

Scientific Journal of Applied Social and Clinical Science

MAIN COST ESTIMATION MODELS IN PROJECTS USED BY BANKS AND FINTECHS IN BRAZIL

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Abstract: Project cost management has become fundamental in banks and “fintechs” that operate in the Brazilian market, offering greater competitive advantage and greater operational efficiency. This study aims to identify which methods can be used to make preliminary estimates of projects, such as: Expert opinion, analogous estimation, parametric estimation, bottom-up estimation, three-point estimation and data analysis. The intention is to improve the accuracy of cost estimates in financial institutions’ project planning. Furthermore, it analyzes the relationship between investments in technology projects and the profitability of a bank and a “fintech” in the period from 2019 to 2021. From the results found, a negative and statistically significant correlation was found between IT project investments in relation to the ROA variable. It has been proven that investment in projects improves the performance of banks and “fintechs”, but its impact is negative on profitability. Another aspect that deserves to be commented on is that in Bank and “fintech” projects, the “bottom-up” estimate is the most suitable because a budget is established and the costs are detailed in the development of the project. **Keywords:** Project management; Financial market; Technologic innovation.

INTRODUCTION

Banks and “fintechs” operating in Brazil have experienced rapid growth and expansion in recent years, requiring technological innovations to create business models and maintain a competitive advantage through online platforms and the provision of innovative digital services (Feyen et al, 2021).

In today’s world, project management has become fundamental in Financial Institutions and other sectors of the economy as it offers greater autonomy to the organization, reduced costs and less bureaucracy. Projects can be

executed in accordance with the standards and tools of the “Project Management Institute” [PMI] (PMI, 2017) or by practices according to the experience of project management professionals in the market and companies need to adopt these practices if want to deliver projects more quickly and cheaper. A structural analysis of costs makes it possible to evaluate the price, avoiding losses to companies. Greater efficiency in reducing your administrative costs in relation to project budgets ensures a higher level of project implementation performance (PMI, 2017). The processes used to estimate project costs, as well as the criteria, methods and techniques, vary in different areas of application, and are related to the size and complexity of the project (Barbosa et al., 2014). In this context, the research question of this work was elaborated: What are the cost estimation models used in projects by banks and “fintechs” in Brazil and what is the relationship between investments in technology projects and profitability in the period of January 2019 to December 2021?

Various methods can be used to make preliminary project estimates, such as: Analogy, Parametric, Modular, Expert Judgment, Button-up, Three-Point Estimation,

DATA ANALYSIS

Decision Making, and Project Management Information System. These procedures depend on the institution’s policy, the experience of the project manager and mainly the volume of information accessible at the time of the estimate (Rad, 2002; Barbosa et al., 2014). The chosen estimation method influences the identification of direct and indirect costs of bank and fintech projects and their budget. Excessive spending on inputs, labor, loans, insurance and taxes is unclear and requires further study. The incorrect choice of the project cost estimation method can impact the calculation of the value of the project

product, project delivery and the company's profitability (PMI, 2017).

Studies on project management in banks and "fintechs", estimation of cost methodology, budget in developing countries is relatively unexplored, especially in Brazil.

The research contributes to the literature by showing that cost estimation models in project management in financial institutions can help companies control costs efficiently by detailing their budget and reducing their risks.

In this context, the objective of this work is to discuss cost estimation methods in projects used in banks and "fintechs" in Brazil and to analyze the relationship between investments in technology projects and the profitability of a bank and a "fintech" in the period from January 2019 to December 2021 through a case study.

MATERIAL AND METHODS

The methodology used, of an exploratory nature, is based on the principle of observing project cost estimation models made by banks and "fintechs", through bibliographical research in articles from scientific magazines and periodicals, monographs, reports, bibliographies and websites relevant to the theme. Furthermore, a case study was carried out, cost estimation models in projects used by banks and "Fintechs" is an area of research with few experiences. Case studies can be recognized as an ideal method for gaining insider information about a new area of knowledge.

To compose this research, a sample was used with 6 annual observations distributed between a bank and a "Fintech", listed on Brazil, "Bolsa", "Balcão" [B3], between the periods from January 2019 to December 2021. The research aims to discuss cost estimation methods in projects used in banks and "fintechs" in Brazil and analyze the relationship between investments in

technology projects and the profitability of a bank and a "fintech".

The explanatory variables were: investments in technology projects represented by $IT_{i,t}$ was calculated using the formula investments in technology projects divided by the total cost of the bank or "fintech" analyzed and the variable $D_{i,t}$ which is a "dummy" in which is assigned a value of 1 for banks and a value of 0 for "fintechs". The dependent variable is the return on assets represented by the acronym ROA calculated by the ratio of net profit before income tax and total assets. Equation 1 summarizes the estimation:

$$ROA_{i,t} = \beta_0 + \beta_1 TI_{i,t} + \beta_2 D_{i,t} + \varepsilon_{it} \quad \text{eq. (1)}$$

where: β = Model coefficient; i = Unit of analysis that represents the bank and "fintech"; t = Period; ε_{it} = Random error

The Chow, Breusch-Pagan and Hausman LM tests were applied to define the best method to be used in the research. After observing these tests, the Ordinary Least Squares [OLS] method was adopted, with a fixed effect. The STATA statistical software was used for the study analysis.

RESULTS AND DISCUSSIONS

The competitive environment in the banking sector is constantly changing with increasing frequency, strict banking regulations and the emergence of "Fintech" companies in the financial sector require adapting quickly and easily to meet their challenges around technology and organizational structures. The digital transformation that financial institutions are undergoing can contribute to the creation of value and the development of various functions of financial institutions: from fraud, anti-money laundering and cybersecurity to achieving operational efficiencies, effective marketing and service sales (Liberti and Petersen, 2019; Puri et al., 2009).

Technological innovation has the power to change the provision of financial services, encourage the creation of new business models, applications, processes and products, as well as increase consumption (Arner et al., 2015; Feyen et al., 2021; Sironi, 2016). According to Hall (2012), new perspectives for project management include IT implementations, research and development, organizational and strategic change management, development of new products and services, and software development.

Advances in technologies such as cloud computing, mobile devices (for example: smart phones), and sensor systems (for example: The Internet of Things), and the “digitization of almost everything” (McAfee and Brynjolfsson, 2016), make the availability of data on economic transactions and human interactions experienced through the internet and online platforms.

However, the reformulation of this business model favors the expansion of customer mobility among competitors and the development of new banking products and services, contributing to increasing the efficiency of service provision and reducing costs. Any projects started require the estimate, but this estimate is sometimes quite difficult. One of the reasons for this is the need for Banks to develop several projects simultaneously, and it is not always possible to separate costs. Projects differ in duration, number of employees involved, administrative costs and equipment used. The lack of transparency about the project’s progress distorts the estimate of time and cost variation in relation to the project’s development and harms the allocation of resources that protect the project in relation to its schedule and budget. Generally, projects that take longer cost more money and experience schedule delays. According to Hall (2012), traditional projects take longer to complete while modern

projects can be shorter, especially in the new products and services segment.

The main causes of project delay in the financial sector are recognized as long contract duration, procurement, civil works, recruitment of consultants and changes in cybersecurity. The main reasons for cost underutilization are categorized as local currency devaluation, competitive bidding price, bidding lower than estimated, and large contingency budgets.

However, it seems to be very important to determine the types of costs and revenues that these companies have, direct costs are the portion of expenses arising during the production of the product. Costs are estimated for all resources applied in the cost estimate. This includes, but is not limited to, direct labor, materials, equipment, services and facilities, information technology and special categories such as financing costs (including interest rates), inflation allowance, foreign exchange rates or a contingency reserve for costs (PMI, 2017). Indirect costs are costs that depend on the company’s administrative activity (Lesnikov, 2009; Mortikov, 2020). If these are entered into the project estimate, they can be included at the activity level or at higher levels (PMI, 2017).

The estimated cost is considered as the budgeted or forecast capital investment cost. It can be defined at different points – or baselines – in the investment and delivery cycle, for example in the case of business planning and contracting.

The cost estimate will typically be different in different periods and becomes more accurate the closer it gets to the final delivery of the project. The baseline indicated for measuring costs depends on what you want to understand and measure. If the cost estimate is accurate, users of the information will proceed with the project.

Actual cost is defined as the actual capital investment costs accounted for at the time of project completion when expenditures are known. The actual and estimated cost are budgeted in local currency and at the same price level (e.g. 2022 real) to ensure comparability and eliminate the effect of currency fluctuations. There are several cost estimates to choose from and several actual cost calculations for a given project at a given time.

Managers may decide to choose the combination of actual and estimated costs that best suits them, probably a combination that makes their projects look good at a low cost. The biggest mistakes in cost estimates occur in the early stages of the project cycle, estimates and decisions need to be impartial, which is different from eliminating errors (Kahneman, 2011; Flyvbjerg, 2008, 2013). Furthermore, the problem isn't even excess costs, it's underestimation of costs. To solve the problem of cost underestimation it is necessary to solve the problem of cost overrun. This can be avoided by adopting the following measures: (a) Getting the "front end" of capital investments right, including using similar methods to determine reliable and unbiased cost estimates that fit the client's risk appetite, (b) Institute an incentive that encourages everyone involved in the project to remain within the budget; and (c) Hiring a delivery team with a proven track record for the specific type of capital investment in question. Project managers can identify hidden risks within the project, determine deadlines and costs, reduce losses incurred by risks and correct project flaws, steering it in the right direction.

Some studies have attempted to understand the financial criteria that are used to measure project performance, such as economic return and cost/benefit analyzes (Archer and Ghasemzadeh, 1999) and profits (Shenhar and

Dvir, 2007; Thomas et al., 2002) . The most used project performance measures are those based on the initially established schedule and the cost values at the end of the project (Gray, 2001; Katz and Allen, 1985; Larson and Gobeli, 1989; Ling, 2004; White and Fortune, 2002), in which there is a consensus between the financial issues involved (Archer and Ghasemzadeh, 1999; Patah and Carvalho, 2007; Thomas et al., 2002).

Planning Cost Management is the process of defining how project costs will be estimated, budgeted, managed, monitored and controlled. Its main function is to define the amount of money to be applied to the development of the Project. Various methods can be used to make preliminary project estimates, such as: expert opinion, analogous, parametric, bottom-up, three-point estimation, data analysis, project management information system, and decision making. The expert opinion is based on the professional's experience in a specific area of knowledge, whether internal or external to the company.

Analogous estimating uses information from previous projects similar to the current project. It is worth noting that this estimate is generally used in the initial planning of the project or in pre-projects since there is little information about the project to be started. Parametric estimation produces high levels of accuracy, measures productivity, uses historical and statistical data. Project planning is more detailed and needs more information. We can cite as an example the cost per square meter of painting when renovating bank branches or customer service points. The "bottom-up" estimate is a more detailed and precise model with greater cost and time as it generates more work. In this type of estimate, a budget is established and the costs are detailed in the development of the project. The three-point estimate is used when there is no historical data and consists

of defining the duration of a specific project activity, classifying the estimate as optimistic, pessimistic and most likely, with the objective of reducing risks and uncertainties involved in the project. The delivery of bank and fintech projects in the optimistic scenario is where everything will go well, the pessimistic scenario is where everything will go wrong and the most likely scenario is where everything will be normal. To calculate the duration of the project, the “Program Evaluation Review Technique” [PERT] method is used using the formula:

$$\text{PERT} = (\text{Pessimist} + 4 \times \text{most likely} + \text{Optimist}) \div 6 \quad \text{form. (1)}$$

Additionally, the standard deviation will indicate how much the project duration calculated in the PERT formula may vary. The standard deviation is calculated as the difference between the pessimistic scenario and the optimistic scenario divided by six. The data analysis estimate evaluates costs, schedule, budget, supplier proposal analysis, quality cost, contingency reserve that prevents risks during the preparation of projects in banks and Fintechs. The project management system uses simulation and statistical analysis software to help estimate costs. When deciding, it is up to the project manager to define the best cost estimate to apply in the development of the project (PMI, 2017).

The Bank studied is a Brazilian financial institution, constituted as a mixed capital company, with 200 branches and service points. has 4.5 million customers. It is a multiple bank with the following portfolios: Commercial, Foreign Exchange, Development and Real Estate. The Bank currently has 4 thousand employees and is a partner in implementing social policies. These programs are government actions aimed at eradicating poverty and marginalization, as well as reducing social and regional inequalities. The

bank is a solid firm aligned with high market standards, with modern solutions through the expansion of the business environment and greater investment in technology.

Searches for banking integration solutions and various digital projects. Furthermore, its actions are focused on projects to improve the credit modeling tool for customer service, allowing the expansion of the processing capacity for large volumes of data. Adopts agile practices in project management with the aim of reducing costs and deadlines, improving the quality of services provided by the company. It aims to promote increased quality in the delivery of results in terms of project management in the various business areas.

The bank’s project cost estimates are defined before the start of the project and must be in accordance with the budget approved by the company’s senior management in order to ensure that performance objectives and targets are guaranteed in the future of the business. The estimate for each project is made by calculating the cost of hours to be worked on developing the project, which is equivalent to the total labor cost. The unit cost of labor is defined by calculating the average sum of all salaries and earnings from all bonus functions (clerks, analysts, specialists and managers) divided by the number of employees in each function. Personnel costs affect internal factors in the financial institution’s operations. Economic and social factors such as financial conditions, labor productivity, motivation system, training system and people management system significantly affect personnel costs (Aseeva et al.,2022).

The project manager must also take into consideration complete information on the cost of cooperation contracts from subcontractors to assist in project development and the availability of resources. For financial institutions, investing in smart

contracts can reduce labor and billing costs. The number of transactions and contracts registered demonstrate the workload related to managing all active and pending contracts in the database, as well as new contracts and transactions registered in the month of analysis.

In financial systems, project quality is the most important factor and it may be acceptable to exceed budget and schedule restrictions. We can cite as the Bank's main projects: efficiency improvement projects (greater agility in executing the service and decisions made in the time saved), Cost reduction project (business cost reduction), IT systems improvement projects within the organization (automation of manual work contributing to the reduction of labor costs), launches of new financial products (impact would be measured by the time it takes the bank to offer new services to customers and reduce the costs of this procedure).

Those responsible for cost estimates are the managers of each area along with the team that will be part of the project. Estimates must be developed by more experienced professionals from the Bank, the use of historical bases of similar projects can contribute to precision in planned costs. In projects in the financial sector, the "bottom-up" estimate is the most suitable as a budget is established and costs are detailed in the development of the project. Among the advantages of choosing this estimate is the assistance in making decisions regarding the scope, quality and schedule of the project. However, the "Bottom-up" estimate can be underestimated or overestimated as it depends on the analysis carried out by managers who will carry out the activities. Furthermore, it is unfeasible in projects that require greater agility. Banks with strong corporate governance need more detailed information in their estimates as they tend not to change the forecast budget.

In the bank under study, the project planning stage costs are estimated and all indirect costs are identified for the operation of the various business areas and control of products and services: Cleaning; Surveillance and security services; Water, energy and gas; Communication; Maintenance and conservation of assets; Office material and Marketing.

The material cost corresponds to the investments for creating a printed contract, check sheet, TED form, pre-printed slip, plastic card, etc. The transfer cost corresponds to amounts paid in other banks that receive payments of bank securities, SPC consultation, foreign exchange operators, etc. The system cost comprises all the costs necessary for the operation of the system that manages the data of the bank's products and services, for example the tariff systems and loan renegotiation system and credit card debt and the channel cost is the cost of the physical or virtual environment where business will be carried out, such as telebanking, internet banking, app, teller, etc.

When projects are developed, direct and indirect costs are identified with the managers of each area, in addition to recommending "benchmarking" research with the aim of obtaining a broad view of needs in such a way that a clear definition of the scope is made possible. of the project as well as an explicit understanding of the benefits to be achieved at the end of the project.

The calculation of indirect cost estimates is done through the development of spreadsheets and indirect costs do not have much relevance in the total cost of the project. In all projects implemented by the financial institution, the EAP is developed and the cost calculations are structured. Rad (2002) highlights that the use of EAP is essential for all necessary resources to be identified for a project and the availability of historical data from previous projects helps

to identify and develop estimation models. The project manager in his estimation must consider the budgetary limits when implementing the project, collect data on the actual costs and compare them with the initial costs making the necessary adjustments.

Experienced professionals know that final costs will be higher than estimated initial costs due to changes in scope, business cycles, etc. The budgeted cost will be the benchmark for the final price of the product to be offered to the customer, an overestimate in cost planning can make the project unfeasible, making the product uncompetitive and an underestimate of costs affects the profitability of the project in addition to causing crises in the execution of it.

According to Barbosa et al. (2014); Each organization determines the beginning of the evaluation of its projects and it is more advisable that costs are identified in the planning stage. The project manager must identify possible risks in the development of the project and have a cash reserve to solve unforeseen events. Good cost management makes it possible to offer products and services at the best prices on the market. Costly and unsuccessful projects are frequent in the routine of companies, generating losses for these institutions. Therefore, studies on the relationship between investments in technology projects and the profitability of banks and “fintech” are frequent in research such as those by Hitt and Brynjolfsson (1996); who analyzed the impact of IT projects on business profitability.

Below is presented the eq. (1) to estimate the relationship between variables adapting the model developed by (Gupta et al., 2018):

$$ROA_{i,t} = \beta_0 + \beta_1 TI_{i,t} + \beta_2 D_{i,t} + \varepsilon_{it} \quad \text{eq. (1)}$$

where: β = Model coefficient; i = Unit of analysis that represents the bank and “fintech”; t = Period; ε_{it} = Random error.

The return on assets is represented by the acronym ROA, which is a measure of profitability, calculated through the values found in the balance sheet and income statements for the year of the bank and the “fintech” under study. It is represented by the ratio of net profit before income tax and total assets.

Investments in technology projects are represented by IT i,t calculated using the formula investments in technology projects divided by the total cost of the bank or “fintech” analyzed.

The variable $D_{i,t}$ is a “dummy” in which the value 1 is assigned to banks and the value 0 to “fintechs”.

Table 1 presents a description of the sample used:

Variables	Note	Average	Standard deviation	Minimum	Maximum
ROA	6	0.38	1.87	-1.68	2.39
YOU	6	-0.06	0.10	-0.22	0.05
D	6	0.50	0.55	0.00	1.00

Table 1. Descriptive Statistics - Data

Source: Original survey results

Note: panel data from OLS regression, N = 6, profitability analysis of 2 companies, listed on B3, in the period from 2019 to 2021. ROA is the profit before income tax divided by total assets. IT is represented by technology projects divided by the total cost of the bank or “fintech”. D is a “dummy” 1 for banks and 0 for fintechs.

The ROA, which represents the profitability efficiency of banks and “fintechs”, presented an average of R\$380,000.00. Investment costs in Technology projects vary between a loss of R\$220,000.00 and a profit of R\$50,000.00. The average expense on technology projects is a loss of R\$60,000.00.

The sample provides information from a bank and a “fintech”, listed on Brasil, Bolsa, Balcão (B3), covering the period between

January 2019 and December 2021. The linear regression statistical model was used with panel data based using the Ordinary Least Squares [OLS] method, with 6 annual observations being carried out. It is worth noting that the “fintech” presented a loss on its balance sheet during this period.

Table 2 presents the results for the model represented by eq. (1):

ROA	Coefficient	PT
Constant	0.1305382	0.494
YOU	-3.940684	0.090**
D	(omitted)	

Table 2. Estimation of the Empirical Model Used

Source: Original survey results

Note: panel data from regression by OLS effect, N=6, Profitability analysis 2 companies, listed on B3, in the period from 2019 to 20221. F (1,3) = 6.09 Prob>F=0.0902 R-square =0.6701. ROA is profit before income tax divided by total assets. IT is represented by technology projects divided by the total cost of the bank or “fintech”. D is a “dummy” 1 for banks and 0 for fintechs. ***, ** and * denote significance of 1%, 5% and 10%, respectively.

The variable investments in IT projects presented a negative and significant effect in relation to the ROA variable. Confirming that investments in technology projects improve the performance of banks and “fintechs”, however their impact is negative on profitability.

This way, investments in technology projects advance due to the strategic need for companies to improve their competitiveness and remain in the market through the optimization of processes, investments in security and technology through the use of applications and digital platforms. It is observed that all banks and fintechs have access to the same technology projects and there is no exclusive technology, which is why it does not generate efficiency in profitability.

The lack of information on measuring the cost-benefit of investments in technology projects and poor cost management may be other factors that influenced this negative effect. The variable D was not statistically related to the variable ROA of Banks and “fintechs”. This result is in line with the research by Gupta et al. (2018); noting the paradox of profitability.

CONCLUSIONS

The objective of this work was to discuss cost estimation methods in projects used in banks and “fintechs” in Brazil and to analyze the relationship between investments in technology projects and the profitability of a bank and a “fintech” in the period of January 2019 to December 2021 through a case study comprising a bank and a “fintech” listed in Brasil, Bolsa, Balcão (B3) totaling 6 annual observations. The study used fixed-effect panel data. From the results found, a negative and statistically significant correlation was found between IT project investments in relation to the ROA variable. In view of this, it has been proven that investment in projects improves the performance of banks and “fintechs”, but its impact is negative on profitability.

Factors such as lack of information on measuring the cost-benefit of investments in technology projects and poor cost management contribute to this result. This research is in line with the results of the study by Gupta et al. (2018), noting the profitability paradox.

Another aspect that deserves to be commented on is that in Bank and “fintech” projects, the “bottom-up” estimate is the most suitable because a budget is established and the costs are detailed in the development of the project. Among the advantages of choosing this estimate is the assistance in making decisions regarding the scope, quality and schedule of the project. However, the “Bottom-up” estimate can be underestimated

or overestimated as it depends on the analysis carried out by managers who will carry out the activities, and is also unfeasible in projects that require greater agility. Financial institutions with strong corporate governance require more detailed information in their estimates as they tend not to change the forecast budget.

As a limitation of the study, we can highlight the low disclosure of investments in technology projects in the accounting

reports and the lack of standardization of the financial statements, which did not allow the improvement of this study.

For future research, it is suggested the inclusion of other variables that influence profitability and investments in technology projects, and other more sophisticated econometric methods and control variables could be used.

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