as one can see from the graph above. In particular, nearly half of the ones that have heard of it use it as well. The women in our sample are more than men. Women that use e-banking are mainly at the age of 18-24 as discussed before. Below 18 years, there are only men that use e-banking and these may happen because of the fact that boys have contact with computers and the Internet before girls do.
### Age * Do you know e-banking

Crosstabulation

<table>
<thead>
<tr>
<th>Age</th>
<th>Do you know e-banking</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;18</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>18-24</td>
<td>50</td>
<td>58</td>
</tr>
<tr>
<td>25-35</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>35-45</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>&gt;45</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>86</td>
<td>100</td>
</tr>
</tbody>
</table>

### Age * Do you use e-banking

Crosstabulation

<table>
<thead>
<tr>
<th>Age</th>
<th>Do you use e-banking</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;18</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>18-24</td>
<td>26</td>
<td>58</td>
</tr>
<tr>
<td>25-35</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>35-45</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>&gt;45</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>100</td>
</tr>
</tbody>
</table>
5.2 Age, reasons that discourage the use of e-banking.

The relationship of age and the reasons for which someone may not be very eager to use the e-banking service is more than sure that can lead us to some interesting results. This table tries to make this relationship clear. People of young age (18-24) who probably know the risks an electronic transaction might have, are not very willing to use it, due to the lack of security. This is the main problem in the age of 25-35, too. The contact with the new technologies young people have is what makes this difference. Adolescents also seem to worry about security but apart from the service itself and the lack of education that they have to face, the majority of them, as it also happens in much elder people, the main cause of their reluctance is none of the listed ones. For adolescents and children this might be the fact that they don’t have money to invest and for the people aged 45 and above, something different could not have been expected as they are used to the traditional banking process and obviously they are not very willing to change their habits.

Age  *  Reasons that discourage e-banking use Crosstabulation

<table>
<thead>
<tr>
<th>Age</th>
<th>secure</th>
<th>service</th>
<th>education</th>
<th>cost</th>
<th>other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;18</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>18-24</td>
<td>18</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>28</td>
</tr>
<tr>
<td>25-35</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>&gt;45</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>7</td>
<td>5</td>
<td>2</td>
<td>8</td>
<td>51</td>
</tr>
</tbody>
</table>

5.3 Education, easiness in the use of e-banking

Education is a factor of great significance when it comes for this sort of issues. One would expect that the more elevated the education is the easier is for people to use e-banking service. This is partially true, but it is not “a rule to follow”. Half of the people asked found it not that easy to use e-banking, by grading it 70-80 in the scale of 100. What is most weird is that everyone with college education and the majority of people with higher education seem not to have faced any problem in using. An explanation for this might be the fact that e-banking doesn’t require special knowledge and its goal is to be used by people of all
educational levels. The key element of any system is the ease of use and the user friendly environment. The developers of e-banking websites take that into consideration and they are trying to incorporate features like step by step tutorials for all kind of users to be able to use it. Even so, for everyone using a complex system with many options, a learning curve is inevitable and the success of the design can be measured on how long users spend online on the system to perform a single transaction and even how many calls they receive on their service desk from customer inquiries.

The results are also shown graphically in “pie form”.

<table>
<thead>
<tr>
<th>Education * Grade how easy To Use is your e-banking Crosstabulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>college</td>
</tr>
<tr>
<td>higher</td>
</tr>
<tr>
<td>highest</td>
</tr>
<tr>
<td>master's / PhD</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
5.4 Usage in hours, feeling of security in the web

Hours per day using the Internet * Grade how secure is the e-banking you use

Crosstabulation

<table>
<thead>
<tr>
<th>Hours per day using the Internet</th>
<th>Grade how secure is the e-banking you use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-50</td>
</tr>
<tr>
<td>&lt;1 hour</td>
<td>0</td>
</tr>
<tr>
<td>1-2 hours</td>
<td>0</td>
</tr>
<tr>
<td>2-5 hours</td>
<td>1</td>
</tr>
<tr>
<td>&gt;5 hours</td>
<td>0</td>
</tr>
<tr>
<td>DK/DA*</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
</tr>
</tbody>
</table>

People, no matter how many hours they spent using the Internet daily, are not very satisfied with the level of security e-banking provides. Also 40 out of 49 grade the security of this system with 60-70. Of course this is not a bad grade, but because of the fact that it has to do with bank transactions, everyone has to be 100% sure that their money is safe. So, this is a thing that must be improved.

It need to be pointed though, that someone who uses the Internet for more than 5 hours a day seems not to worry that much from such threats because of the familiarity of the environment.

* DK/DA : Don’t Know / Don’t Answer
5.5 *Job, E-banking services you use*

If the job of a user is matched with the service used most, the results would be more than interesting. It is clear that students use all sorts of e-banking services, in contrary with managers that use it only for payment. Workers in private sector are pretty much the same with students. So the cause that leads young people and employees of private companies in the use of e-banking is their needs and their financial status. A manager’s financial status is statistically much healthier than a student’s one. This is probably the reason that students, and employees, use services dealing with credit cards, loans, requests and money transfer, while managers don’t. As far as unemployed people are concerned, it is expected that the main services that they seem to care for are money transfer and requests, due their financial status, too.

**Job * E-banking services you use Crosstabulation**

<table>
<thead>
<tr>
<th></th>
<th>payment</th>
<th>money transfer</th>
<th>credit card-loan</th>
<th>requests</th>
<th>other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Job</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>private sector</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>manager</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>student</td>
<td>9</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>24</td>
</tr>
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<td>unemployed</td>
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<td>7</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>14</td>
<td>14</td>
<td>4</td>
<td>11</td>
<td>4</td>
<td>47</td>
</tr>
</tbody>
</table>

![Pie chart showing distribution of e-banking services by job type](chart.png)
5.6 Do you use e-banking, which bank do you use for e-banking services

Do you use e-banking * Which bank do you use for e-banking services Crosstabulation

<table>
<thead>
<tr>
<th></th>
<th>National</th>
<th>Alpha</th>
<th>Eurobank</th>
<th>Piraeus</th>
<th>Marfin</th>
<th>City</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you use e-</td>
<td>yes</td>
<td>11</td>
<td>6</td>
<td>9</td>
<td>19</td>
<td>1</td>
<td>1</td>
<td>47</td>
</tr>
<tr>
<td>banking</td>
<td>no</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>11</td>
<td>6</td>
<td>9</td>
<td>19</td>
<td>1</td>
<td>1</td>
<td>48</td>
</tr>
</tbody>
</table>

Which bank do you use for e-banking services * Opinion for e-banking you use Crosstabulation

<table>
<thead>
<tr>
<th></th>
<th>Opinion for e-banking you use</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>average</td>
<td>very much</td>
</tr>
<tr>
<td>Which bank do you use for e-banking services</td>
<td>National</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Alpha</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Eurobank</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Piraeus</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Marfin</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>City</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>31</td>
</tr>
</tbody>
</table>

The bank, which Greek users of e-banking trust for their transactions, is Piraeus. This may be caused by the high level of responsibility and security it provides. Of course it needs to be mentioned that this bank is one of the strongest private ones in Greece, someone might say that it is the first, so it more than expected that people who have their money in that bank, use its e-banking system, too. For the same reason, i.e. the number of clients, National bank comes second and Eurobank third.

What is important for research and for the banks of course is the opinion users have for the e-banking service they use. Piraeus bank, although it has more clients than the other banks, it seems not to get positive comments, whereas National bank’s clients are more satisfied with the services they are provided. This is something that obviously differs from the
statement mentioned above, i.e. the security and responsibility that bank provides lures the users, but this doesn’t mean that it is inexplicable. It is important to keep in mind that e-banking is at the time in “natal level” and there is a lot that has to be done, in order to make the system perfect in all aspects. Of course it is needed to point out that the results of this specific table are based on people’s personal opinion, and therefore, one has to deal with them critically and refrain from drawing conclusions quickly.

The statistical analysis continues with the analysis with ANOVA method of three hypotheses. The hypothesis was derived from the combination of some of the more important questions of the survey.
5.7 Research Hypothesis 1

**Education * Grade how easy To Use is your e-banking**

**H₀: Users with higher education find it easier to use and understand the e-banking services.**

The study of this research hypothesis aims at examining whether the more educated Internet users are also those who find it easier to understand e-banking (and consequently are more familiar with online banking services).

<table>
<thead>
<tr>
<th>Paired Samples Statistics</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1 Education</td>
<td>5.16</td>
<td>49</td>
<td>.800</td>
<td>.114</td>
</tr>
<tr>
<td>Grade how easy To Use is</td>
<td>4.61</td>
<td>49</td>
<td>.931</td>
<td>.133</td>
</tr>
<tr>
<td>your e-banking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paired Samples Test</th>
<th>Paired Differences</th>
<th>95% Confidence Interval of the Difference</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Deviation</td>
<td>Mean</td>
</tr>
<tr>
<td>Pair 1 Education -</td>
<td>.551</td>
<td>1.355</td>
<td>.194</td>
</tr>
<tr>
<td>Grade how easy To Use is</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>your e-banking</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Education is a factor of great significance when it comes for this sort of issues. One would expect that the more elevated the education is the easier is for people to use e-banking service. This is partially true, but it is not “a rule to follow”. In this case the hypothesis H₀ is marginally, Sig. = 0.06, so this means that the truth is somewhere in the middle. The finding here is that “The educational level does not affect the ease of using and understanding e-banking services.”
5.8 Research Hypothesis 2

Hours per day using the Internet* Grade how secure is the e-banking you use

**H₀:** Users who spend more hours per day in the Internet feel more secure about e-banking transactions.

The study of this research hypothesis aims at examining whether the Internet users that spend more hours online are also those who think that e-banking is more secure (comparing to those who do not spend so much time online).

<table>
<thead>
<tr>
<th>Paired Samples Statistics</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1 Hours per day using the Internet</td>
<td>3.22</td>
<td>49</td>
<td>.848</td>
<td>.121</td>
</tr>
<tr>
<td>Grade how secure is the e-banking you use</td>
<td>4.00</td>
<td>49</td>
<td>1.500</td>
<td>.214</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paired Samples Correlations</th>
<th>N</th>
<th>Correlation</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1 Hours per day using the Internet &amp; Grade how secure is the e-banking you use</td>
<td>49</td>
<td>.508</td>
<td>.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paired Samples Test</th>
<th>Paired Differences</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Std. Deviation</td>
<td>Std. Error Mean</td>
</tr>
<tr>
<td>Pair 1 Hours per day using the Internet - Grade how secure is the e-banking you use</td>
<td>-.776</td>
<td>1.295</td>
</tr>
</tbody>
</table>
After doing the One-Sample Test, it can now be decided if $H_0$ hypothesis will be accepted or rejected. The only factor there is to be tested is the significance level, which is Sig. = 0.000 as one can see in the two last tables above. The hypothesis $H_0$ is accepted, since, which is not over 0.05. The finding here is that “Users who spend more hours per day in the Internet feel more secure about e-banking transactions.”

5.9 Research Hypothesis 3

**Job * E-banking services you use**

$H_0$: The e-banking services that one may use depend on their job: Users with jobs related to the Internet use more complicated e-banking services than users of non-related to the Internet occupation.

The study of this research hypothesis aims at examining whether the Internet users that their job is related to the Internet are also those who use more complicated e-banking services.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job</td>
<td>100</td>
<td>1</td>
<td>7</td>
<td>5.63</td>
<td>2.053</td>
</tr>
<tr>
<td>E-banking services you use</td>
<td>47</td>
<td>1</td>
<td>6</td>
<td>2.83</td>
<td>1.798</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>47</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ANOVA**

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>23.513</td>
<td>3</td>
<td>7.838</td>
<td>2.693</td>
<td>.058</td>
</tr>
<tr>
<td>Within Groups</td>
<td>125.125</td>
<td>43</td>
<td>2.910</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>148.638</td>
<td>46</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In this case, the one-way ANOVA test, is performed with the “e-banking services you use” as the dependent variable and the “job” as the factor. The hypothesis $H_0$ is rejected, since Sig. = 0.058, which is over 0.05. The finding here is that “User’s occupation is not related to the usage of Internet e-banking services.”
6 CONCLUSION

The results of our research help us come to certain conclusion as far as Internet banking and the behaviour of the Greek customers is concerned. Following the categorisation of the diagram above it will be graded to those certain characteristics.

6.1 Summary

To start with the user’s information, it can be said that the majority of the people asked, knew about it and one can mark it with 8 out of 10. This indicates that there is no particular issue of whether people are aware of the services provided by the Internet banking; therefore there is no need to improve this overall. This is probably the main reason why the bank advertisements on the media do not stress the existence of Internet banking for their banks. Most people nowadays take it for granted that their bank has to have internet banking services available.

On the contrary, even the majority had adequate information, they don’t use e-banking with the same amount and one can mark user’s familiarity with a 5 out of 10. The main age group that uses Internet banking is between 18 and 24 years old. Through the survey a major problem is being surfaced for the banks. Although their service is up and running, not many are using it. This can be improved with incentives. For example many people know that with an online transaction there is no charge for transferring money, while if this is done through a bank €1.20 is being charged (except Piraeus Bank). Perhaps the use of the online banking system can be more user friendly with more helping pop-up menus, online chat with a bank representative and other methods. Overall the use of e-banking websites is a learning curve for the users and it cannot be stressed enough that the web designers should not alter too much the usability, and the colours even of their e-banking sites, so that the users should not become frustrated and discouraged when they are used a certain sequence of clicks for a particular transaction. Other banks offer a leaflet of printed step by step instructions for average users to follow in order to get them started with the use of their e-banking sites. In addition to that, most of the Greek people find e-banking not really easy to use and rate its ease of use around 70-80 percent, so one can say that effectiveness can be graded with 6. There are many cases where the user has to pick up the phone and call to the support desk for additional information for example for validation of IBAN (International Bank Account Number) numbers or for conversion of IBAN numbers to account numbers –when transferring
money within the same bank organisation.

The optimistic result is that more than half of those people feel that Internet is secure enough to be used for their transactions. It is graded with 8 out of 10. It’s good enough for a country like Greece that e-banking is a new way of transactions, so one can predict that in the future the customers which will prefer e-banking will increase rapidly.

Concerning the education of the users of e-banking it is derived from the survey that it is mainly used from higher education users. This is not the majority of the population though. Banks need to focus and invest ease of use for people with college, and higher education. UK banks provide free Internet with local call charge for their users. Greek banks should follow this tactic to give an extra incentive for users that would not normally have Internet connection to their houses to start use the Internet and furthermore, their Internet banking services.

The amount of time spent on the website should be limited to a minimum. Automatic and secure login-logout would greatly reduce the time spent on the website. This requires careful planning and flow of the services in order to make it quick and easy for a user to perform an online transaction. It should not take more time than waiting on the queue of the bank to transfer money to an offshore account.

Payments and money transfer services are dominant in the use of the Internet banking and this is most of the banks invest. Most of the banks now have inventories with DEKO services where users can easily pay their telephone bills, electricity, water and other services, even their Internet service provider. Communication with other providers should make it easier for the e-banking users to pay their bills directly providing a reference number printed on their invoice. There are still some services that require the user to pay a visit a bank or an ATM which in no case could be avoided for example depositing money. This can also be improved so that the deposited money shows up directly on their account from the Internet.

Comparing our results with another recent research on the demographic profile that make use of Internet Banking Services in Greece (Aggelis 2006), which showed that users with more than 2 years of enrolment to banking services are more familiar with electronic payments, one can clearly see that the results waved in the same percentage and the behaviour of the consumer has not changed yet in the Greek Banking environment. The majority of customers live in big cities (especially female users). This is due to the small Internet penetration in Greek countryside. Finally, the majority of customers are young people (21-40 years old). Those customers are more familiar with Internet, e-banking and technology.
6.2 Managerial implications

From the researches that are mentioned in a previous chapter conducted in global level the rhythm of the development and distribution of e-banking has fallen the last two years compared to what happened in 2004 that the percentage of growth was almost 50%. This is due to the fact that those who were about to adopt the new method have already done it, but there are a lot of suspicious and uninformed people all over the world that deny to use the new methods without firstly feeling total sure, secure and familiar with those.

Moreover, it is significant to focus on the results that the hypothesis researches have given and point that the way the users face e-banking services has nothing to do with their professional or educational status. Nevertheless, the more familiar with the Internet users pay more attention to security which is a very important indicator that online business should care more and develop security levels on online transactions.

6.3 Limitations of the research

The sample of the research has been collected in three Greek cities (Kavala, Komotini and Xanthi) and therefore is not representative of Greece in total. Although it could be said that Northern Greece is representative by the sample, the number of the respondents is not big enough for such a generalisation. Nevertheless, from the research outcome, the results should be taken account by bank managers and economists, in order to improve the quality of Internet Banking Services.

6.4 Future research suggestions

Due to the nature of the Internet banking process, information is being exchanged very quickly and efficiently between customers and the organisation. Statistics and numbers are just a click away for a manager or a surveyor who is auditing the efficiency and efficacy of a system. So besides from the entire load balancing that the e-banking has to offer to a bank, when built right, it can offer powerful tools to help improve the workflow of the organisation and target new groups according to the nature of the services used from e-banking. One cannot be certain of what analysis takes place from the management of the e-banking, but from the results of the survey it is almost certain that most of the Greek banks just follow the trends in Europe and America rather than to really focus their expertise in spreading the use of
their e-banking systems.

Our search proves that Greece follows the current from a good distance, but the indications make us feel satisfied and optimistic for the future of e-banking. The automation of the Internet banking has a lot to offer both to the customer and the bank itself. The upcoming generation is being educated through computers, and is more familiar with the use of Internet. As a natural flow of events the growth of e-banking is inevitable, but management needs to realise that by investing in a rigid e-banking application, in effect they convert their customers to employees. Training to use a user-friendly application can be limited to a minimum and cost can be cut through a successful implementation. Technology is shifting towards wireless Internet and evermore smaller smart phones-computers. Once when the plastic money was a trend, transactions in the future might take place on the spot of the purchase through a mobile phone.

The recipe is straightforward: security, ease of use and being able to follow the technological advances. When these are followed, management has a great tool on their hands to turn their service into profit.
7 REFERENCES


Internet Links

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4. www.atebank.gr
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7. www.buzzback.com/
8. www.cirstatements.com
10. www.economic.gr
11. www.emporiki.gr
12. www.eurobank.gr
13. www.euro2day.gr
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15. www.hba.gr
16. www.hrima.com
17. www.ionianet.gr
18. www.marfinegniabank.gr
19. www.naftemporiki.gr
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22. www.oktonia.com
23. www.schwab.com
24. www.winbank.gr
# 8 APPENDIX

**Thesis Survey**

Researcher: Nikolaos Satsios  
Supervisor: Vasilios Chatzis  
Research time period: 1/06/2008 – 30/06/2009

No of sample: ____________

## E – Banking Questionnaire

<table>
<thead>
<tr>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 - 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 - 35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 - 45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45+</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary school</td>
<td></td>
</tr>
<tr>
<td>Lower secondary school</td>
<td></td>
</tr>
<tr>
<td>Higher secondary school</td>
<td></td>
</tr>
<tr>
<td>Higher Education</td>
<td></td>
</tr>
<tr>
<td>Highest Education</td>
<td></td>
</tr>
<tr>
<td>MsC, PhD Degree</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Occupation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Employee</td>
<td></td>
</tr>
<tr>
<td>Public Officer</td>
<td></td>
</tr>
<tr>
<td>Free Profession</td>
<td></td>
</tr>
<tr>
<td>Businessman – Owner of a Business</td>
<td></td>
</tr>
<tr>
<td>Salaried Manager</td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Annual Income</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5.000€</td>
<td></td>
</tr>
<tr>
<td>5.001 – 15.000€</td>
<td></td>
</tr>
<tr>
<td>15.001 – 30.000€</td>
<td></td>
</tr>
<tr>
<td>30.001 – 50.000€</td>
<td></td>
</tr>
<tr>
<td>&gt; 50.000€</td>
<td></td>
</tr>
<tr>
<td>No income</td>
<td></td>
</tr>
<tr>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Do you have access to the Internet? If yes, for how long?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I don’t have access</td>
<td></td>
</tr>
<tr>
<td>Less than 6 months</td>
<td></td>
</tr>
<tr>
<td>6 – 12 months</td>
<td></td>
</tr>
<tr>
<td>1 – 3 years</td>
<td></td>
</tr>
</tbody>
</table>
How often do you use the Internet?
- Everyday
- 2-3 times a week
- Once a week
- Once a month
- Less than once a month

How much time do you spend in the Internet per day?
- Less than 1 hour
- 1 – 2 hours
- 2 – 5 hours
- More than 5 hours
- NA

Where do you most often access the Internet?
- Home
- Work place
- School / University
- Other

What are your main problems during your access to the Internet?
- No problems
- High price
- Slow connection
- Few services available
- Other

Are you familiar with e-banking?
- Yes
- No

Do you use e-banking?
- Yes
- No

Are you familiar with mobile banking?
- Yes
- No

Do you use mobile banking?
- Yes
- No
- NA

Are you familiar with phone banking?
- Yes
- No

Do you use phone banking?
- Yes
- No
- NA

Which bank (s) do you cooperate with?
- National
- Alpha bank
- Euro bank
- Pireaus Bank
- Marfin Egnatia bank
- City bank
HSBC ❑
Nova bank ❑
Agricultural Bank ❑
General Emporiki ❑
Other ❑

- From which bank(s) do you use e-banking services?
  National ❑
  Alpha bank ❑
  Euro bank ❑
  Pireaus Bank ❑
  Marfin Egnatia bank ❑
  City bank ❑
  HSBC ❑
  Nova bank ❑
  Agricultural Bank ❑
  General Emporiki ❑
  Other ❑

- How many transactions (in average) do you actualise per month by utilizing e-banking services?
  At most 2 ❑
  2 - 5 ❑
  5 – 10 ❑
  > 10 ❑

- How did you start using e-banking?
  Your bank recommended it ❑
  A friend / familiar person recommended it ❑
  Through an advertisement / registration ❑
  Accidentally by yourself ❑
  Other ❑

- Which of the following e-banking services do you use?
  Payment / order ❑
  Money transfer ❑
  Credit cards / Loans ❑
  Investments ❑
  Requests ❑
  Other ❑

- Do you think that e-banking of your choice (which you use) is updated and able to cover all the issues of your interest?
  Not at all ❑
  Little ❑
  Indifferently ❑
  Much ❑
  NA ❑

- How would you score its **usefulness** (in a 100-scale)?
  0 – 50 ❑
  50 – 60 ❑
  60 – 70 ❑
  70 – 80 ❑
  80 – 90 ❑
  90 – 100 ❑

- How would you score its **easiness** (in a 100-scale)?
  0 – 50 ❑
  50 – 60 ❑
- How would you score its **security** (in a 100-scale)?
  - 60 – 70
  - 70 – 80
  - 80 – 90
  - 90 – 100

- What do you believe could actuate you more to use e-banking services?
  - Education
  - Development of e – government
  - Information
  - Greater assurance from banks
  - e – Banking for business
  - Other

- Which are the reasons that discourage you from using e-banking?
  - Transaction security
  - Service
  - Education on using the services
  - Usage cost
  - Other

- Do you believe that **Teiresias institution** functions for or against the use of e-banking?
  - For
  - Against
  - Indifferently
  - NA

- Do you believe that your personal data submission into the Internet (during your e-banking transactions) puts their protection in danger?
  - Yes
  - No
  - NA