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INFORMATION TECHNOLOGY AND ELECTRONIC BANKING SERVICES IN BRAZIL

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Abstract

The purpose of this study was the creation of a costing methodology to evaluate banking systems that present a high and diversified use of information technology. To check its performance, this methodology was applied to the costing of the main electronic transactions performed at the automated teller machine (ATM) network of one of the largest retail banks in Brazil. This study aims to: (a) establish a more reasonable manner of charging these electronic services costs customers, (b) evaluate the costing methods applied to the Brazilian banking industry in order to use them in platforms where technology is prevalent, (c) provide an efficient decision-making tool to be used in a competitive and globalized environment.

Keywords: Information technology, activity-based costing (ABC), ATM, banking population, electronic banking services

Introduction

Information technology is the area that utilizes electronic resources to access and or transform information. It enables to process specific data and transform it into a new form of information. It is useful to communicate ideas and information almost immediately in a very practical and efficient way. It is also an assynchronous tool, free from geographical frontiers. Its crucial point is how to measure efficiently the costs of banking services automation. If, on the one hand, the electronic transactions carried out through services, such as home banking, phone banking, Internet banking, automated teller machines (ATMs), and others, represent the elimination of costs resulting from banking premises and human resources, on the other hand, electronic services also have a cost. This paper proposes a model to measure this cost.

The Brazilian Banking Market

The present Brazilian banking system derives from a process started in the 1960's through the consolidation, recovery, merger and incorporation of several privately-owned banks to strengthen and update the national financial system. During this process there were, among other actions, the establishment of incentive banks intent on encouraging both the national and regional economic development (National Bank for Social and Economic Development (BNDES), Banco da Amazonia S.A. (BASA), the creation of full service banks (acting as commercial banks, investment banks and insurance companies), the reduction of limits for the chartering of a bank, and special programs for the improvement and recovery (Program for Fostering, Restructuring and Strenghtening the National Financial System (PROER). The main responsible agent for the stability of the Brazilian financial system is the Banco Central do Brasil (BACEN), the Central Bank of Brazil, created in 1964.

For the purposes of this study, we highlighted three basic peculiarities of the Brazilian banking market: *the full service bank*, *the territory jurisdiction*, and *the multifunctionality*. Brazilian banks can act as commercial banks, insurance companies and investment banks as well, all over the country with no regional limitation over their operations. During the expansion process of the banking network, Brazilian government made use of the banks as agents for tax collecting and securities and benefits payment. Still today Brazilian banks perform service rendering functions, together with traditional financial intermediary services. These

features help understand the dimension of telecommunications and processing platforms necessary to real time banking information in a continent-sized country (8.5 million km², 160 million population). There are over 200 banks in Brazil today, of which the largest ones are the following:

Table 1. Ranking of the 12 Largest Retail Banks in Brazil

Ranking	Institution	Ownership	Total Assets (in US$ billions)	Current Accounts (in millions)	Employees	Branches
1	Banco do Brasil	State-Owned	72	900	89329	2873
2	C.E.F.	State-Owned	61	8,50	99,311	1919
3	Bradesco	Private (Domestic)	46	10,10	63,824	2579
4	Itaú	Private (Domestic)	32	9,90	47,571	2466
5	Santander Brasil	Private (Foreign)	28	4,40	33,922	757
6	Unibanco	Private (Domestic)	24	3,30	18,970	712
7	ABN Amro Real	Private (Foreign)	15	2,00	21,566	679
8	HSBC	Private (Foreign)	11	1,80	19,281	983
9	NCNB	State-Owned	8	1,00	12,431	486
10	Sudameris	Private (Foreign)	8	1,00	8,840	274
11	Bilbao Vizcaya	Private (Foreign)	5	1,00	5,601	285
12	Mercantil Finasa	Private (Domestic)	4	160	5104	209
Total	*12 Retail*	*Banks*	*314*	*5360*	*425750*	*14222*
Total	*Bank*	*System*	*409*			

Source: Ernst & Young Consulting and BACEN, June-September 2000

Following a replacement strategy of transactions performed in branches by means of electronic distribution channels, Brazilian retail banks have been on the Internet since 1995 (Bradesco). At present on-line banking transactions through the Brazilian Internet are checkings of account balances, payments, transfers, cash investments and Stock Exchange investments. The technological evolution of self-service proposals (ATMs, home banking, Internet banking) conferred the Brazilian financial system international recognition for its high degree of sophistication and effectiveness. According to Lapper (2000), a study published by Cluster Consulting of Barcelona ranks Bradesco the third (3rd) largest bank on the Internet in the world behind Bank of America and Wells Fargo. Part of this progress in data teleprocessing resources results from the burden of years of inflationary process that influenced the development of funding systems and on-line investment of financial resources in order to finance Brazilian public deficit.

According to Liberali (2000), "the abusive inflation rates present in the Brazilian economy over two decades urged bank customers to change almost every day their investments to avoid losing their money. This behavior guaranteed investment profitability and prepared customers for the future changes implemented later by the Internet". Chart 1 below shows the dimension of this process. It was essential for banks, urged by rates of 2,500% per year, to fund and invest immediately the available money. So, over the years, the main Brazilian banking product was **inflation.**

Since the 1980's, following a world trend, Brazilian banks have installed an extensive ATM network, interactive voice response systems (call centers), remote computer-operated systems (home banking), and Internet banking systems. Most of this implementation was based on the assumption that services rendered electronically are cheaper, therefore every investment for their

installation is self-justified. These days, however, Brazilian banks are realigning their operating policies and administrative structures forced by the new challenges of a low-inflation, competitive and globalized economic environment.

Methodologies of Costing Applied to Brazilian Banking Industry

Money stability achieved by the Real Plan (June 1994) eliminated not only the assets distortions caused by soaring inflationary indexes, but also redeemed the importance of the costing science for Brazilian banks. The climbing

Chart 1. Brazilian inflation according to General Price Index, Market (IGPM)
Source: BACEN, February 2001

inflation rates that had brought profitability and financed the implementation and maintenance of a sophisticated computer system lost importance. Brazilian banks realized that they needed cost computation systems that could identify accurately the profitability of their operations, since these were then less influenced by the floating rates and more and more sensitive not only to new technological resources (computers, software, satellites), but to innovative operating processes (outsourcing, logistics, distribution). Historically, Brazilian banks adopted at this very moment the use of two different costing systems: the direct and the absorption costing. The direct costing method focus only on the management of the product according to its variable costs such as direct labor and direct supplies. The absorption costing method treats all costs, both variable and fixed, as final product costs.

According to Oliveira (2000), "the elements that prompt every financial institution to decide on a specific model are associated to its degree of information availability, level of banking automation, and resources in the areas of cost and method organization. The direct costing system is mostly used in the financial institutions that have a lower degree of information and automation, since it is essentially based on data reported during the flow of the product process, and are relevant to the cost analysis. The absorption costing system, however, is basically an accounting system to which these data are not important. It inventories only times and quantities of products and services as components for their cost allocation. Therefore, financial institutions adopted at first the direct costing computation model because of its easy implementation and maintenance."

There were, however, others important elements for the adoption of one or other type of costing model, such as: (**a**) the acquired ability to use a methodology in a financial institution caused a natural cultural resistance to its change, (**b**) until the mid-1980's, labor expenses for some banks amounted to around 50% of their total expenses, which validated the adoption of the direct costing model, (**c**) up to the 1980's, the importance of indirect costs was smaller than today. This proportion has changed with technological improvement, however.

According to Oliveira (2000) again, "some financial institutions developed hybrid models: they picked the advantageous features of the two models, put them together and generated a third one. The explanation for this fact might also be related historically to the Brazilian computer science development and to the growing use of banking automation that with time made a greater amount of data available".

Today computer systems provide accurate information about customer frequency behavior as well as product and services demand per type of distribution channel (ATM, Internet, call center). Branches have already implemented devices of electricity measurement to identify consumption per type of utilized resource. Monitoring software determine with a million-second precision the time each Data Processing Center (DPC) routine has dedicated to each type of requested product. The new technological resources make data collecting a reliable, effortless, and routine task. They increase knowledge about fixed costs behavior, partitioning and allocating them in more and more accurate amounts. The barriers to the enhancement of costing models were broken down and a new category emerges: the hybrid models.
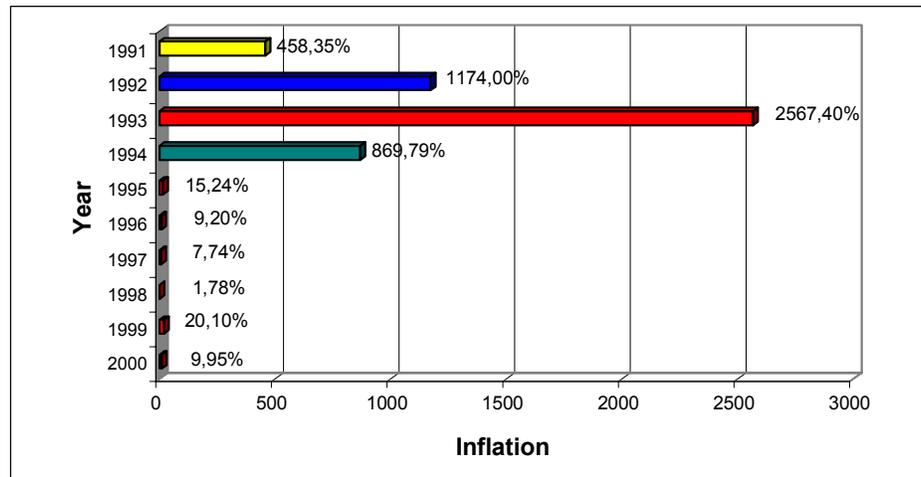
According to Oliveira (2000), " the hybrid model of cost computation of banking products and services is a compound of the other two costing systems It is, however, important to take into consideration that: (**a**) through the measured direct costing concept, this model tries to evaluate objectively everything that can be measured (transactions, labor, supply materials), approaching this way the direct costing system, (**b**) the application of the allocated direct costing concept tries to transfer the expenses of the production processing areas to products in a relatively objective manner, since it associates the volume expense (expenses) to the service of each processed product and computes this product costs taking into account its quantity (transactions). At this point, the hybrid model approaches the direct costing system since it eliminates from the unit costs possible idle time levels that are likely to occur during production (usually, the ATM is not active after midnight) , precaution neglected by the absorption costing system that requires previous knowledge of all banking products and services to be effective". This chronological approach and the above arguments make it easier to understand the proposed costing model for electronic services offered by Brazilian banks.

Proposed Method for the Costing of Electronic Services in Brazil

The cost structure of these electronic platforms is not discernible to people. It is composed of a tangible part (ATMs, for example) and another intangible part (telecommunications infrastructure, money supply logistics, transportation, hardware, management, call center, depreciation). These structures have as main feature a concentration of fixed costs (telecommunications infrastructure, hardware, call center, depreciation) in the 80% level (total fixed costs against total costs) established during the project of infrastructure. Following the evolution of costing methods applied to Brazilian banks, this study aimed to develop a method that could incorporate both the advantages of the two previous models (direct and absorption ones) and the concepts of the Activity-Based Costing (ABC) method in order to create an hybrid system. The steps of this development were: (a) revision of the most important accounting methodologies applied to the banking industry, (b) the choice of the most suitable methodology, (c) identification of the variables, (d) cost allocation according to the proposed methodology, (e) analysis of the results.

After a revision of the previous mentioned accounting methodologies and the studied system, some problems were identified: (a) the electronic banking platform is composed basically of indirect costs and the direct costs (supply materials, direct labor, data processing) representing less than 30% of the total cost Thus, the direct costing system is not appropriate. (b) generally, the absorption costing usually adopts the volume criterion to drive the indirect costs to end-products. This simplification increases the cost of products with a high level of production. However, it does not represent the reality. In Brazil, 90% of the ATMs transactions are withdraws and bank statements (45% each one). According to the volume criterion, they have similar cost per transaction. This conclusion is inconsistent because a withdraw transaction includes all the logistic system (money supply) and uses more parts of the equipment (a greater depreciation). For the reasons above, we concluded that the development of a hybrid model would be more appropriate.

The hybrid model has many features influenced by the ABC methodology such as: (**a**) the evaluation of cost and manner the services are processed through the analysis of basic involved activities (cash withdrawals, account balance checks, money transfers), (**b**) the definition of resource-consuming areas that are themselves consumed or assigned to end-products. These resources involve labor at the branch, equipment supply materials, electricity, telecommunications, data processing, et cetera, (**c**) these resources are distributed through cost drivers that will make the communication between cost centers and product, service or client. Therefore, each activity will have an appropriate cost driver (for example, DPC cost allocation through Central Processing Unit(CPU) working time), (**d**) the increase of the chain of values involved in the process of developing services to customers.

The conceptual contributions of direct and absorption costing methods are the following: (**a**) the development of labor methods and standards (electricity consumption, ATM supply materials, labor cost), (**b**) use of chronoanalysis and measurement of utilized inputs (ATM occupancy time, ATM supply materials), (**c**) use of statistical techniques to quantify the use of offered resources (ATM customer service capacity), (**d**) identification, quantification and allocation of the company's administrative costs (human resources, management, security, facilities supervision, audit, legal department, high management) to the analyzed activities.

During the long period of the research (4 years) some problems were detected and solved: (a) the old banking data information is inappropriate to the purposes of the ABC system. As a consequence of this reality, it was necessary to develop many standard costs such as: energy, supply materials consumption and labor in order to make a correct cost allocation. (b) a more realistic concept of ATM capacity was developed in order to avoid the flotation of the effective demand. This flotation implies in different monthly cost per transaction and could distort the performance analysis. (c) as a result of the ABC methodology, common resources (telecommunications, space, electricity) were identified and criteria of separation were developed in order to demarcate the two worlds: the brick and mortar branch and the electronic bank (the ATM is usually located inside the traditional bank branch).

To better understanding the above described, this paper used the traditional terminology, such as data processing, supply materials, labor, et cetera.

Results

Since the costs are influenced by external factors such as: price (electricity, supply materials, telecommunications, depreciation) consumption of materials (supply materials), law (labor benefits, overtime) and the volume of transactions (customers), a data model simulation was built to evaluate all factors together in order to estimate the cost per transaction. The model was based on the standard of each variable cost and the appropriate cost driver of each fixed cost such as audit (men hours), legal department (hours per department), system development (hours of development) et cetera. The model was examined in different ATM terminals of different suppliers in order to evaluate the operation. The results and the most important variables are in the following tables.

Table 2. Transaction Average Costs per Type of Equipment (US$ of June 1996)

	EQUIPMENT		
Cost Variable	*ATM A**	*ATM B**	*CASH DISPENSER*
Direct Labor	14.965	14.342	193.299
Electricity	2.281	2.186	29.462
Data Processing	2.985	2.880	26.119
Technical Assistance	7.389	8.602	71.009
Software Maintenance	742	711	15.197
Supply Materials	13.072	15.176	114.375
Telecommunications	7.892	7.615	69.057
Depreciation	8.227	7.885	162.071
Subtotal Direct Costs	*57.553*	*59.397*	*680.589*
Subtotal Support Areas	*18.841*	*18.056*	*243.365*
HR Management	182	174	2.354
Facilities Supervision	149	142	1.926
Audit	66	63	856
Contract Administration	66	63	856
Legal Department	49	47	642
High Management	39	38	513
Supplies	46	44	599
System Development	613	587	7.921
Overtime	72	69	935
Value Transportation	13.756	13.275	120.333
Total Costs (a)	*91.432*	*91.955*	*1.060.889*
Transactions (b)	103.637	100.000	906.803
Cost per Transaction (a/b)	*0,88*	*0,92*	*1,17*
Normal Capacity (c)	86.280	82.685	1.114.450
Cost per Transaction (a/c)	*1,06*	*1,11*	*0,95*

Source: Abensur and Brunstein. April-June 1999
* A and B mean ATM terminals of different suppliers

Chart 2 below shows the respective break-even point. Income behavior was restrict to bank charge possibilities offered by effective law:

The lack of available studies of electronic banking services in Brazil led us to compare the results of the proposed methodology with similar services of American banks. Moreover, the cost information is confidential. Both numbers and the applied methodology are not published.

Conclusions

Utilizing the developed methodology it was possible to compare the costs computed in the company case study with American market costs and use it to understand the probable strategic near-term moves in Brazil. Average cost of a transaction performed at an ATM is US$0.52 in the United States against US$1.17 in Brazil, as shown above in Chart 3. Why? Mainly, because it is associated to the scale of use of resources. In other words, the prospective volume increase of transactions in Brazil is directly related to the possibilities of expansion of banking population. In absolute numbers banking customers and the participation of banking population in relation to total population are:

- USA – 192 million (79%)
- Korea – 32 million (71%)
- Holland – 12 million (80%)
- Brazil – 30 million (23%)

A quick examination of the above numbers explain in part the differences in unit costs and banking services prices charged all over the world. If, on the one hand users lack, on the other hand available capacity exceeds. In Brazil on-line systems are available twenty-four hours a day, seven days a week. Consequently, a predictable move for the Brazilian banking market will be the conquest of new users (not always customers) for the system. This appeal will concentrate in the consumers with lower purchasing power (in Brazil, layers D and E with annual income up to US$ 3,000) since the higher layers are saturated. This process will be easy or easier according to the electronic platform type. Free access to Internet offered by large retail banks is a recent example. It not only attracts a high flow of new users, but it is likely to obtain income through indirect means such as publicity.

Chart 2. Break-Even Point of an ATM
Source: Abensur and Brunstein. 1999

Chart 3. Cost Comparison between Case Study and American Costs per Channel

According to Miya (2001), "as middle-class people already are consumers of banking services, the clientele increase in banking system will occur with the massive incorporation of people that today enter a branch to pay their electricity, water and telephone bills. They do not own a current account nor a credit card, but perhaps a savings account". Anyway, only banks very well prepared in costs will be able to attract new low income and low profitability users in order to balance their electronic services systems.

References

Abensur, Eder Oliveira and Brunstein, Israel. "Costing Methodology of Virtuality: a Case Study of Banking Services," *Journal of Business of the* University of São Paulo, São Paulo, April-June 1999, pp. 47-54.

Banco Central, *Statistical Tables*, Monthly Newsletter,,São Paulo, February 2001.

Lapper, Richard. "*Quick to Adapt Technology*," Financial Times, London, 20 December 2000.

Liberali, Sophia Camargo. "*Years of High Inflation Gave Birth to Innovative Electronic Services*," O Estado de São Paulo, São Paulo, 5 June 2000.

Miya, Fideo. "*Banks Struggle for 15 Million New Current Accounts*," Gazeta Mercantil, São Paulo, 23 January 2001.

Oliveira, Jaime de Souza. "*The Importance of Cost Information as a Tool for Measuring Performance due to Technological Revolution of Financial Industry*," VII Brazilian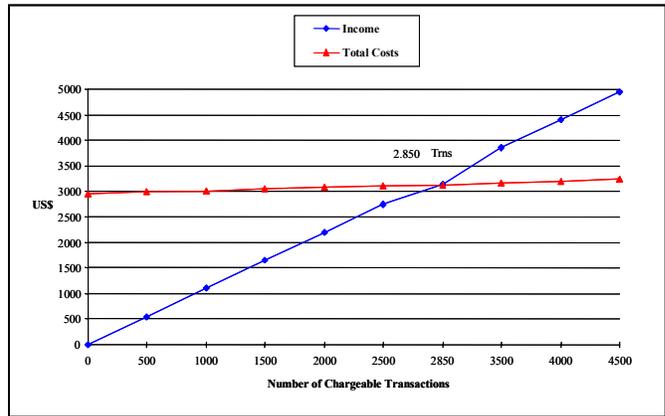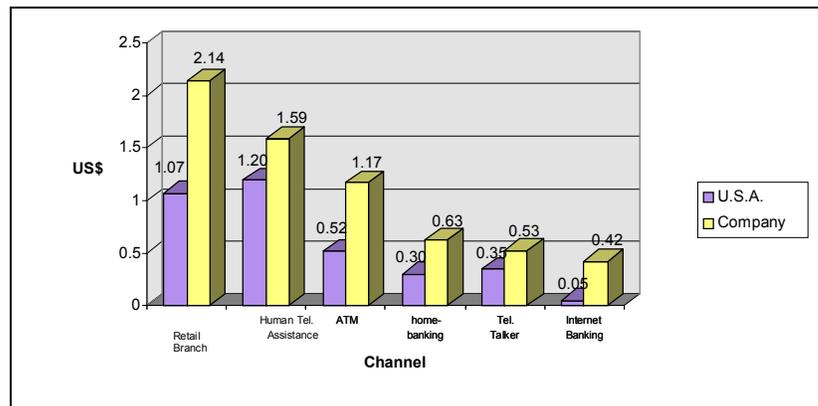 Congress of Costs, Recife, 2000.