A COST-BENEFIT ANALYSIS OF TWO ALTERNATIVE APPROACHES TO INTERNET BANKING IN UKRAINE

by

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Abstract

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Ukrainian banking institutions are now looking at technologies of remote account access and gradually adopt them. This study reviews Internet banking in the context of Ukraine and applies Cost-Benefit Analysis technique to choose between two alternatives for Internet banking development: individual and consortium variants. We test whether a consortium approach has advantages and could be more attractive to major groups of agents.

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Chapter 1

INTRODUCTION

New information technologies now become more widely used in all industries and banking is not an exception, moreover, banking products could be delivered in purely digital form. Banking institutions in developed countries started providing remote services several years ago and have already passed initial stage of development. Extensive usage of Internet technologies made it possible to use this route as a delivery channel for banking products. Development of Internet banking in Ukraine has some peculiarities: not only commercial banks but also National Bank of Ukraine could be interested in this system and could participate in the development process.

After filling up almost all niches in traditional banking, modern and most advanced banks started seeking new possibilities. One of the most exciting features of the modern world is the prevalence of information over other factors of production (such as labor, capital or land). It is possible to state that we are living in the information era, where availability or unavailability of information plays a decisive role in the production process.

Internet is one of the most exciting and runaway creations of the last decades. During the last period of time quality, speed and accessibility of Internet have improved significantly and Internet transformed to the place of business. More and more companies have become involved into the process of collaboration over the Internet and the Web. It is natural that banks – a blood circulating system of the economy – also became involved into this process.

Traditional banking is a good example of an area that could be almost completely digitalized. This means that large number (or almost all) of routine banking operations could be performed without direct human participation.

Account opening and closing, money transfer process, electronic bill payment, online cash management etc. could be automated. We can now see gradual transformation of traditional services into digitized ones. Credit and debit cards, electronic money transferring through specialized networks (S.W.I.F.T., SPRINT etc.), client-bank applications, telephone banking, and Internet banking *per se* are examples of such a process. Usage of the Internet is the following step in the continuous process of transformation and improvement. It tends to simplify access to the banking operations and allows performing them almost from any point in the world and from any computer that has an open Internet connection.

The Ukrainian banking system is relatively young and now undergoes development process. Internet banking could be viewed as one of the possibilities for further development. One of the arguments in favor of Internet banking is that involvement into international cooperation and technology exchange could potentially improve national welfare. Discrepancy in technology largely describes differences in national welfare, so in order to reach the level of developed countries, Ukraine has to adopt new technology and participate in international technological exchange.

The development of good web site is the first important step on the way to the Internet banking. Only several Ukrainian banks have their own websites; some banks present only basic information about them, other provide relatively good navigation about the services provided, however it should be noted that while quality of these sites differs substantially the overall grade is extremely low. The most common feature of all sites is a lack of actual up-to-date information. Frankly speaking, none of them could be considered as a first step on the way to the Internet banking, however web sites of only a few banks (for example Aval, Privatbank, International Commercial Bank, etc.) are the most closely fit the requirements. In the new environment, banks will have to transform their attitude toward usefulness of Web sites in attracting new clients.

A separate issue is the provision of services similar to Internet banking. This is online banking, mobile banking, and other forms of automating banking services. The main difference is a scope of technologies and devices used to access these services. For instance Privatbank, in cooperation with national operator of mobile communication in Ukraine Kyivstar GSM, provides "mobile banking" – limited access to the account from cellular phone using SMS (short message service)[1]. This service requires emission of VISA Classic payment card and gives a "possibility to effectively pay for mobile communication service from "Kyivstar GSM" from your mobile phone." (Kyivstar, 2001)

Relatively large number of banks provides client-bank service, where customers can perform limited types of transactions and view account balances. However, this service is limited mainly to the corporate clients.

Another topic that has to be addressed is legislative one. Ukrainian banking legislation is relatively strict and requires personal presence of customer in the bank. Customers should present passport and identification number to make even the easiest operations. It seems that these requirements should be relaxed to allow convenient banking services. Validation of payment documents is a serious problem and one of the possible solutions is the usage of electronic signature. Law on payment systems and money transfer in Ukraine has been adopted on 5 April 2001.

Assume that at least some banks decide to develop Internet banking. Then they will have to choose the right strategy to win in this "business game." Because the real number of possible business strategies is large enough, we propose to limit our attention only on two of them: independent development of Internet banking systems and consortium alternative.

[1] See http://www.starcard.com.ua for details

Taking all these into account we could conclude that Ukraine has a very good chances to be involved into international banking society partly through the Internet banking technologies.

Finally, it should be noted that we do not position this work as a business project and do not view Internet banking exclusively from the position of one or another group of agents (either businesses, individuals or government). The main purpose is to analyze social impact of Internet banking usage. Because one of the examined alternatives involves participation of governmental structures, they could use this work for further studying of Internet banking phenomena.

The reminder of this paper is organized as follows. Chapter 2 surveys the literature available on the topic of cost-benefit analysis and presents a short review of most notable papers dealing with Internet banking and related techniques. Chapter 3 overviews technique of cost-benefit analysis and describes the steps required to do complete the analysis. Chapter 4 describes the framework of internet technologies in Ukraine and skim four major groups of players: internet service providers, banks, businesses and private consumers, and governmental institutions. We analyze an ability and willingness of these players to deal with internet-related issues. In chapter 5, we apply technique of cost-benefit analysis to the Ukrainian evidence and present recommendations for the practice of Internet banking development in Ukraine. Chapter 6 contains conclusions, final remarks, and "what to do list."

This paper might not only be of an interest to economic researchers working in the field of Internet banking, but also have practical implications for both the management of commercial banks and policymaking institutions.

Chapter 2

LITERATURE SURVEY

The main problem with the topics on e-commerce and Internet banking is the absence of theoretical literature. There are many reviews in the popular press and many comments on the Internet sites all over the world, but a lack of serious studies involving econometric technique mainly due to the absence of numerical data. In this paper, we will use cost-benefit analysis technique, which is rather developed.

We could divide the whole literature available into two major groups: theoretical background of cost-benefit analysis (CBA) and studies and surveys of Internet banking.

Theoretical literature

Cost-benefit analysis is well-developed topic and most authors agree in the question how it should be performed. For example, Boardman (Boardman *et al.*, 1996) in the first chapters identify nine different steps that are crucial for CBA. Later he expands these steps and discusses different pitfalls and complications. This book is positioned as a guide for practice as well as for academic and scientific work. However, it seems that authors prefer to discuss academic issues and heavily use social benefit and social loss curves, which are rarely observed in practice.

Other authors such as Weimer and Vining (Weimer and Vining, 1992) identify slightly less steps – only four, but conceptually they are the same. Authors view cost-benefit analysis as an instrument in social policy evaluations and devote only single chapter to this method. Authors heavily discuss methods of monetizing impacts such as opportunity cost, willingness

to pay, discounting for time and risk. The advantage of this work is the review of cost-benefit analysis application for different market models: efficient markets and negligible price effects, efficient markets with noticeable price effects, inefficient or distorted markets, secondary markets. However, they also depart far from practical usage and their work could be mostly applied to the theoretical study of social projects.

Empirical studies of Internet banking

The second group of papers consists of empirical studies of Internet banking and related issues.

Arthur Andersen Financial Services provides several surveys on electronic business (Arthur Andersen, 2000a, 2000b, 2000c). They investigate electronic business-to-business (eB2B) and electronic business-to-consumers (eB2C) areas. These surveys do not directly address Internet banking, but provide some basic results about perspectives of electronic business, readiness of customers and suppliers to participate in new relations and therefore define the role of Internet Banking in servicing this new form of conducting business. Surveys were conducted among 226 different companies having activity in different sectors of economy all over the world.

In the first survey "Converging on an eBusiness future: eB2B in the financial services industry" (Arthur Andersen, 2000a) the accent was on the preparedness of eB2B area – the bedrock of new economy that dwarfs eB2C volumes. It seems that respondents were mostly concerned about the impact of eB2B competition on market-facing areas, which include marketing, sales, and product distribution. Less attention was paid to the ability of newly arisen eB2B intermediaries to affect internally driven areas such as payments, clearing and settlements. However, Arthur Andersen points out that "it is precisely in these internally focused areas where some of the most impressive efficiency gains can be made – gains which would support the overall profitability and efficiency of the business. It is surprising as well that

respondents do not see any clear linkage between eBusiness and the capacity or need to impose changes in the supporting internal processes." (Arthur Andersen, 2000a) Respondents did not express the sole opinion about the forms of future payments. They shared preferences among credit and debit cards, bulk payment systems, various forms of certification and bilateral netting, but there was also strong support for electronic cash. Now there is no clear winner among these alternatives – each system has its pluses and minuses and could suit different types of transactions.

Positive bias toward consumer side could be noted at the present stage of eBusiness development. Most respondents pointed out (in most cases very optimistically), that areas of their business that face consumers, particularly in the distribution, customer relationship, management, sales and marketing, and market competitiveness, have already been transformed to reflect demand of eB2B platform. Authors also sliced survey in geographical aspect, but it seems that such a slicing does not reflect any pattern. In any region, there are some businesses that are more prepared and some that are less.

As a general result of this survey, we could infer that most companies feel that they are ready for the new environment. Often they did not choose yet an exact model of adoption (leave business methods relatively unchanged, change somewhat or undergo a radical transformation), but in some cases they are already in the process of transformation to eB2B platform.

The second survey "Thriving in the new economy: perception vs. reality" (Arthur Andersen, 2000b) addresses issues of producer-customer relationship. Companies that provide services directly to the final consumers were the objects of this survey. Their vision of eBusiness problems and perspectives sometimes differs from eB2B point of view.

The most surprising result is that surveyed companies rated better known and understood issues as being more important then eStrategy. These included consolidation, cost reduction and streamlining, diversification of products and

markets, strategic partnerships, multiple delivery platforms, globalization of operations and brands, and disintermediation. "Respondents' perception of drivers and potential advantages of using eBusiness for financial transactions implies that eBusiness strategies are not being integrated as part of a comprehensive platform." (Arthur Andersen, 2000b)

Arthur Andersen argues that despite the common belief of respondents that they have effective technical infrastructure to support eBusiness strategy, in reality they do not have a sole marketing perspective and do have an improperly aligned marketing strategy. Most respondents view eBusiness more as marketing and not the transaction platform. They see eBusiness as only the means for promoting products, presenting them to potential customers and not the instruments of making deals, transferring payments etc. Respondents show a great concern about taxation innovation and adoption of existing taxes to the global eBusiness environment. Up to now, there is no common strategy in transforming taxation system of major countries.

These two surveys clearly show the present disposition in the world economy in relation to the new medium of business conduction – eBusiness platform.

The position of banking sector among other financial intermediaries is presented in the other Arthur Andersen's paper "Measuring eBusiness effectiveness in the financial services industry: banking" (Arthur Andersen, 2000c). This paper is one of a five-part series of thought pieces from Arthur Andersen discussing eBusiness effectiveness within the financial services industry. This thought piece concentrates on the banking segment. Other thought pieces focus on the brokerage, lending, asset management, and insurance segments of the industry.

All these sectors were examined on overall eBusiness ability, overall Web site structure, sales & marketing issues, possibility of on-line application and processing, fulfillment of functions and ongoing customer service. In the

company of other financial intermediaries, the banking sector performs fairly badly, leaving only the insurance behind. As expected, the brokerage segment leads the financial services industry in terms of overall eBusiness capabilities. This is not surprising, as this segment has been an early adopter of eBusiness. Furthermore, the brokerage segment has leveraged eBusiness across more of its business cycle than the other industry segments.

These findings indicate that the banking sector has room for improvement and some specific recommendations could be made based on the best practice. Addressing some of the best practices and key opportunities outlined in this thought piece will help an organization to remain a player in the online market. However, even these capabilities may not be enough to enable an organization to be competitive or achieve market leadership. Moving forward, speed and flexibility will be keys to success in an online financial services arena where leaders will be determined by an organization's ability to not just meet but to redefine the basic requirements by introducing new, eBusiness-driven models.

This paper is particularly useful in conducting banking business based on eBusiness platform. Ukrainian banks do not have a well-defined strategy of behavior in new environment and these recommendations could be extremely valuable.

An interesting study of relations between personal characteristics and activity in using Internet technologies presented in the NBER working paper "Does the Internet Increase Trading? Evidence from Investor Behavior in 401(k) Plans." (Choi *et al.*, 2000)

Authors analyzed the impact of Web-based scheme of trading on the trading activity and presented statistical model to formalize their findings. Nevertheless, the most interesting part of the paper that could be useful not only in the 401(k) plans analysis, is the empirical portrait of Web trading. While analyzing the topic – who trades on the Web – authors run a regression

on personal characteristics along with indicators of Web trading activity. As might be expected coefficient of age is negative – older participants are less likely to change their habits and adapt to the new platform. Salary and plan balances are positively related to the expected Web activity. Active participants benefit more from new scheme and actively use it. Generally, young, male, well-educated, wealthy people are more likely to be early adopters of computer technology, and author's results are highly consistent with such beliefs.

To find out whether people adhere to the new media, authors constructed a tree where each trader could follow one of the branches, choosing either phone or Web on each step (3 steps have been analyzed, however the exact number is not important.). Model allows some switching back and forth between Web and phone transactions. Despite the global tendency of reduction in costs of using Web, in the short run users may experience increase in them and turn back to the phone operations. Tree shows that with each subsequent trade on the Web, the probability of making the next trade on the Web increases. However, the reverse is also true: the longer the sequence of phone trading the more likely that next operation will also be conducted using phone.

Another important implication of the empirical evidence is that Web traders usually have lower marginal costs and therefore perform smaller transactions and willing to undertake smaller expected benefits. These results seem to be contradicting with previous one stated that wealthier people tend to use Web more actively. However, distinction should be made between traders and trades. In the latter case, trades tend to be smaller and occur more frequent.

All the results presented in this paper refer to the (unusual for Ukraine) pension savings plans. Nevertheless, all the implications, particularly empirical one, seem to be valid for other activities linked to the usage of computer and Internet technologies.

The most prominent study of Internet banking could be found in the research paper "Internet Banking: Developments and Prospects" (Furst, 2000). This paper is unique in the sense that its implications are based on the raw data available directly from the Office of the Comptroller of the Currency. Data covers only activity of banks and banking institutions in the United States, but the sample is relatively large (covers 2,517 national banks on a quarterly basis for the period Q2 1998 - Q3 1999) to get reliable results and financial data is matched with the questionnaire conducted between mid-August and mid-September 1999 and covered topics on Internet banking.

Authors have developed logit models to explain why banks choose to adopt Internet banking, and why some choose to offer a relatively wider array of Internet banking products and services. They have found that largest banks that account for almost 90% of national banking assets have already adopted some Internet banking schemes and they perform successfully in providing Internet banking services. In contrast small banks and *de novo* Internet banks shows worse results than similar banks not providing Internet banking.

Chapter 3

BASICS OF COST-BENEFIT ANALYSIS

Any decision problem involves several alternatives to proceed and the main question he has to solve is what alternative to choose. There are a number of methods developed to solve the problem of choice. All of them, regardless of the way, designed to weed out *a fortiori* detrimental projects. Several methods could be applied to project evaluation simultaneously to get results that are more reliable or to fit the specific choice rule more closely. The main requirement of all method is that the total expenses for preliminary analysis should not outweigh benefits from the project implementation.

Sundry methods require different resources and take different time. Some are more complex and some are simpler. We will concentrate on one among the broad range of methods – Cost-Benefit Analysis (CBA).

The purpose of CBA is to assist decision-making. More specifically, the objective is to facilitate the more efficient allocation of resources.

As Boardman *et al.* (1996) notes, simple personal decision-making illustrates many of the features of CBA. These include a systematic categorization of impacts as benefits (pros) and costs (cons), valuing it in monetary term (assigning weights), and then determining the net benefits of the alternatives. When an individual talk about costs and benefits, it means often only his own costs and benefits, regardless of the external effect. Similarly, in evaluating private investment projects, firms tend to consider only those costs and benefits that directly affect the profits or revenues.

Generally speaking, CBA should cover all the possible costs and benefits to be socially useful. "The benefit-cost analysis from the perspective of society

indicates what should be done in an ideal world…" (Weimer, 1992) – the world without incomplete information, uncertainty, and externalities. Only in this case we could choose the projects that will yield highest social return. Because different forces are involved in the decision-making process, the "scuffle" is unavoidable and government (if the project could potentially influence public welfare) should intervene and participate in choice of favorable alternative. The decision whether to intervene or not should be based on careful analysis that would consider all *pro et contra*.

Benefit-cost analysis grounds on the Kaldor-Hicks criterion emphasizing that policy should be adopted only if those who will gain could fully compensate losers and still be better off (Kaldor, 1939). Policies that increase social surplus are potentially Pareto improving and therefore meet Kaldor-Hicks criterion.

There are two major types of CBA:

1. *Ex ante* CBA – the standard CBA. Its contribution to the decision-making is direct, immediate, and bureau specific; it is most useful for deciding whether resources should be allocated to a particular project.
2. *Ex post* analysis is conducted at the end of the project, when it is much less uncertainty about what the actual cost were. The main purpose of this analysis is "learning" of what mistakes were made by the analysts and whether specific alterations in course of project development have positive of negative impact.

In practice, many CBA studies are performed during the whole project life and could be classified as *in media res*. The later this analysis will be performed the less uncertainty about the cost remain. Some other types could be mentioned (combination of *ex ante/ex post, ex ante/in media res*) but they are artificial to some extent and rarely used in practice.

CBA may look intimidating and complex. One of the possible ways to implement CBA is to break it apart and follow this list of steps.

Required steps are (Boardman, 1996):

1. Decide whose benefits and costs count (standing).
2. Select the portfolio of alternative projects.
3. Catalogue potential (physical) impacts and select measurement indicators.
4. Predict quantitative impacts over the life of the project.
5. Monetize (attach dollar values to) all impacts.
6. Discount the time to find present values.
7. Sum: Add up all benefits and costs.
8. Perform sensitivity analysis.
9. Recommend the alternative with the largest net social benefits.

We will go through them to describe each step more closely.

Decide whose benefits and costs count (standing)

On the first step analyst should first decide who has standing that is, whose benefits and costs should be counted. In most cases, project managers define the scope of agents that has to be analyzed. In spite of this, analyst has to be very careful not to miss somebody.

Almost any project could be analyzed from different points of view and the scope of actors under examination will heavily depend on the standpoint. The broadest definition of society comprises all people, no matter where they live or what they do. "Because the political importance of externalities cannot always be readily determined, it is usually best to begin by listing *all* identifiable impacts, whether they are internal or external to the national society. Explicit judgment can be made about which externalities should be ignored and which monetized…" (Weimer and Vining, 1992) Of course, the impacts of each individual project on most of society members would be negligible and we would simply spend resources counting them, so it seems not wise to list all the impacts on all individuals.

The rationality under decision whether to include or exclude somebody could be very simple in one case and extremely complicated in other. Evident benefits and costs are not a problem, however, often project has a number of "hidden" factors that have indirect effect, and the main goal of the analyst at this stage is to uncover all relevant issues.

Select the portfolio of alternative projects

This step requires the analyst to specify the set of alternative projects. This is necessary for further comparison: we would be able to select the best alternative among several alternative projects. The only relevant comparison could be obtained when we use the common method of analysis for every project. In any other case (when we alter list of affected agents or composition of benefits and costs), we would have got unreliable and incomparable results.

Catalogue potential (physical) impacts and select measurement indicators

"Step 3 requires the analyst to catalogue the physical impacts of the alternatives and to specify the impact's units. We use the term *impacts* broadly to include both required resources and outputs of the projects.

Specification of impact category indicators occurs simultaneously with specification of the impact categories." (Boardman *et al.*, 1996)

It is not too hard to define measurement indicators. For business project analysis the natural measure uses monetary units. To make adequate comparison single measurement system must be used. All effects that do not have natural monetary representation should be converted into monetary units using estimates or other appropriate technique. For example, saved time, improved health, acquired pleasant feelings etc. It is obvious that researcher is

not able to capture all the effects; in contrast, he has to concentrate on relevant ones.

Predict quantitative impacts over the life of the project

Almost all projects have impacts over the extended periods. The forth task of the analyst is to foresee impacts for every project over the whole life period.

This stage is very complicated, because exact measures of impacts often not available. Analyst has to use some estimates, previous experience, external information, or any other possible ways to quantify benefits and costs. The most nontrivial task is to quantify things that do not have natural numerical representation or those that are hard to measure such as number of customers for new product, number of hardware failures and significance of damage, total amount of time saved, total amount of additional support costs, gains from safety improvements, etc.

A bit more straightforward but also very complicated procedure should be used to predict salvage value of the project. If the project assumes expansion during the life period and the exact scale is ambiguous, it is necessary to predict as precisely as possible the extent of such an expansion. The alternative way is to quantify impacts of the scalable project on unit base and then scale the costs with respect to the actual size of the project. For example, if we know that project lasts for 10 years, and we have the information that project will behave similarly year after year, we could calculate costs and benefits per year and then multiply them by number of years.

Monetize (attach dollar values to) all impacts

The analyst has to monetize each of the single impact units defined previously to get a common basis for the subsequent summation. *Monetization* means value in currency units (dollars, hryvnias, etc.). For the impacts that do not have natural numeric representation, the ideal way is to find such values in a

"catalogue" (however it is not always possible). IMF, World Bank or some other agencies publish statistical books that contain estimates for a number of indicators.

Discount the time to find present values

"For any project that has either costs or benefits arising over extended periods (years), we need a method to aggregate the benefits and costs that occur at different times. Future benefits and costs are discounted relative to present benefits and costs in order to obtain their *present value.* The need to discount arises due to most people's preference to consume now rather then later." (Boardman *et al*., 1996) "The concept of present value provides the basis for comparing costs and benefits that accrue at different times. The concept of expected value provides the commonly used approach to dealing with risky situations." (Weimer and Vining, 1992)

Conventional methods of discounting could be used in this case. Discounting is a standard technique for making costs and benefits accruing at different times commensurate. It should be noted that discounting has nothing to do with inflation, however inflation has to be taken into account when we compute present value. Discounted value of cost or benefit occurred in year t we could calculate simply by dividing value by $(1+d)^t$, where d is a discount rate. The choice of the appropriate discount rate is a disputable issue. It seems that different social groups should have different discount factors and they could change over time.

Again, if we are not certain about the life period of the project or project could extend to all-sufficient formation, we will not be able to get present value of the benefits or costs. In this case, the solution could be to calculate present value for the period when project will still be under control.

Sum: Add up all benefits and costs

The simplest decision rule for a single alterative is to add p the present value of benefits and compare it to the total present value of all costs, and see whether it is higher or lower. If total costs are greater then total benefits, then we choose not to implement such a project and so his value is zero (the best possible alternative).

If $NetPresentValue = Benefits - Costs > 0$, then we could recommend proceeding with this project further.

When there is more then one alternative, the rule is to choose one with the highest Net Present Value (NPV). If all alternatives show negative NPV then we end up with decision not to implement any project.

Perform sensitivity analysis

Sensitivity analysis is the way to deal with uncertainty. In spite of our efforts to perform the most accurate and precise analysis, we always face some uncertainty, especially when dealing with immeasurable items. We use the best possible estimates of unknown quantities to produce the *best case*. The purpose of sensitivity analysis is to recognize this uncertainty and to estimate, how sensitive are our predictions of benefits or costs to the changes in assumptions. "If the sign of net benefits does not change when we consider the range of reasonable assumptions, then our analysis is *robust* and we can have greater confidence in its results." (Boardman *et al.*, 1996)

Too often, project analysis deals with the large number of unknown parameters and it is not possible to analyze the impact of changes in all assumptions explicitly (the number of variants to be considered equals n^k, where n is number of assumptions changed and k is the number of alternatives for each assumption – it is not wise to analyze them all). If we could not compute net benefits for such a large number of combinations, we

would still have to analyze the potential impact or changes in assumptions. Sensitivity analysis could help to do this.

As Boardman *et al.* (1996) notes, the theory of sensitivity analysis deals mainly with:

1. *Partial sensitivity analysis*: How do net benefits change as we vary a single assumption holding everything else constant. Mostly applied to assumptions that analyst believes to be the most important and uncertain.
2. *Worst- and best-case analysis*: Does any combination of reasonable assumptions reverse the sign of net benefits?
3. *Monte-Carlo sensitivity analysis*: What distribution of net benefits results from treating the numerical values of key assumptions as draws from probability distribution? This analysis deals with riskiness of the project.

Recommend the alternative with the largest net social benefits

In the last step, we choose the project with largest net present benefit.

Chapter 4

INTERNET BANKING FRAMEWORK IN UKRAINE

The Ukrainian process of Internet technology implementation has its own unique features. A huge pool of problems comes from technical side. Ukrainian telecommunication network is extremely old and connection quality is very low. All telecommunication facilities are under governmental control (privatization of Ukrtelecom is scheduled for 2001) and this state of affairs prevents modernization.

The other aspect is costs of Internet usage. In contrast to the US, where it is possible to get fast Internet connection at no direct cost (zero payment, but agreement to receive advertising materials through mailbox), Ukrainian citizens have to pay relatively large payments (in comparison with average income) in order to obtain low quality connection.

Despite these problems e-commerce, Internet banking, and all other Internet related business technologies have a bright future in Ukraine.

To analyze Internet banking phenomena, we have to define actors that are present on the market whose actions could be of a great importance. We divide all of them into 4 major groups:

1. Internet service providers;
2. Banks and banking institutions;
3. Businesses and private consumers;
4. National Bank of Ukraine and other governmental organizations.

Internet service providers (ISP)

Ukrainian Internet history began in 1992, when the domain "ua" was officially registered. From that time until 1999, this market has shown excellent performance and high growth potential with annual growth rate exceeding 180%. (Balyuk, 1999)

Personal computers are the main base for Internet access. The exact figure for the number of computers in use is not available, but according to International Telecommunication Union (ITU) estimations, it is equal to about 800,000 PCs or 1.58 per 100 inhabitants (ITU, 1999)[2]. This is an extremely small number in comparison to other countries (Russia – 3.74, Poland - 6.20, United States – 51.05, Jordan 1.39, Syria – 1.46, Europe average – 14.63, World average – 6.78). The overwhelming majority of computers are based on the modern Intel platform; however there are still a vast number of i286 – i486 computers that are not suitable for running latest software.

At the end of 1999 according to different estimates, there were from 130,000 (Spektor, Sachs & Company, 1999) to 200,000 (ITU, 1999) registered Internet users in Ukraine (about 150,000 Internet users in 1998). Approximately 25% of them have a permanent connection (constant IP addresses); the remainder use dial-up connection. Permanent connection is usually used by medium and large businesses and organizations; small businesses and individuals often find dial-up connection more economical. According to Spektor, Sachs & Company (1999) research, about 60-70% of Ukrainian Internet users are businesses; the rest are individuals. At the same time, number of Internet

[2] Computers for personal use. Therefore does not include computers that are accessed via a terminal such as super, mainframe or mini computers. Includes the family of microcomputers using Intel 80x86 microprocessors (e.g., IBM PC compatibles) and Motorola 68x microcomputers (e.g., Apple) as well as other microcomputers containing microprocessor, monitor, keyboard, and data storage. Does not include game machines, electronic calculators, or personal digital assistants.

hosts is estimated to be 19,775 in the end of 1998 and 28,973 in the end of 1999[3], showing growth rate of 46% per year.

It could be treated as given that the number of Internet connection does not equal the number of people involved in the world of World Wide Web. On average, each permanent connection provides access to about 12 business professionals, each business dial-up serves 3-5 professionals, and each individual dial-up connection give access to 1-3 people. According to these estimations, the total number of regular Internet users could thus be as high as 700,000 or about 1.4% of a total Ukrainian population. (Spektor, Sachs & Company, 1999)

The State Committee of Ukraine for Communication and Informatization has forecast the number of regular Internet users – it would grow to more than 320,000 by the end of year 2000. The growth expected to pick up pace in 2001 and 2002, with the number of regular net users rising to 1.3 million by the end of year 2001 and to almost 2.4 million, or around 4.9% of the population, by the end of 2002. (Horodetska, 2000)

"The average Ukrainian internet user is 35 years old or younger; male; a university student or graduate employed in the financial, science, mass media, or advertising areas; with a monthly income exceeding USD 100." (Spektor, Sachs & Company, 1999) According to SOCIS Group study (2001), 66% of Internet users are men; 61% have job while 32% are students; 34% are at the age of 19 to 25 years, 11-18 years old constitute – 21%, 26-30 years – 20%; income is at the average level for 58% of users while high and above average income have only 8% (looking at Russia we could find out that 72% of Internet users have high or above average income).

[3] Internet hosts refer to the number of computers in an economy that are directly linked to the worldwide Internet network. Note that Internet host computers are identified by a two-digit country code or a three-digit code generally reflecting the nature of the organization using Internet computer. The number of the hosts is assigned to the countries based on the country code although this does not necessarily indicate that the host is actually physically in the country.

How does this data correspond to the international experience? There are some investigations about the structure of Internet audience. For example, Choi, Liabson, and Metrick (Choi *et al.*, 2000) found out that "young, male, well-educated, wealthy people are more likely to be early adopters of computer technology." They have tested these relationships statistically on 401k plan data using binary logit regression. Regression shows significance of sex, age, salary, and some other variables.

Studies of Russia's internet audience show similar figures: teenagers (10-15 years old) – 20%, youth (16-24 years old) – 26%, young men (25-34 years old) – 27%, middle-aged persons (35-44 years) – 17%, older then 45 – about 10%. Sixty percent have higher education, 20% - secondary education. If we glance at social class position, then we will see that 32% are managers, 31% are high skill professionals with higher education, 14% – technicians, students and pupils constitute about 14%. Every ninth person has cellular phone, every sixth uses palmtop or PDA, every fourth drives personal or official car. Latter figures could look somewhat strange but they indirectly show users income and social status. (Smirnov, Matveychuk, 1998)

From a geographical aspect, technical facilities are distributed extremely unequally with Kiev being a concentration point and several technologically advanced "islands" in Odessa, Dniepropetrovsk, Donetsk, Lviv, and Kharkov. About 50% of country's registered users are concentrated in Kiev. (Spektor, Sachs & Company, 1999) This is not surprising, because average income in Kiev is the highest in Ukraine; business, government, educational institutions located there; the telecommunication network is much more advanced. It is expected that Kiev will make the main contribution to the growth of Internet in the next few years.

The Ukrainian Internet services industry is extremely fragmented. At the end of 1999, there were about 200 ISPs. These absolute figures could be compared with other European countries as well as population per ISP

figures, however substantial differences are encountered in the Internet users per ISP figures (see Table 1). The ten largest Ukrainian ISPs control less then 10% of the total market. Following the trends of developed countries, the possible scenario of future Internet expansion could involve merging and consolidation, capturing economies of scale in maintenance, customer service, and marketing.

Table 1. Internet service providers in selected European countries (end of 1999)

Country	Population, millions	Internet users	Number of ISPs	Population per ISP	Internet users per ISP
Ukraine	49	200,000	200	245,000	1,000
Ukraine*	49	700,000	200	245,000	3,500
Russia	146	2,700,000	330	442,424	8,182
Poland	38	2,100,000	150	253,333	14,000
United Kingdom	59	12,500,000	220	268,182	56,818

** On the assumption of multiple users per single Internet access channel. Data for other countries is not available*
Source: ITU

Majority of Ukrainian ISPs are secondary providers - they do not own direct high bandwidth external channel to the main European or US nodes and have to lease it from one of 12 companies (See Appendix 2).

The price of Internet connection quickly becomes lower and lower due to the increased competition among providers and extension of external bandwidth. "Since 1996 the average hourly fee for dial-up access has decreased from $4 to $0.7-0.8. Industry experts forecast future near-term decreases in Internet access tariffs, mainly due to the cheaper access to external channels. Currently, leasing a 2Mbit/sec external channel costs a Ukrainian ISP about $50,000 per month, compared to about $1,000 for the typical American provider." (Spektor, Sachs & Company, 1999)

Despite the fact that technical aspects are outside the topic of this paper, couple of words should be said about network architecture to set up complete picture.

Ukraine became involved in the information technology boom not so long ago – much later than major developed countries. Telecom facilities, installed primarily in mid 1970s, are out of date, could not serve all the demands from the customers, and have to be replaced. Statistic shows that only 6-8% of phone line users could use dial-up connection at 19,600 bit/sec or higher and only 20-22% at 14,400-19,600 bit/sec rates. (Balyuk, 1999) However, some positive trends could be observed. For example, the number of phones per 100 inhabitants increased from 14.5 in 1990 to 22 in 1999, digital long-distance exchanges gradually replaces analog, fiber-optic channels crowd out copper lines. (Spektor, Sachs & Company, 1999)

The Ukrainian global telecom network is developing quite rapidly. In mid-1996, the total bandwidth of external channels was only 6.1 Mbit/sec (Balyuk, 1999); by 1999 it had increased almost fourfold to 23 Mbit/sec (Spektor, Sachs & Company, 1999). Significant role (about 70%) is devoted to satellite channels while fiber-optic channels constitute about 26%.

Telephone lines remain the primary medium of communication, particularly within the country borders.

Banks and banking institutions

Ukrainian banking sector originates from USSR system of banks and banking institutions. This system consists of specific banks responsible for the particular types of clients and operations (See Table 2).

Table 2. Banking system of USSR

Original bank name (Russian name)	New bank name (Ukrainian name)	Client groups and scope of activity
Promstroybank (Ïðîìñòðîéáàíê)	Prominvestbank (Ïðîì³íâåñòáàíê)	Enterprises Factories Works
Zhilsotsbank (Æèëñîöáàíê)	Ukrsotsbank (Óêðñîöáàíê)	Housing and communal services Social infrastructure Schools, infant schools Graduate schools, universities

Original bank name (Russian name)	New bank name (Ukrainian name)	Client groups and scope of activity
Ukraina (ÀÏÁ Óêðàèíà)	Ukraina (ÀÊÀÏÁ Óêðà¿íà)	Collective farms (kolkhoz) State farms (sovkhoz)
Vnesheconombank (Âíåøýêîíîìáàíê)	UkrEximBank (Óêðåêñ³ìáàíê)	Foreign transactions Export and import operations Foreign exchange
Sberbank (Ñáåðáàíê)	Oscshadbank (Îùàäáàíê)	Individuals

Modern Ukrainian banking system has two-layer structure and consists of National Bank of Ukraine and 195 commercial banks (only 153 are actually functioning)[4]. (National Bank of Ukraine, 2001) The largest commercial banks are Prominvestbank, "Ukraina," "Privatbank," Ukrsotsbank, Oshchadbank, Ukreximbank, "Aval."

The assets of these banks make up 48.76% of the total assets and capital equals to 33.29% of total capital of banking system. However, five out of seven banks are state or former state banks that are very rigid to the adoption of new technologies, so we cannot expect them to be among the leaders in the adoption of remote access services. It could be expected that large commercial banks with total assets greater then 10 million UAH free of "soviet" legacy will capture leadership. They are more flexible and to some extend more aggressive in business expansion.

The first bank that uses Internet to provide services emerged in 1995 in the United States. It was Security First Network Bank. Now more then 90% of the Top-50 US banks provide Internet banking services. Russian banks adopted this technology in 1998 (in May 1998 "Avtobank" presented his system named "Home bank" to the public).

Here we come to the question: "Why do banks want to provide Internet-based services?" The first reason is necessary but not sufficient condition – the demand for these services. Banks present services that are demanded.

[4] Data on February 01, 2001

However, they would not provide them as if there were no other reasons. The second reason is that it is profitable to the banks. Banks could reduce their costs down to 1 cent per single transaction, which is 100 times lower then servicing through conventional branch network. Here we have to note that costs on transaction vary from $0.01 (Booz-Allen&Hamilton, 2000) to $0.13 (Journal of Internet Banking and Commerce) per transaction.

At the same time, we have to take into account costs of establishing and supporting Internet banking system. They are comparable to those of establishing a branch. Combining these costs with low transaction costs we could expect that they will be repaid in a short time. However, this will be possible only in the case – and this is the third reason – of ability to attract large number of clients that are not constrained with geographical position of the bank.

In the case of Ukraine, it is hardly believable that people from rural regions will have a personal computer, connection to the Internet and willingness to consume Internet banking services. Nevertheless, more and more farmers start using modern facilities, technologies and, as a result, have enough income – we could treat them as potential clients of Internet banking. They would be able to get even more benefits because their conventional costs of servicing in the branch of some bank are substantially higher.

Boundlessness of Internet could allow a bank from a small town to serve the clients from all the regions of Ukraine and costs of such territorial expansion will be close to zero. The question of account opening is disputable, because current Ukrainian legislation requires physical presence in the bank to open an account or even to perform any transaction, however if it would be allowed to make remote transaction, why it is not possible to allow remote account opening? Authenticity issue is mostly a technical topic and could not be barrier to the Internet banking spreading.

We did not mention another reason here – competition. As soon as commercial banks pass the "filters" set by NBU and economic reality, they would have to compete in prices. We could look at any developed country and see that interest rates are close enough to each other. With similar interest rates, the availability of remote access service could be the trump card that would attract new customers. Even now, bankers note that clients stick to banks providing better and wider range of services even for slightly higher price. Richer and more "advanced" clients not only tend to use convenient modern technologies but also encourage other clients from their circle of acquaintance to use them. This is extremely useful for banks that could extend their client base. Persons that use credit and debit electronic cards, smart-cards, current and deposit account tend to be the first adopters of innovations such as phone banking or telebanking, virtual payment cards, Internet banking etc.

Businesses and private consumers

The crash of the banking system accompanied with hyperinflation in the beginning of 1990s heavily affected individuals – they lost their savings – and undermined confidence in the banking system. This leads to the situation when even after 10 years of reforms the majority of people do not use banks for savings or settlements. Only the minority of population are active clients of commercial banks.

Not surprisingly, banks receive about 80% of their profits from businesses and corporate clients and direct their efforts toward them when developing new technologies.

As banking professionals point out, Internet banking systems are natural extension of conventional and widely accepted Client-Bank systems that uses Internet channel as a mean of information delivery. They are primarily oriented to the corporate customers and businesses, however could be readily adapted to individuals on first demand.

Why do businesses use Client-Bank systems? The natural answer is cost savings and efficiency gains. Using conventional banking, company managers have to hire additional bookkeepers and use bookkeeping software to generate payment orders. Then these payment orders have to be delivered to the bank. The costs of such operations are (direct and indirect): bank's charges for each transaction, bookkeeper's fee for the time being out of office, driver's fee, car deterioration, cost of petroleum etc.

Managers could omit these costs using Client-Bank or Internet banking services. In addition to cost saving they get extra control over company's current accounts. They could get consulting services, apply for credits on-line, and visit bank only for operations that are not conventional and require contact with banking officials in person.

Remote Access Services (RAS) require computer facilities, however for businesses it is not a problem in most cases. Businesses already own computers, modems, and other required equipment and about half of them have Internet connection. They use computers for accounting purposes and other office needs so that little or no extra expenses necessary to use RAS. In most cases problem arises on the way between bank and firm. Low quality of connection could discourage managers and prevent wide spreading of new technologies. Sometimes companies refused to use Client-Bank software and turn to Internet banking technologies because they have much better link between office and ISP than between office and their bank.

Another issue that stands on the way of remote account access technologies is the tariff policy of the banks. As evidence shows, Ukrainian banks set tariffs without any economic analysis – just using intuition – or being guided by other banks providing similar services. Price of the service could be based on the client's willingness to pay – thereby banks try to capture marginal value for individual consumer. It is hard to define this marginal value exactly and often price of RAS outweighs benefits for consumers of this service.

What scheme should be applied is not clear. It seems that on the initial stage it is possible to deal with each consumer individually and define his marginal willingness to pay. However when Internet banking services will become available to all it will not be worthwhile to spend resources for defining these parameters. Because marginal costs for Internet banking services will be close to zero the possible variant is to set fixed initial payment and then charge fees according to the activity of service usage.

If we turn to the individuals, the analysis will become even more complicated. For the most part, bank clients do not have required facilities or do not connected to the Internet. As we have noted earlier, only about 1.4% of the total population is connected to the Internet, about 2.6% will be connected at the end of the year 2001, and, if this positive tendency remains, about 4.8% by the year 2002. (Horodetska, 2000 with references to State Committee of Ukraine for Communication and Informatization) Here we could count the total number of Internet users – both corporate and individuals – because those who could access Internet banking services from the computer at work are still potential clients for these services.

Let us try to analyze the share of potential clients more precisely. Almost 100% of Internet users are city residents and concentrated in metropolitan areas – Kiev (about 50%), Dniepropetrovsk, Donetsk, Odessa, Lviv, and Kharkov. Not surprisingly, at the same time, these regions are technological and industrial "islands" and banks concentrate their activity there. From the bank's point of view, it is more interesting to deal with clients whose income is above average. This is fully complies with our analysis of average Internet user characteristic (average income above USD100). It is hard to define the share of such dients – official data is not available or not reliable. However, each bank individually is able to draw out these figures indirectly. Data on account balances, turnovers, and overall clients' activity could serve as a base for such estimations. Moreover, in order to get right estimations it is

necessary to take into account affiliated persons (e.g. close relatives) or to make estimations on household basis.

To constrain clients further, we could estimate the number of cardholders – they use cards to access current account and could receive substantial benefits from RAS. Cardholders in Ukraine could be divided into two groups: those who open card account by their own and use it extensively, and those who were "forced" to open card under so called "salary projects." The second group make up about 50-60% of total number of cardholders and in most cases should be excluded from the list of active users – in most cases debit cards (VISA Electron, EuroCard/MasterCard Mass, Cirrus/Maestro) are imposed on them and are used only for cashing purposes[5]. Considering these two categories of clients, we could roughly estimate the potential number of Internet banking users.

The following table (see Table 3) presents estimation of number of potential Internet banking clients as a share of population in metropolitan areas that has Internet access.

Table 3. Ratio of Internet users to the population of metropolitan areas

Total population of Ukraine	49,153,027	
Citizens of metropolitan areas (beginning of 1999)	8,109,000	
Kiev	2,618,000	
Dniepropetrovsk	1,113,000	
Donetsk	1,058,000	
Kharkov	1,510,000	
Odessa	1,020,000	
Lviv	790,000	
Number of Internet users	Absolute	Share of population in metropolitan areas
2000	700,000	8.63%
2001	1,300,000*	16.03%
2002	2,400,000*	29.60%

* Estimates (Horodetska, 2000 with references to State Committee of Ukraine for Communication and Informatization)
Sources: Statistical yearbook, 1999

[5] To make analysis that is more precise, we have to refer to the statistic of payment card usage and separate active and passive users.

Another method that could be used to estimate the share of potential gainers is the estimation of share of "active" cardholders to the population of metropolitan areas (see Table 4).

Table 4. Share of active cardholders in the population of metropolitan areas

Number of cardholders	Absolute	Share of population in metropolitan areas
Cards issued (on 01/20/2000)	394,600	4.9%
Cards issued under salary projects (on 01/20/2000)	200,000*	2.5%
Cards issued (on 03/01/2001)	more than 1,000,000	12.3%
Cards issued under salary projects (on 03/01/2000)	550,000*	6.8%

* Estimates
Sources: UA Today

Unfortunately, it is not clear how these two sets intersect, i.e. how many cardholders have Internet access. Additional studies are necessary to answer this question.

The main question that arises is: "What are the reasons to use Internet banking?" It is possible to ask similar questions: "Why do we need electronic mail, telephone, ICQ and other electronic communication facilities?" After all, there is conventional mail. However, most of us could hardly remember when they sent their last letter. It is much more convenient to pick up phone or turn on computer. This is mostly because modern means of communication are much more effective and convenient. This is the major reason why more and more people around the world refuse to go to their bank and prefer Internet banking.

We could separate all benefits into two main groups: tangible and intangible. Terms "tangible" and "intangible" are used here to show that some benefits could be converted into material form and hence evaluated in contrast to

"intangible" that increase consumers utility and influence decision-making, but could not be easily quantified.

Advantages for Internet banking consumers:

1. Banking from any location that has an Internet connection (Internet-based).
2. Working offline (bank program or personal finance software) after downloading account information.
3. Better control over money flows.
4. Monitoring check clearance.
5. Accessing account 24 hours a day, 7 days a week.
6. Monitoring account in real time (withdrawals, deposits, ATMs, debit card purchases).
7. Transferring funds from one account to another.
8. Setting up electronic bill payments.
9. Online banking is more cost effective for banks. This should result in lower fees for customers.

Drawbacks to Internet banking consumers:

1. Consumer have to own a personal computer with a modem and Internet connection to access Internet-based accounts.
2. Online banking is subject to the reliability of web servers and other computers. If they crash one cannot access his cash easily.
3. One has to know how to use a computer.
4. If one ever changes banks, he may have to switch software. He will have to re-enter all your old account information into a new program. This could be very time consuming (however this process could be readily automated).
5. Lack of security. However, this is extremely disputable question – modern information protection systems are quite sophisticated while there are many bottlenecks in conventional banking (primarily related to human factors).

Most advanced system of remote banking services provide a range of banking products that are available to the customers in a bank office: current account operations (balances, account abstracts, money transfers), investment options (deposit accounts, securities, FOREX operations), bill payments (regular and non-regular payments) and even loan issuance.

Table 5. Comparing the Internet banks vs. the 30 largest US banks

Web launch	Bank Name	Product Rating*	Rate Index**	Fee Index**	Net Score
Internet banks					
1997	NetBank	9.2	6.45%	1.03%	5.42%
1997	Moneywise-bank	9	6.14%	1.08%	5.06%
1997	Telebank	9	6.34%	1.30%	5.04%
1999	First Internet Bank	9.4	6.33%	1.19%	5.14%
1999	USAccess Bank	8.6	5.18%	1.20%	3.98%
1998	CompuBank	8.4	3.79%	0.92%	2.87%
Internet Banks Average			4.71%	1.30%	3.41%
The Nation's 30 Largest Banks					
1997	NationsBank	6.6	4.18%	1.93%	2.25%
1998	First Union Bank	6.4	3.66%	2.01%	1.65%
Nation's 30 Largest Banks Average			3.55%	3.22%	0.33%

* The product rating is a cumulative score of the depth of online products and services offered by the bank. A maximum score is ten. The internet banks profiled above scored an average of 8.9 compared to the 5.9 average scored by the nation's 30 largest banks.

** The rate index is an average of recent MMA, interest checking, 180-day CD, 1-yer CD, and 2.5-year CD yields on accounts of $10,000. The fee index is computed using a random model of high banking activity over one year. Subtracting the Fee Index from the Rate Index yields the Net Score, which is indicative of the overall value of using each bank.

Source: Money-rates.com (http://www.money-rates.com/ibreport.htm)

World experience shows that Internet banks could give higher interest rates on deposits, lower on loans and charge lower fees. Recently, the average interest rate on deposits in conventional US banks is 3.55% while Internet banks offer 4.71% (see 5 above). But what is more interesting is the average yearly fee charged: in conventional banks fee is about 3.22% while in Internet

banks it is only 1.3% – more than 2.3 times lower. If we add up here time saving and convenience, we can state that Internet banking services are much more preferable to the customers (as Net Score indicates). (Money-Rates, 2001)

This is the evidence primarily from US, but what about Ukraine? Could customers expect similar pattern in cost behavior? It is hard to say now, because none of the banks provides Internet banking services by now and it is hardly believable that there will be "pure Internet banks." Moreover, there is no pure interest rate competition. Offered interest rates depend on the pool of bank's characteristics and bank managers "impudence" (as Ambrose Bierce have noted "Price is a value, plus a reasonable sum for the wear and tear of conscience in demanding it"[6]).

Internet banking users could possibly get significant time saving. According to Finport.Net studies, average conventional operation takes 43 minutes on a single banking transaction, 20½ minutes using PC-banking (Client-Bank system), and only 5 minutes using Internet banking technologies. (Finport.Net, 2001) This timesaving could be monetized using opportunity costs. Thirty eight minutes times the number of Internet banking customers times the average salary of this group of clients could give us an approximate value of cost reduction.

Here we have count only making payment orders. To get more reliable and precise estimates it is necessary to estimate time saving on every operation that could be done via Internet channel.

National Bank of Ukraine and other governmental organizations

March 20, 1991 – the day when Parliament adopted the law "On banking and banking activity" – could be treated as the birthday of Ukrainian banking

[6] Ambrose Bierce (1842 - 1914), The Devil's Dictionary

system. Since that time, banking system has undergone significant changes. The heritage of USSR did not satisfy new demands of Ukrainian economy and many banks of "new wave" have emerged.

Implementation of interbank clearing system – system of electronic payments (SEP) – has played a determining role in the performance of financial sector. Since 1994, this is the most advanced interbank clearing system in the world. It allows payments to cross the country from west to east in half an hour. Now National Bank of Ukraine is working on the on-line system of instant payments, which will allow payments to pass in a seconds and should improve stability and safety of the system.

SEP should also have influenced the velocity of money that would have to rise. Consequently, National Bank should have, in principle, more control over the money supply (monetary aggregates and monetary base). Control in this case means ratio of expended efforts to gains. It could be argued that it is all the same for NBU whether to control *x* hryvnias or *2x* in money supply, however it is not the same for the public opinion.

Since 1997 National Bank of Ukraine has tried to develop and introduce the National System of Mass Electronic Payments that is based on the smart-card technology and should substitute cash transactions on the whole territory of Ukraine. Pilot projects that involve several banks in Kiev ("Express", "Incombank-Ukraine" and "Etalon" banks) and Kharkov ("Megabank" and "Grant" banks) regions are already functioning. For this system to become really national and mass, it is required that commercial banks provide convenient remote access to electronic accounts. This system could function using existing Internet channel and this is the reason why NBU has to participate actively in the process of Internet banking system development.

NBU has already made some steps towards legalization of electronic payments – it has submitted law "On electronic signature" to the Parliament which should legalize relationship between agents in this area. Moreover, on

April 5, 2001 Ukrainian parliament has adopted the law on payment systems and money transfers in Ukraine. Among other innovations, the law imposes the equality of a signature made on paper payments documents to an electronic signature.

Chapter 5

ALTERNATIVE PROJECTS OF DEVELOPING INTERNET BANKING IN UKRAINE

Project description

To start the Cost-Benefit Analysis (CBA) we have to become familiar with the project *per se.*

We propose to analyze two alternatives of further Internet Banking services development. Suppose for a moment that at least some banks realized the necessity of Internet banking and are thinking about implementing the project. At this moment, almost all Ukrainian banks are at the same stage in this process – no one has implemented the full-sized project (and hence do not has sunk costs). Banks could face two alternatives:

1. Commercial banks act independently and each bank seeks appropriate solution.
2. Commercial banks create consortium (or some other coordination unit) and develop a common platform for Internet banking technology.

Strictly speaking, there exists the third alternative – do nothing. It should be applied in case of negative net benefit.

Let us review each alternative more closely to be prepared for CBA.

Independent project development

Each bank that wants to provide Internet banking services and be among the leaders has to develop its own system and pass through all the steps required to promote this new product to the market, including:

1. Project analysis. Banks has to have some preliminary information to make initial decision whether to accept the project proposition or reject it. (For further analysis suppose that bank has adopted the project).
2. Choice of the model. Bank has to decide what services it is willing to provide and develop a model of business expansion, model of internal business interaction etc.
3. Investment in hardware upgrade. Almost for certain bank will be required to upgrade computing facilities and possibly revise network structure.
4. Investment in software. Software could be bought from outsourcing software companies or created by bank's specialists.
5. Advertisement campaign. Clients should become familiar with new type of services provided by this specific bank. Moreover, when several banks will provide similar services, bank will have to convince customers that its services are more advanced and more closely fit customers needs.
6. Project support and further development. It is hardly believed that some bank will be able to provide full range of banking services over the Internet from very beginning, so it will be necessary to extend the number of services provided and to improve their quality.

Obviously, this list is not complete and any step could be split up for smaller parts.

Why could bank choose this strategy? How would it benefit adopting this scheme? The situation is very similar to one that was several years ago in the market of plastic payment cards. We could infer some experience from that situation. Any bank that will decide to provide Internet banking services in Ukraine at this moment will be able to get benefits form leadership. It could capture relatively large market share (as it were with first providers of VISA and Eurocard/Mastercard cards, namely Privatbank and Aval). Then it will be able to provide second order services to followers: offer host services or supply software solutions as it was happened with plastic cards - leaders have established good relationships with international associations (VISA and

Eurocard) and afterwards these associations preferred to deal with known partners.

Developing Internet banking projects independently, banks will more likely use different approaches and then market will be able to choose the most appropriate – a primary benefit of competition. This is the way to progress. However, in this case somebody will be more successful and somebody not. This is the potential source of instability and poor solutions could discourage the idea of Internet banking *per se.* Banking industry is very sensitive to external and internal disturbances and failure in Internet banking business could harm bank's stability, solvency, and client's confidence – this is the likely way to bankruptcy. From the other side, if most Internet banking projects will be successful it will encourage followers to participate aggressively in this business.

Separate project development has other negative aspects. Banks will experience excessive expenditures for "reinventing the wheel", which they would charge to the customers. For customers it will mean higher costs and lower attractiveness of the remote access technologies. For the society as a whole, these expenditures could also be excessive, compared to concerted alternative.

Common-base cooperative project

The alternative to separate development of the projects is to create banking consortium in order to develop a common Internet banking platform specification requirements.

How this could be done? We will try to outline a possible procedure.

1. Banks create consortium or similar organizational structure aimed to organize development and support to Internet banking technology. These efforts have to be coordinated with governmental organizations such as

Central Bank (National Bank of Ukraine) and Security Service (Security Service of Ukraine) in measure of their competence.

2. Consortium elaborates requirement specifications for basic protocol taking into account suggestions of commercial banks and NBU. Then it defines the list of potential candidates or announces competition for software development.

3. Outsourcing companies or bank's IT departments develops preliminary propositions that cover topics of security, scalability, and other global technical issues, and present them to the governmental organizations for evaluation. Governmental organizations defines most suitable project and approve it. Preliminary project propositions have to be financed by grant provided by consortium.

At this stage, companies present no exact software solutions just basic protocol specification.

National Bank of Ukraine checks compatibility with existing banking systems, internal NBU specifications and banking legislation, possibility for further extension.

The result of this phase is a formal Internet banking protocol specification.

4. Based on the approved protocol specification outsourcing companies can develop server and client software. This software could be sold to banks and customers separately or companies could sell software packages to the bank with right to resell it to customers.

Banks could go the other way – develop their own software with built in limitations to work with rivals.

5. Further improvements of protocol have to be concerted with governmental agencies.

Why could banks want to create consortium and spend their money on coordination issues? There are several possible answers.

Looking in the past to the process of Internet development, we could see that Internet exists almost for 30 years. It started from the development of TCP/IP protocol (Transmission Control Protocol/Internet Protocol)

specification that has made possible for different computer systems to communicate. One of the most important events in the history of Internet development is the emergence of World Wide Web that was based on hypertext technology. Using Hypertext Markup Language (HTML) – a set of instructions for document formatting, WWW unified and tied together huge amount of information that could be found in Internet in the form of text, picture, or sound. Work in Internet became simple and easily understood to anyone. (Smirnov, Matveychuk, 1998) State of affairs just described is very similar to Internet banking. Internet banking issues have many technical problems and standardization could greatly improve applicability and attractiveness of this kind of services. As in any technical field, standardization is a necessity.

The second possible argument is cost saving. If "concerted" variant (i.e. consortium) will be adopted, costs will be shared among all participants and probability of positive outcome increase. Management of each individual bank will not face the full range of project problems.

Another argument in favor of consortium is that proposed variant does not exclude competition. Competition will be present either on the stage of base protocol development through the organized contest, and during final software development.

Cost-Benefit Analysis of two alternative Internet banking projects

Now we are ready to perform CBA for two alternatives: independent versus cooperative development of Internet banking system.

Let us follow steps listed above to perform CBA.

Decide whose benefits and costs count (standing)

We could distinguish four major groups of players who will bear costs or receive benefits:

1. Banks and banking institutions;
2. Businesses and individuals – i.e. current and potential bank clients;
3. Internet Service Providers (ISP) and outsourcing software companies;
4. Governmental organizations.

Other economic agents (if any) would be affected only indirectly and to much smaller extent.

Instead of analyzing total effect on society, we separate it and study the individual impacts.

Select the portfolio of alternative projects

As we have already stated, we will examine separate alternative of Internet banking systems development versus coordinated one. We are interested in these two alternatives, because the first option represent situation where banks will act alone without any help from or intervention from NBU. Reality is so that banks now have to use some "tricks" to avoid required personal attendance at the bank office, because current Ukrainian legislation require personal identification of customer, off-line servicing is not allowed.

The alternative project requires some initial efforts from bankers in order to create this consortium and develop the common Internet banking platform. The problem is that Ukrainian bankers cooperate extremely reluctantly and it is hard to prove them benefits from cooperation (if they exist).

Catalogue potential (physical) impacts and select measurement indicators

All the impacts could be categorized according to the "owner" i.e. who get benefits and who bears costs.

Banks have to spend money on project development and support. Development costs are one-time cost and could be treated to large extent as sunk costs, however support costs prolong to the project life. Development costs could be separated into several stages (low-level system, intermediate, and full-sized system). These costs are naturally measured in monetary terms

and are directly observable (or could be relatively easily estimated). Benefits come from increase in number of customers, regional expansion, decrease in service costs. The first two are essentially the same and represents the number of additional customers the bank would attract with new services and increase in usage of banking services. Monetary measure is used to quantify decrease in service costs.

ISPs will get more customers. It might be strongly expected that actively using Internet banking, people will use other Internet services vigorously. From the other side, ISP will have to provide better quality of services and improve connection quality. Obviously, this will require additional investments into hardware (routers, hubs, other communication facilities, technicians, other staff), but will be fully compensated with an increase in number of customers.

Outsourcing software companies will be able to sell their software to the banks and to the Internet banking customers. Different schemes of cooperation are possible. Bank could order software development from outsourcing company and buy the right to use this software (resell it to its customers). As a result, bank will be the owner of the software system. Another solution: software company develops Internet banking system independently and sells it freely in the market. Because we have a standard Internet banking communication protocol, common software could be used to access respective services from several banks.

Businesses and individuals are the "main benefit gainers." They will receive much more convenience, timesaving, and cost reduction at relatively low fee. Unfortunately, these impacts are hard to measure (especially convenience). To be more precise we have to mention reduction in service costs (cheaper transactions), increase in flexibility and control over money flows, possibility to perform banking operations from any location that has an Internet (or Internet-based) connection, opportunity to work offline using bank program or personal finance software after downloading account information.

Consumers will be able to access their accounts 24 hours a day, 7 days a week, 365 days a year and monitor account transfers in real time. One of the most attractive possibilities is a possibility to set up electronic bill payments.

It should not look like there are only huge advantages without any drawbacks. Online banking is subject to the reliability of web servers and other computers – if they crash one cannot access his cash easily. However, this is a problem of bank and not of a client (magnetic strip on credit card could become demagnetized and cash could bourn down – nevertheless no one worry about that). To use Internet banking one has to know how to use a computer, however now more and more people are familiar with them.

Governmental organizations (NBU and SSU) will generally bear costs for project analysis, however they could receive some benefits in return. NBU is actively promoting National System of Mass Electronic Payments and Internet banking could become an integral part of this system. It is not clear, to what extent could Internet banking payment system augment smart-card system, but they could potentially supplement each other.

As one of the possible scenario outcomes, National Bank of Ukraine will be able to control money supply more easily. Why this effect will take place? From the one hand, Internet banking could attract free money into the banking system and reserve requirements of National Bank will have greater effect; from the other hand, Internet banking technique could theoretically increase velocity of money and monetary policy will operate on longer lever, i.e. monetary policy instruments will be more effective.

All the abovementioned impacts are presented in Table 6.

Table 6. Impacts and measure terms of Internet banking.

Impact owner	Impact	Measure terms
Bank	Hardware extension setup costs	Monetary
	Project development setup costs	Monetary
	Project support regular costs	Monetary

Impact owner	Impact	Measure terms
	Increase in number of customers	Number
	Service cost reduction	Monetary
ISP	Setup costs for hardware enhancement and extension	Monetary
	Increase in number of customers	Number
Outsourcing software companies	Costs for software development	Monetary
	Revenues from software sales	Monetary
Businesses and Individuals	Service costs reduction due to the fact that online banking is more cost effective for banks	Monetary
	Timesaving	Time
	Cost saving	Monetary
	Increase in flexibility and control over money flows	?
	Banking from any location that has an Internet connection (Internet-based)	?
	Working offline (bank program or personal finance software) after downloading account information	Monetary
	Accessing account 24 hours a day, 7 days a week	?
	Monitoring account in real time (withdrawals, deposits, ATMs, debit card purchases)	?
	Setting up electronic bill payments	?
	Risk of computer system failure (web servers, banks' computers, ISP services)	?
	Costs of acquiring knowledge of how to use computer, Internet, and Internet banking *per se*	Time/Monetary
	Costs of adopting to new software if one ever change banks	Time/Monetary
Governmental organizations and NBU	Costs for project analysis	Monetary
	Increase in control over monetary aggregates	Monetary / ?
	Simplified integration of the National System of Mass Electronic Payments into existing banking model	Monetary / ?

"?" – Measure terms are ambiguous or not defined

Predict quantitative impacts over the life of the project

Predicting the future is a kind of an art. Because we will perform *ex-ante* CBA, it is not possible to make precise predictions about impacts over the life of the project. Nevertheless, let us try to make at least some of them.

It is hard to expect that banks will implement a full-sized project from the very beginning. The wise solution will be to implement Internet banking system in a several stages. At each step bank will extend the size of the system, implementing new features and options. Obviously, such an extension requires additional costs for hardware and (possibly) software improvement. Costs for project support are distributed to the whole project life. Bank should perform *in media res* CBA to verify initial estimations and adjust its policy accordingly.

Government will bear one-time costs for project evaluation. Government could receive one pool of benefits when it will be ready to introduce its smart-card project. The second pool of benefits could come from monetary policy – as more money will be held in banking system National Bank will be able to control money supply more easily.

Businesses and individuals will receive benefits and pay service fee permanently during the project life.

Monetize (attach dollar values to) all impacts

This is the most ambiguous task. Some impacts are naturally measured in monetary terms and could be easily (or moderately easily) quantified, while others are not possible to measure at all, or they do not have natural numerical measurement.

According to the Booz-Allen&Hamilton's study (Booz-Allen&Hamilton, 2000) the setup costs for banking retail web site are USD50,000 or less (extremely complicated projects could cost USD50,000 – USD200,000). Maintenance costs, including personnel expenses and hardware replacement costs, are lower then USD50,000 per year. This is true for developed countries. For the case of Ukraine, we have to make some adjustment. It is expected that maintenance costs will be about USD20,000 per year (or even less, depending on the amount of support required). Set-up costs could also be lowered, especially for low-level systems. It should be noted that each bank

would have to make hardware extension whatever scheme would be chosen (see Table 7).

Table 7. Monetized benefits and costs for banks and banking institutions

Impact	No cooperation		Cooperation	
	min	max	min	max
Hardware extension (one-time)	$20,000 each	$50,000 each	$20,000 each	$50,000 each
Project development (one-time)	$20,000 each	$50,000 each	$40,000 total	$100,000 total
Project support (per year)	$20,000 each	$50,000 each	$20,000 each	$50,000 each
Increase in number of customers	?	?	?	?
Cost reduction (per transaction)	$0.95	$1.07	>$0.95	>$1.07
Cost reduction (per year)	$0	$52,000	$0	>$52,000

Cost per transaction is estimated at $1.08 for a branch, $0.54 for telephone, $0.28 for PC-banking, and $0.13-$0.01 for the Internet banking (Booz-Allen&Hamilton, 2000). These figures cold be analyzed in two ways: from the one hand they represent the real cost reduction for commercial bank, while from the other hand they show the potential reduce in transaction fee for the customer. We should note here that cost per transaction could be lower in cooperative variant as a result of standardization. If we take cot of $1.08 as given and take $0.01 as minimal and $0.13 as maximum cost of Internet-based transaction, the cost reduction will be $1.07 and $0.95 respectively. Combining these figures with the number of transactions per year (about 50,000 for medium-sized bank, see Appendix 1) we get a cost reduction of about $46,000-$52,000 per year.

Timesaving could also be monetized (see Table 8). As different estimates show (Finport.Net, 2001), conventional banking techniques require about 43 minutes per operation, while transaction through Internet banking could be performed in 5 minutes[7]. Saved 38 min (0.63 hours) should be multiplied by

[7] These estimations are valid for corporate customers, however for individuals these figures should be greater (especially for conventional style of operation)

opportunity costs. For individuals we could use $100 per month (i.e. $0.625 per hour) as an approximation to the lower bound of average wage of Internet banking users and $200 per month ($1.25 per hour) as an upper bound of average wage.

For business, we have to take into account all the accompanying costs:

salary of bookkeeper – $100-$200 or $0.625-$1.25 per hour;

salary of driver – $70-$160 or $0.45-$1 per hour;

travel costs – $1.05 per single visit of bank (travel distance: 30 km forth and back on average, consumption of fuel 'Super': 10 l/100km, price of fuel: $0.37 per liter) plus car wear and tear.

Gain from service cost reduction could be calculated as follows: maximum cost reduction could be achieved if banks reduce charges to customers to full extend i.e. if banks charge $1.07 less for each transaction. Minimum amount will be zero if banks will "grab" all the efficiency gains.

To calculate (very roughly) number of visits to the bank that businesses and individuals perform we use some banking statistics (see Appendix 1).

Figure 1. Activity of bank's clients (JSCB Pivdencombank, Dniepropetrovsk, 01/01/2000 - 12/31/2000)

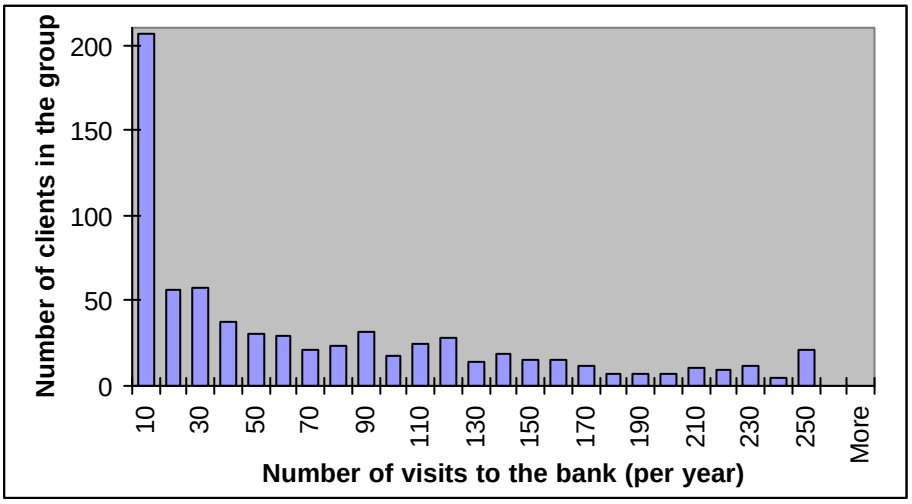

Diagram shows that 29% of firms visit bank less then 10 times a year (3.8 times on average). We take this figure as an extremely low bound. However, 71% do more then 10 visits and 29% visit bank more then 100 times a year (160 times on average) – and those clients are of great interest for us as a potential users of Internet banking. Here we have counted only 'positive' visits when bookkeeper made at least one transaction.

Individuals that will use Internet banking will be able to do periodic payments via this service. Each individual normally will have to visit bank minimum 24 times a year to pay house rent and make phone payments. Top range is hard to define – it will heavily depend on the activeness of each individual consumer. As an extreme top case, we could suppose that consumer will be willing to make payments daily (360 times a year). As a top average, we could accept figure of 180 payments a year. Here we have taken into account only operations that have impact on account balance.

The most problems arise with "virtual" effects that are hard to measure. We evaluate them only qualitatively and define whether these effects will be "positive" (i.e. consumers will benefit) or "negative" (consumers will become worse off).

We assign "positive" value to increase in flexibility and control over money flows, banking from any location, accessing account 24 hours a day and real time account monitoring. Working offline is more likely to benefit customers if software become available that works with several banks (similar to MS Outlook or MS Money). This is more likely to happen after development of standard protocols; for the "no-cooperation" case the effect is ambiguous, but in any case it is not negative. The same is true for setting up electronic bill payments.

If we examine an issue of risk of system failure, it should be noted that standardized systems are generally more elaborate and treated to be more stable and fail-proof. For both alternatives, the general sign of this effect is

negative, however the negative effect in case of independent development is larger, i.e. we have larger probability of crash.

In order to use Internet banking consumer must know how to use a computer, Internet, and other specific software. In most cases potential consumer that will be willing to use Internet banking will already have required knowledge, however if it is not the case he will have to spend some time and make some efforts to obtain them. Taking all this into account, it is hard to expect that this effect will have large extent, however in any case it will be negative. As experience shows, it is easier to use unified software and we could expect that negative effect will be smaller in case of common software base. If one ever change bank he will have to adapt to new software in case of different systems usage. These costs could be minimized or even omitted if cooperation alternative will be adopted.

Table 8. Monetized benefits and costs for businesses and individuals

Impact	No cooperation		Cooperation	
	min	max	min	max
Service costs (per year)	$0	?	$0	?
Number of visits to bank				
- Businesses	4.89	153.68	4.89	153.68
- Individuals	24	180	24	180
Timesaving (hrs/year)				
- Businesses	3.1	97.3	3.1	97.3
- Individuals	15.2	114	15.2	114
Cost saving (per year)				
- Businesses	$8.42	$380.36	$8.42	$380.36
- Individuals	$10	$143	$10	$143
Increase in flexibility and control over money flows	Positive			
Banking from any location that has an Internet connection (Internet-based)	Positive			
Working offline (bank program or personal finance software) after downloading account information	0	?	Positive	
Accessing account 24 hours a day, 7 days a week	Positive			
Monitoring account in real time (withdrawals, deposits, ATMs, debit card purchases)	Positive			
Setting up electronic bill payments	?	?	Positive	

Impact	No cooperation		Cooperation	
	min	max	min	max
Risk of computer system failure (web servers, bank computers, ISP services)	Negative (larger)		Negative (smaller)	
Costs of acquiring knowledge of how to use computer, Internet, and Internet banking *per se*	Negative (larger)		Negative (smaller)	
Costs of adopting to new software if one ever change bank	Negative (small or omitted)			

It is hard to monetize impacts on outsourcing companies and ISPs (see Table 9 and Table 10), because a large number of factors have to be included here. Software price depends heavily on the program complexity, number of buyers, producers etc. We could even have freeware client programs based on an open protocol specification.

Table 9. Monetized benefits and costs for ISPs

Impact	No cooperation		Cooperation	
	min	max	min	max
Hardware enhancement and extension (one-time)	?	?	?	?
Increase in number of customers	?	?	?	?

Table 10. Monetized benefits and costs for outsourcing software companies

Impact	No cooperation		Cooperation	
	min	max	min	max
Costs for software development (one-time)	0	?	?	?
Revenues from software sales (per year)	0	?	?	?

An interesting issue is impacts on governmental structures. Official institutions will have to spend resources on project analysis in any case. If independent scheme is chosen then they will have to certify each system separately. If cooperation project will be realized, it will be necessary to certify protocol (first stage) and then each system separately. It is hard to define what case will demand more resources.

Table 11. Monetized benefits and costs for governmental organizations

Impact	No cooperation		Cooperation	
	min	max	min	max
Costs for project analysis	Negative (NBU will have to certify Internet banking systems)		Negative (NBU will have to certify protocol (one-time) and certify each system separately. Number of distinct systems could be much less and certification process for them could be simplified)	
Increase in control over monetary aggregates	Positive		Positive	
Simplified integration of National System of Mass Electronic Payments into existing banking model	0		Positive	

Sum: Add up all benefits and costs

In order to make right decision, we now have to sum up all benefits and costs for both projects for minimum and maximum variants. In addition, we have to take into account non-quantifiable effects.

Is it possible to *calculate precisely* net benefits in these four cases? It seems not. We miss a lot of necessary information. For example, we do not know the number of banks that will be willing to participate in consortium agreement. In addition, we do not know the structure of bank clients: how many of them has active Internet connection, how many actively use their accounts or at least want to use them actively, how many of them are plastic card owners (the group that could get more benefits) etc. Nevertheless, we *could make some reasonable assumptions*.

Let us start with the number of banks. In order for *Ukrainian* banks to adopt an idea of consortium, their initial investments into the project have to be lower then in any other alternative. Therefore, the minimal number of banks in the consortium is two. Suppose for further discussion that required minimum is met and consortium is functioning.

Obviously, there is some optimum number of consortium participants. Because additional information that is required to define this exact number is not publicly available, we are able only to assume that, for instance, 5-6 banks will participate (1 or 2 large and several small) – manageable number of participants that should not cause large enforcement costs. It is natural to assume that proportion of people that have Internet access is maintained for the bank clients. For the independent project, banks will have 16 to 30% percent of individuals doing transactions via Internet (see Table 3) and about 30 to 40% of businesses. In case of cooperation, these figures for business could be 50-60% because of standardization.

For a pool of four medium-sized bank with the number of business clients from 700 (Pivdencombank) to 1300 (Ukrainian bank of trade cooperation), it will generate a cost reduction from $92,000 to more then $500,000 (see Table 12). For a large-size bank (for example Privatbank), it could be reasonably assumed that from 50,000 to 180,000 transactions per year will be done via Internet.

Table 12. Projected benefits for bank participants of consortium (1 large bank and 4 mid-size banks)

Impact	Cooperation	
	min	max
Cost reduction (per transaction)	>$0.95	>$1.07
1 large bank		
Number of transactions (legal persons)	100,000	300,000
Cost reduction (per year)	$47,500.00	$192,600.00
4 mid-size banks		
Number of transactions (legal persons)	194,756	820,560
Cost reduction (per year)	$92,509.10	$526,799.52
Total cost reduction:	$140,009.10	$719,399.52

Reduction in cost per transaction is expected to be larger for the concerted case as a natural result of standardization. This is another vote in favor of cooperation. Therefore, we end up with a total cost reduction for concerted variant from $140,000 to $700,000.

If we will turn to the consumer preferences, we will be able to see, that time saving and cost reduction is almost the same (or absolutely the same) for both projects – consumers are almost indifferent which way their banks service them, they are only concerned with the quality of services. In theory they should depend on the chosen alternative, however choice of a bank will have much greater effect.

The main difference is found in the non-quantifiable effects. Their precise effect is hard to define; the best we could do is to define the sign and specify under what alternative we would have larger effect's magnitude. For example, it looks so that working offline in bank program or personal financial software after downloading account information will be much easier to implement and to use unified software in case of adopting concerted alternative.

National Bank of Ukraine will be able to capture benefits only in the case of implementing second project. Definitely, it will bear some costs for proposition analysis, protocol specification, software certification etc., but will be able to compensate them indirectly.

Recommend the alternative with the largest net social benefits

What recommendation we will be able to issue? It seems that alternative project with cooperation of commercial banks, National Bank of Ukraine, and Security Service of Ukraine will be more beneficial for all involved agents: consumers, commercial banks, and National Bank of Ukraine.

Is the game worth the candle? It is hard to say with certainty. Too many unexploited factors could affect the final decision.

The most important barrier is unwillingness of banks to cooperate and share their knowledge and resources with others, despite any evident benefits. Concerted project could fail regardless of anything.

Another problem that arise is the vagueness of number of participants. How many banks feel their readiness to provide Internet banking services? How many legal persons customers do they have? To get precise answer to the question which alternative to recommend we have to get answers to the above questions.

Nevertheless, we could draw bottom line with the data in hand. Obviously, implementation of Internet banking will have positive effect (see Table 7, Table 8, Table 12) but the major difference between two alternatives is found in the setup costs (and it is relatively small) and in non-quantifiable effects. Everything else being equal we could recommend the consortium alternative.

Chapter 7

RESULTS AND DISCUSSION

Pitfalls on the way to the Internet banking

Why do not we already have a developed system of Internet banking? There are a number of barriers and pitfalls. They come from all four groups of agents.

The most natural barrier is the level of income of Ukrainian citizens. It is well below the subsistence level for the large share of Ukrainians. This reason combined with the price policy of Internet service providers does not stimulate wide spreading of Internet in Ukraine. As we have noted earlier, the quality of telephone lines (the main mean of end-user connection) is extremely low.

The second pool of problems comes from banks and bankers. Ukrainian bankers are extremely rigid to cooperation. They deny information sharing; even information that could not be classified as bank secrecy – such as number of clients, accounts or any other aggregate data.

Another problem with banks is rather real – free riding. If the proposed consortium idea would ever be realized, there would arise huge free-rider incentives for those banks that are not within consortium agreement. Those who will not enter consortium will simply be willing to wait until the protocol will be specified, certified, and ready for further development. As a result, free-riding banks will get base protocol without bearing costs and this will give them some additional competitive power.

Governmental organizations do not support ideas of new technology implementation. The problem is that most state employees came out of Soviet system – the system of total state control and planned economy - they do not want to let control go out of their hands. Moreover, they implicitly suspect everybody of cheating. That is why stamp has more power than signature; verbal agreements do not have legal power; any operations without personal authentication and written stamped and signed contracts are prohibited. Authorization is done using simple organoleptic analysis i.e. visual inspection of identification document (almost always passport). Any new methods – ID cards with built-in smart technology etc. – are costly and do not have government support, despite any benefits they yield.

The similar situation is around Internet banking. This technique requires changes in legislation, particularly the legalization of electronic signature, remote client servicing etc.

Internet technologies are boundless, i.e. they do not have geographical boundaries. However, Ukrainian legislation imposes strict regulation on the cross-border operations especially on capital movements. Residents are not allowed to open accounts abroad without explicit permission from NBU. Foreign currency outflows are under strict control.

Future of Internet banking in the world

We have shown earlier that Internet banking in Ukraine has a very good place to start and could become a major medium of banking services. What we could expect in the future or, more precisely, in what direction should we straight our efforts to get as much benefits as possible?

Let us present the hypothetical model of "dream world."

Problems of security issues are at the first place. Most people tend to overstate problems they do not fully understand. This is the problem of

cryptography – not so many people are familiar with basics of cryptography and just repeat somebody's words about insufficient level of security. We will not go into details, but modern technologies of cryptography are safe enough for most purposes. To fabricate passport is much more easily task than decrypt message or do other harmful things in digital world.

In order for the worldwide to function efficiently, it is required to solve the problem of identification. The most natural solution is to assign a unique ID number to every living person. System of numbering should be unified for all continents, countries, regions etc. In addition to this ID, every person has to own unique electronic signature (preferably on the smart card or other media) that will be used for identification purposes simultaneously with regular signature or instead of it and will have the same power.

The next step is to ensure conditions for perfect capital mobility without any legislative restrictions. This idea is realized in European Union. If Ukraine is willing to become a member of EU, it should harmonize legislation to meet EU requirements.

World Wide Web is growing in extremely fast pace. It took only 4 years to reach the number of customers that telephone network get during the last 50 years. Internet banking could also overcome the number of conventional bank customers in a few years.

Chapter 8

CONCLUSIONS

Internet banking in Ukraine is absolutely new and underdeveloped phenomenon. There are a number of possible ways for further development, however, we have concentrated only on two of them: independent project development and consortium alternative.

Cost-Benefit Analysis is one of the methods used in economics to deal with project evaluation. It has certain advantages and disadvantages compared to others, but it is quite intuitive and relatively simple. Typical CBA involves nine steps – from choice of the project to making final decision.

There are four groups of players in the Internet banking playing field: banks, ISPs, businesses and individuals, and governmental organizations. Banks and governmental organizations play most important role in the question to be or not to be to the Internet banking – if at least one of them refuses to support an idea, there will be no Internet banking at all.

Application of CBA to Internet banking requires categorization of all possible effect, either positive or negative. As any new project, Internet banking has a number of effects that are hard (if ever possible) to quantify. Our analysis is based on the yearly bases, so that no discounting is required.

CBA of two alternative approaches to Internet banking shows that substantial differences are located among setup costs, i.e. "stock." "Flow" of benefits and costs is almost the same for these two alternatives and analysis that is more precise is required. This analysis will be possible only if additional information will become available such as how much hours will it take person to adopt to

the new undefined software. Any estimation will be unreliable until more specific information about the projects will become accessible.

The future of Internet banking in Ukraine is still cloudy. There are a number of changes in legislation that are required and – this is the major problem – income of Ukrainians is well below the minimum, required to use banking products actively and have Internet access.

Simulation of consortium idea (with one large bank and four mid-sized) shows that the consortium alternative is more beneficial to all groups of agents and it could be recommended.

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APPENDIXES

APPENDIX 1

Activity of clients in the JSCB Pivdencombank (Dniepropetrovsk) in the period from 01-Jan-2000 to 31-Dec-2000 (scope: legal persons).

Visits to bank	Frequency	Percentage
0-10	207	28.75%
10-20	56	7.78%
20-30	58	8.06%
30-40	38	5.28%
40-50	31	4.31%
50-60	29	4.03%
60-70	21	2.92%
70-80	23	3.19%
80-90	32	4.44%
90-100	18	2.50%
100-110	25	3.47%
110-120	28	3.89%
120-130	14	1.94%
130-140	19	2.64%
140-150	15	2.08%
150-160	15	2.08%
160-170	12	1.67%
170-180	7	0.97%
180-190	7	0.97%
190-200	7	0.97%
200-210	11	1.53%
210-220	9	1.25%
220-230	12	1.67%
230-240	5	0.69%
240-250	21	2.92%
250-260	0	0.00%
More then 260	0	0.00%
Total	**720**	**100%**
Total number of visits	**48,689**	

Source: JSCB Pivdencombank, Dniepropetrovsk

APPENDIX 2

Company, location	External bandwidth	Number of secondary providers	Number of subscribers*	Notes
Ukrtelecom, Kyiv	• 2 Mbit/sec fiber-optics • 2 Mbit/sec fiber-optics • several more fiber-optics channels	18	-	State owned monopoly of local telecommunication network. Leases lines to secondary providers.
Infocom, Kyiv	2 Mbit/sec satellite	>20	2,000	Able to significantly increase satellite channel bandwidth.
Lucky Net, Kyiv	• 6 Mbit/sec satellite • 2 Mbit/sec satellite	>55	3,000	The largest Ukrainian provider for Internet users.
Global Ukraine, Kyiv	• 1 Mbit/sec satellite • 2 Mbit/sec • 2 Mbit/sec • 256Kbit/sec	>20	2,700	Two channels installed during 1999. Supplies the bandwidth for 3 Kyiv providers.
Institute of Solid Physics, Lviv	512 Kbit/sec	N/A	N/A	Bandwidth is used for scientific and educational purposes
Farlep, Odessa	256 Kbit/sec satellite	2	1,000	
Paco Links, Odessa	256 Kbit/sec satellite	N/A	500	
Telematica, Odessa	128 Kbit/sec satellite	5	500	
Monolit, Kyiv	• 64 Kbit/sec • 128 Kbit/sec satellite	-	1,000	Plans to increase external bandwidth capacity.
Representative office of UN in Ukraine, Kyiv	128 Kbit channel	N/A	-	Provides free service for non-profit organizations.
Kharkiv Politechnical University, Kharkiv	Two 28.8 Kbit/sec channels	N/A	N/A	Bandwidth is used for scientific and educational purposes.
Sovam Teleport, Kyiv	2 Mbit/sec fiber-optics	N/A	1,000	Equity stake acquired by telecommunications provider Golden Telecom

** Estimate*

Source: Spektor, Sachs & Company (1999); Vitaly Balyuk (1999)