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Management of technological projects and economic profitability in the financial risk of banking institutions

Gestão de projetos tecnológicos e rentabilidade econômica no risco financeiro das instituições bancárias

Gestión de proyectos tecnológicos y rentabilidad económica en el riesgo financiero de instituciones bancarias

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Abstract
This article analyzes the relationship between technology project management (GPT and economic profitability (RE) for the areas of financial risks with the aim of presenting a flexible model between both variables derived from performance indices and cognitive skills for the area of financial risks of a Mexican banking institution. This is through a quantitative method supported by a predictive econometric model of data obtained from 313 technological projects. The results show that the RE depends on the behavior of the dimensions of the GPT; considering the information taken for empirical verification based on the resulting sample and other data derived from the qualitative indicators.
Keywords: Financial risks; Management of technological projects; Economic profitability.

Resumo
Este artigo analisa a relação entre gestão de projetos de tecnologia (GPT) e rentabilidade econômica (RE) para as áreas de riscos financeiros com o objetivo de apresentar um modelo flexível entre ambas as variáveis derivadas de índices de desempenho e habilidades cognitivas para a área de riscos financeiros de uma instituição bancária mexicana. Isso por meio de um método quantitativo apoiado por um modelo econométrico preditivo de dados obtidos a partir de 313 projetos tecnológicos. Os resultados mostram que o ER depende do comportamento das dimensões do GPT; considerando as informações colhidas para verificação empírica com base na amostra resultante e outros dados derivados dos indicadores qualitativos.
Palavras-chave: Riscos financeiros; Gestão de tecnologia; Rentabilidade econômica.

Resumen
En este artículo se analiza la relación que tiene la gestión de proyectos tecnológicos (GPT) con la rentabilidad económica (RE) para las áreas de riesgos financieros con el objetivo de presentar un modelo flexible entre ambas variables derivado de índices de desempeño y habilidades cognitivas para el área de riesgos financieros de una institución bancaria mexicana. Esto a través de un método cuantitativo apoyado en un modelo econométrico predictivo de datos obtenidos de 313 proyectos tecnológicos. Los resultados muestran que la RE depende del comportamiento de las dimensiones de la GPT; considerando la información tomada para la comprobación empírica con base en la muestra resultante y de otros datos derivados de los indicadores cualitativos.
Palabras clave: Riesgos financieros; Gestión tecnológica; Rentabilidad económica.

1. Introduction

Mexican banking is regulated, normed, and supervised by different entities that report to the executive branch of the country, highlighting here the Ministry of Finance and Public Credit (SHCP). This is an auxiliary interaction of the National Banking and Values Commission (CNBV), the National Insurance and Bonding Commission, and the National Commission of the Retirement Savings System (CONSAR), responsible for regulating the operation of multiple banking and the complement of financial intermediaries. Another important entity, dependent on the Bank for International Settlements (BIS), is the Bank of Mexico (BM), whose main objective is focused on protecting the purchasing power of the national exchange currency (the Mexican peso). (SHCP, 2019); Rankia México, (2021).

International banking outlines the structure, influence, and impact of the global financial system and its regulatory entities on the Mexican financial system. In addition, it facilitates the identification of economic bases about the function of the areas of financial risks, preventive reserves, and their relationship with Economic Profitability and interaction with the Management of Technological Projects in banking institutions (BPI, 2019; Bank of Mexico, 2017). The most representative global financial institutions are the *Bank for International Settlements*, an international stock exchange system formed by a network of institutions, including brokerage houses, the foreign exchange markets, and the Insurance and Bonding market (Ontiveros, 2011). The main international and national organizations that issue standards for local performance are the World Bank *Group*, International Monetary Fund (IMF), and Bank for International Settlements (BIS) (BIS, 2019; Bank of Mexico, 2017; Ontiveros, 2011).

According to the BIS (2019), the international framework for measuring, standardizing, and monitoring liquidity risk contains the section of the Basel Committee's reforms that reinforces international regulation on capital and liquidity in order to promote greater resilience to contingencies. The objective of these reforms is to improve the capacity of the banking sector to absorb shocks from financial or economic stresses of any kind, thereby reducing the possibility of contagion from the financial sector to the real economy.

During the first phase of the 2008 financial crisis, many banks, despite having adequate levels of solvent capital, were in difficulty because they did not adequately manage financial risks (BIS, 2019). The crisis highlighted the importance of healthy liquidity for the proper functioning of financial markets and the manifest weaknesses in the banking sector (Banco de México, 2017). The reversal of market conditions showed that liquidity can be very volatile and the effect is maintained for long periods (BIS, 2019; Bank of Mexico, 2017).

The events mentioned forced Mexican banks to comply with the rules regarding the evaluation of the different types of risks, using various technological means generated through the management of technological projects. This is under the responsibility of the technology departments, which must be executed quickly, in a timely manner, and with the capacity to contribute to the daily operation of the areas of financial risks, therefore, the use of efficient technology management models provides dynamism to the operational performance of these areas (Banco de México, 2017).

As a solution to the liquidity risk of financial institutions, the Basel committee published in 2008 the document "Principles for the proper management and supervision of liquidity risk", with detailed indications on how to manage and supervise funding risk in order to promote better management (BIS, 2019). The committee coordinates its rigorous implementation through continuous supervision to ensure that each country's central banks adhere to these indispensable principles (BIS, 2019).

The problems faced by the financial risk areas of Mexican banking institutions involve the excessive time it takes to update their different models of risk assessment and rating, the exchange rate, granting of credit, the rating of the portfolio in credit, and the risk assessment for debt issuance. This influenced the quantification of preventive reserves, especially on book capital, and the deficiencies in the current models for the management of technological projects (GPT) through which the updating of the rating and non-compliance risk models is achieved. On this, the operation is carried out every year and a half, while the suggestion of the Bank for International Settlements is of a monthly nature. So, the opportunity and efficiency are lost in the delivery periods of the technological solutions for rating the different types of risk, in addition to the impact, it generates in the monetary estimation of preventive reserves and therefore economic profitability (Banco de México, 2019; CNBV, 2019; BPI, 2019).

The components of the GPT include the behavior of the level of probability of success of the project, the cost, the effort, and the execution time, without losing sight of the direct and indirect costs of operation. Other things are, the economic rates related to the cost per hour for the effort and the operational efficiency during the realization of each project, and the tacit use of administrative inputs and the human resources involved (CNBV, 2019; IPMA, 2019; Benavides, 1998; Gomez, 2016).

This research proposes a flexible model of management of technological projects in the area of financial risks, to support the economic profitability (RE) of a banking institution with an econometric perspective that includes the period from January 2005 to August 2019 on projects, partially or totally, related to the financial risks of a financial Mexican group in Mexico. It takes into account the correlational analysis of the variables GPT, the RE, and its dimensions, as well as the analysis of the predictive behavior of the resulting economic growth (Banco de México, 2017; CNBV, 2019; Dornbusch & Fischer, 1994; IPMA, 2019; Lucas, 1988; Smith, 1794; Samuelson 1993).

The results derived from the research show improvement in operational efficiency and an increase in the probabilities of success in the management of technological projects in the areas of financial risks, obtaining a positive increase in economic profitability and a decrease in preventive reserves from an econometric approach.

2. Theoretical Framework

The management of technological projects

The theoretical analysis of information technologies and their corresponding evolution, as well as the contributions to the performance of the management of technological projects related to the banking sector and its responsibilities. It represents an important pillar for the generation of financial services in banks and determines the use of best practices that help in the direction and fulfillment of financial risk projects (Castells, 1997; BPI, 2019)

Technology is a set of knowledge relating to a technique, the development of which is subject to the regulatory principles of science and includes machines, tools, methods, and economic and social relations of the environment, oriented to the satisfaction of needs through the generation of products, services or technological processes (Ziman, 1986; COTEC, 2007; Petrov, P. e Ivanov, S and Dimitrov, S. 2021). On the other hand, Benavides (1998) defines it as "the set of knowledge that society possesses and that has application in industrial activity", and summarizes it as the use of scientific and technical knowledge for the creation of a product.

There are certain classifications of technology that arise from the notion of technological systems which demand coherence between all the unitary technologies used in them, manifesting themselves quantitatively and qualitatively, and differentially integrating their tacit importance. Benavides (1998) describes the organization of the technological system in the form of a hierarchical network of technologies, where the different elements of the system are according to their impact.

The classification of technologies up to those related to information technologies (IT) and the specification of the different generational stages through which the development of the same went through, establishes the preamble to review first the IT and then its relationship with management through specific projects. The application of technology is always limited and shaped by customer requirements and market forces, economic concerns and the demands of the own evaluation of financial investments (Solleiro, 2008).

Currently, every business decision should involve an IT expert as a strategic member in the implementation of new technologies for the benefit of the company. This systematic way of working requires the establishment of a set of methods, procedures, tools, and techniques that make it possible to carry out projects (Maigua, 2012).

The basic definition of a project, according to the *Project Management Institute* (PMI) (2008), is "a temporary effort that is carried out to create a unique product, service or result that can have a social, economic and environmental impact that will last much longer than the projects themselves". From the same PMI, the definition of project management is "the application of knowledge, skills, tools, and techniques to the activities of the project to meet the requirements of the same".

Operational efficiency in the management of technological projects (GPT) is determined by the value represented by time, cost, quality, economic contribution to the institution, and level of satisfaction of the technological needs of the business. This is according to the parameters pre-established in the internal rate of return on investment derived from the present value of the benefits among the present value of the assets. Miranda (2005), defines efficiency in terms of the context of projects as "the relationship between the costs of inputs applied and the outputs obtained by the project"; while (Nava & Venegas, 2009), and Cohen & Franco (1992), define it as "the relationship between costs and the products obtained". Bonnefoy & Armijo (2005), indicate that "efficiency refers to the ability to develop an activity at the minimum possible cost, while effectiveness measures whether the predefined objectives for the activity are being met".

GPT is regulated by the software development life cycle (logical components of a computer system) depending on the methodological model used according to either internal development or pre-existing reference. It carries several phases that lead to projects through different stages of maturity until their completion as indicated by the PMI (2008): Initiation, Planning, Execution, Monitoring and Control, and Closure, which seek to maximize efficiency in the management of technological projects to meet their objectives in time and cost. The degree of performance efficiency in the GPT is highly linked to the patterns defined in time, effort, and cost that contribute economically in the short, medium, and long term with the indicators of return on investment established by the institution or organization, affecting the level of probability of success of each project (PMI, 2008).

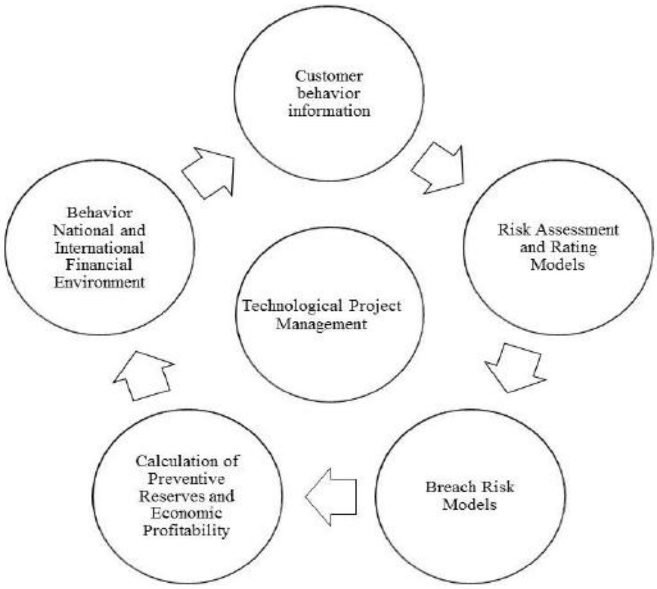
Efficient of technological projects is linked to the organizational structure defined for each project (Gómez, 2016), including the environmental factor of the company that can influence the availability of resources and the way of directing the projects. Besides functional structures, there are several alternatives for the management of technological projects related to administrative efficiency, the optimization of the delivery time of technological solutions, and the economic growth plans of the companies, institutions, and organizations. GPT needs to rely on the use of techniques to minimize errors and increase its efficiency. Among the most widely used project management methodologies are the Gantt Chart, Pert/CPM, and the Critical Chain Method. Each of them has advantages and disadvantages, but all are a great help when planning and managing resources, as well as controlling the evolution of projects (OBS, 2017)(OBS, 2017).

The GPT in the area of Risks of local financial institutions must consider different factors among which are the liquidity coverage ratio, the preventive reserves of financial institutions, contingent events, financial risk, and associated uncertainty among others. The calculation of the liquidity ratio is based on the traditional methodologies used by banks to assess their exposure to contingent events. The standard requires that the value of the coefficient be not less than 100%, i.e. the fund of high-quality liquid assets must be at least equal to the total net cash outflow (BIS, 2019). The application of the rules issued by Basel is reflected in the local financial systems through the process of determining the preventive reserves affected by the RE. That guarantee the return of the liabilities of savers and investors by assigning them to credit or investment instruments, minimizing the risk of default with the generation and application of risk assessment models for granting loans or issues of debt in financial markets (BIS, 2015 and 2019; Bank of Mexico, 2019).

Financial risk, according to Arias (2006), is considered "the uncertainty associated with the value and/or return of a financial position", while for the BIS (2019), uncertainty is ignorance of the near future and risk as the probability of an unfavorable event occurring. Thus, the risk areas in the financial field are responsible for addressing potential problems, delineating, and defining the models of predictive measurement of delinquency risk on the capital granted in credit, and establishing precautionary measures within the calculation of the expected loss, for direct impact on the determination of capital reserves in banking institutions. (CNBV, 2019; BIS, 2019; Bank of Mexico, 2017; CFI Team (2022). Similarly, for the different types of financial risk (Arias, 2006), the application of algorithms within technological projects are determined on high volumes of information. For this, the financial risk areas use technological solutions managed and arranged by the corresponding technology departments, on a variety of existing tools in the market or those developed internally that facilitate the understanding and generation of information models (Green, 2008; Gomez, 2016).

Based on these definitions and the normative influence exerted by the rules and policies issued by the Bank for International Settlements in its Basel section, Figure 1 shows the simplified operational flow to implement technological alternatives, administratively regulated through the management of technological projects for risk areas (BPI, 2019).

Figure 1. Operational Flow of Technological Project Management in the areas of risks.



Source: Prepared with data from the BIS (2019).

This functional cycle highlights the generation of the appropriate technological solutions, through the GPT (guiding axis of the flow) that help determine the different types of risks; begins with the study of customer behavior information, which is transformed into models of evaluation and qualification of risks for the granting of credit, investment in the markets, exchange rate parity and interest rate granted that will allow the generation and modeling of default risks associated with the probability of default, for its aggregation within the calculations of monetary precautionary reserves with direct impact on economic profitability, taking into account the impact generated by changes in macroeconomic and microeconomic environments.(BPI, 2019)

3. Economic Profitability

For the financial sector, administrative or operational efficiency is essential and is related to the behavior of economic profitability (RE), based on the arithmetic ratio of Total Expenses minus Depreciation and Amortization among Average Net Assets (Honduras, 2007). For the Central Reserve Bank of Peru (2017), profitability is the ability of an asset to generate profit, it is the relationship between the amount of a certain investment and the profits obtained once commissions and taxes have been deducted, always expressed in relative terms (Central Reserve Bank of Peru, 2017).

The RE expressed, usually as a percentage, measures the income-generating capacity of the company's assets or invested capital and is independent of the financial structure or composition of the liability; the ratio or indicator expresses the economic efficiency of the company. It is obtained by dividing the total annual profit of the company before deducting the interest on the debts or cost of the capital of others by the total assets, multiplied by 100. While financial return (RF) measures shareholder return or return on equity, RE measures the income-generating capacity of the company's assets, regardless of the type of financing used and its cost (Encyclopedia of Economics, 2017). Another important description of economic profitability is the one presented by Vázquez (2013), such as the return obtained from the assets used in production regardless of who finances the investment and as a sample of the efficiency of a company's investments, expressed as follows:

$$RE = (\text{Operating result})/(\text{Total assets}) \times 100 \qquad (1)$$

Gironella (2017), addresses economic profitability (RE) or performance from a financial point of view, is also known by the English acronyms ROI (*Return on Investments*), ROA (*Return on Assets*) or ROCE (*Return on Capital Employed) or ROCE (Return on Capital Employed*) = Profitability of assets employed); although the terminology is varied, the meaning is identical. Regarding the ratio to calculate the RE, Gironella (2017), judges the degree of effectiveness of the resources used by a company (material and human) without taking into account its financial structure; that is, without considering the sources of funding (Asterou, D.; Pilbeam, K y Tomuleasa I. 2021). In accordance with this criterion, the financial expenses incurred by the company and the expense of the income tax are missing in its calculation, since they are concepts independent of the objective pursued. The ratio or formula that determines the economic profitability used for this research is:

$$\text{Ratio of RE} = AIIB / (\text{Average total of the year}) \qquad (2)$$

Being AIIB = Profit before interest (financial expenses) and tax (tax on profits). This ratio is expressed in percentages.

As for the Mexican financial system and especially the multiple banking bloc, the National Banking and Securities Commission (CNBV) periodically publishes the positioning and ranking that banks occupy in the Mexican financial market, based on two main economic indicators, Economic Profitability (ROE) and Profitability on Assets (ROA). The combination of both indicators makes it possible to determine the most convenient way to finance investment in banks.

The National Banking determines the ROE and ROA variables and the Securities Commission based on the following algorithms (CNBV, 2019):

$$\text{ROE (Economic Profitability)} = (\text{Net Income}) / (\text{Current AccountingCapital}) \qquad (3)$$

$$\text{ROA (Financial Return)} = (\text{Net Income}) / (\text{Total Assets}) \qquad (4)$$

In the bulletins of financial reasons published by the National Banking and Securities Commission, you find Total Assets, Traditional Collection and Accounting Capital, the latter with the discount of preventive reserves for the loan portfolio (CNBV, 2015).

The economic profitability determined after discounting the amount of the preventive capital reserves; can be benefited from the improvement of the risk models in charge of the areas of financial risk, and with the use of technological tools provided in time and opportunity by the departments of technological management, for the final calculation of the precautionary reserves (CNBV, 2015).

4. Methodology

The main problem faced by the areas of financial risks in banking Mexican institutions is the time it takes to update their models of evaluation and rating of financial risks. This joined to the rules and policies of behavior and operation established by international and national regulatory bodies as well as to the macro and microeconomic variations of the environment. Therefore, they do not determine in a timely manner the appropriate conditions for granting financing and the monetary amounts that will support the liabilities in events that could trigger delinquency scenarios affecting the profitability of the financial institution.

The use of technological alternatives for the determination of the different types of risks, their study, classification, and synthesis of information, are important for the correct performance of financial risk management. So the help of the management of technological projects to achieve the materialization of these technical solutions, it is essential, reflected in the success and fulfillment of projects within the areas of financial risks.

Based on the type of study carried out for this research, with the proposal of a model that fully relates the flexible management of technological projects with economic profitability, depending on the needs of the areas of financial risk, and the cognitive aspects of the person who will use it, the research used is "empirical" (Sierra, 2007), since the work is argued on the documentary observation of economic behavior in the financial sector, the analysis of its characteristic aspects of operation, the consultation and observation of the historical behavior of the projects in the banking institution that according to the number of dependent and independent variables involved in the determination of the model results in a "quasi-experimental" research design (as applied only in a Mexican banking institution); the type of research in this case is quantitative (Sierra, 2007).

The hypothetical-deductive method and the documentary research allowed to identify the way in which the different variables and their dimensions involved are correlated through the observation of the phenomenon, the creation of the general and specific hypotheses, deduction and materialization of results, and the verification or verification of the specified work premises. With the qualitative inquiry was obtained using the instrument of interval and scale of ratio or proportion, the quantifiable estimation for the evaluation of cognitive abilities and sufficient information was obtained for the econometric analysis of human capital using the least squares method. (Green, 2008)

For this research, Lucas's (1988) model of Endogenous Growth, also known as Economic Growth, was used to analyze the econometric relationship between technological impact, monetary capital, the amount of labor and human capital (cognitive skills) with economic profitability or economic growth.

Lucas (1988) includes neoclassical models of economic growth, the determining factor of the accumulation of human capital (formal education and knowledge by acquired experience), states that "the amount produced depends on the quantities of factors K, N, and A. He states that "Human Capital is the value of the potential income generator that individuals have. It includes innate ability and talent and the education and qualifications acquired." The function of production in its structural form considering Human Capital is as follows:

$$y = A\,f(K, H, L)$$ ....equation (32).

where:

y= Endogenous or economic growth

K= Amount of Capital

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L= Amount of Work

A= Technology Situation

H= Human Capital

By way of conclusion, Lucas (1988) states that "when there are constant returns of scale, the rate of return of production is equal to the growth rates of the weighted factors of each of them by their share of income, plus the rate of productivity growth."

Assuming that the factors of Capital, Labor and Technological Progress remain constant, we would obtain for the Human Capital factor the following function:

$$y = af(H)$$ ....equation (33).

"For each additional unit in the amount of Human Capital by factors with assumption of constant performance for Capital, Labor and Technical Progress (a), the rate of production per capita increases" (Lucas, 1988).

The complete model proposed by Lucas (1988) differs from the neoclassical models of Sollow (1956) and Swann (1956) in the incorporation of the Human Capital variable:

a $y = AK^{\alpha}(\mu HL)$). Production function...equation (34).

b $S = sY$). Savings function...equation (35).

c). $I = K$ Investment function...equation (36).

d). $S = I$ Equilibrium function...equation (37).

e). $L = L_0 e^{nt}$ Labor Force Growth Function....equation (38)

f). $\square = H\square(1-\mu)$ Human Capital Accumulation Function....equation (39)

g). $\frac{\dot{K}}{L} = sAk^{\propto}(\mu H)^{1-\propto}$ Function Capital growth in per capita terms....equation (40)

h). $\frac{\dot{k}}{k} = sAk^{\propto -1} - n$ Capital growth rate per capita....equation (41)

i). $\frac{\dot{H}}{H} = \theta(1-\mu)$ Growth rate of GDP per capita....equation (42)

j). $\frac{\dot{y}}{y} = \propto \left[s\frac{f(k)}{k} - n\right] + (1-\propto)[\varphi(1-\mu)]$ Growth Rate of the Capital Stock of the Economics....equation (43)

k). $\frac{\dot{y}}{y} = \propto [sAk^{\propto -1}(\mu H)^{1-\propto}] + (1-\propto)[\varphi(1-\mu) + n]$ Growth Rate of the Product....equation (44)

The model of Lucas (1988) allows to analyze econometrically the impact of the management of technological projects and their dimensions with profitability and human capital, by analogy, knowing that economic growth for a banking institution is represented by economic profitability, it will be determined if there is a relationship between the flexible management of technological projects, human capital and economic profitability.

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Methodological Scheme

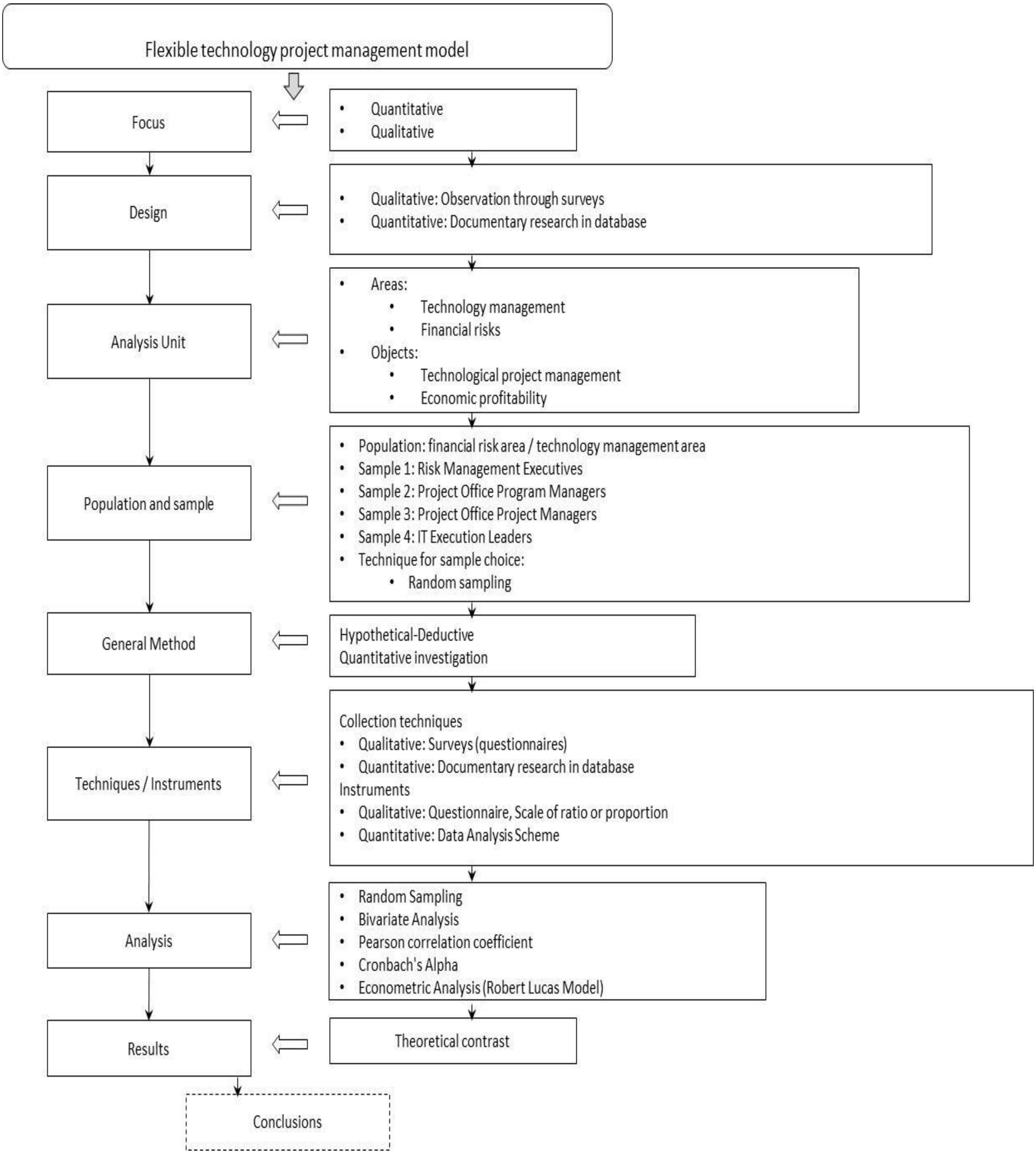
Figure 2 shows the methodological scheme that allows identifying the different stages of research with the techniques of data collection, analysis of results and elaboration of conclusions (Bunge, 2013; Phillips, 2000; Hernández-Sampieri & Mendoza, 2018; Sierra, 2007)..

The scheme begins with the research approach that is divided into quantitative and qualitative, the design was shaped according to the types of approach in quantitative with documentary research in databases and for the qualitative through observation through surveys (Sierra, 2007; Hernández-Sampieri & Mendoza, 2018).

The units of analysis were identified which were divided into the areas and objects of study, based on this division the population proportional to the identified areas was delimited and the samples were elaborated according to the roles involved in the management of the technological projects, as well as the use of the random sampling technique for the elaboration of the samples. The general research method used was hypothetical-deductive with quantitative research type; the use of surveys and database research as qualitative and quantitative collection techniques, and the questionnaire with application of ratio or proportion scale and data analysis scheme as qualitative and quantitative instruments respectively. (Sierra, Doctoral Thesis and Scientific Research Papers, 2007; Hernández-Sampieri & Mendoza, 2018)

They were defined for the analysis of the information, random sampling for the choice of the information to be reviewed, the bivariate analysis to determine the relationship between the dependent and independent variable, the Pearson correlation coefficient to determine the relationship between the variables and with the dimensions, Cronbach's alpha for the reliability of the questionnaire and the analysis economé trico for the economic crossing. Finally, through theoretical contrast, the results and conclusions were elaborated (Sierra, 2007; Hernández-Sampieri & Mendoza, 2018).

Figure 2. Methodological scheme.



Source: Own elaboration based on the management of technological projects for the banking sector that describes the methodological flow used in the research.

The research included the study of the relationship of the management of technological projects with economic profitability in a banking institution, the second bank positioned in the Mexican financial sector. Study subjects were selected by random sampling (Sierra, 1983).

- Population: financial risk area / technology management area
    - Sample 1: Executives responsible for financial risk management.
    - Sample2: Program Managers of the Project Office.
    - Sample3: Project Managers of the Project Office.
    - Sample 4: Technical Leaders of the Project Management department.

Application Schema

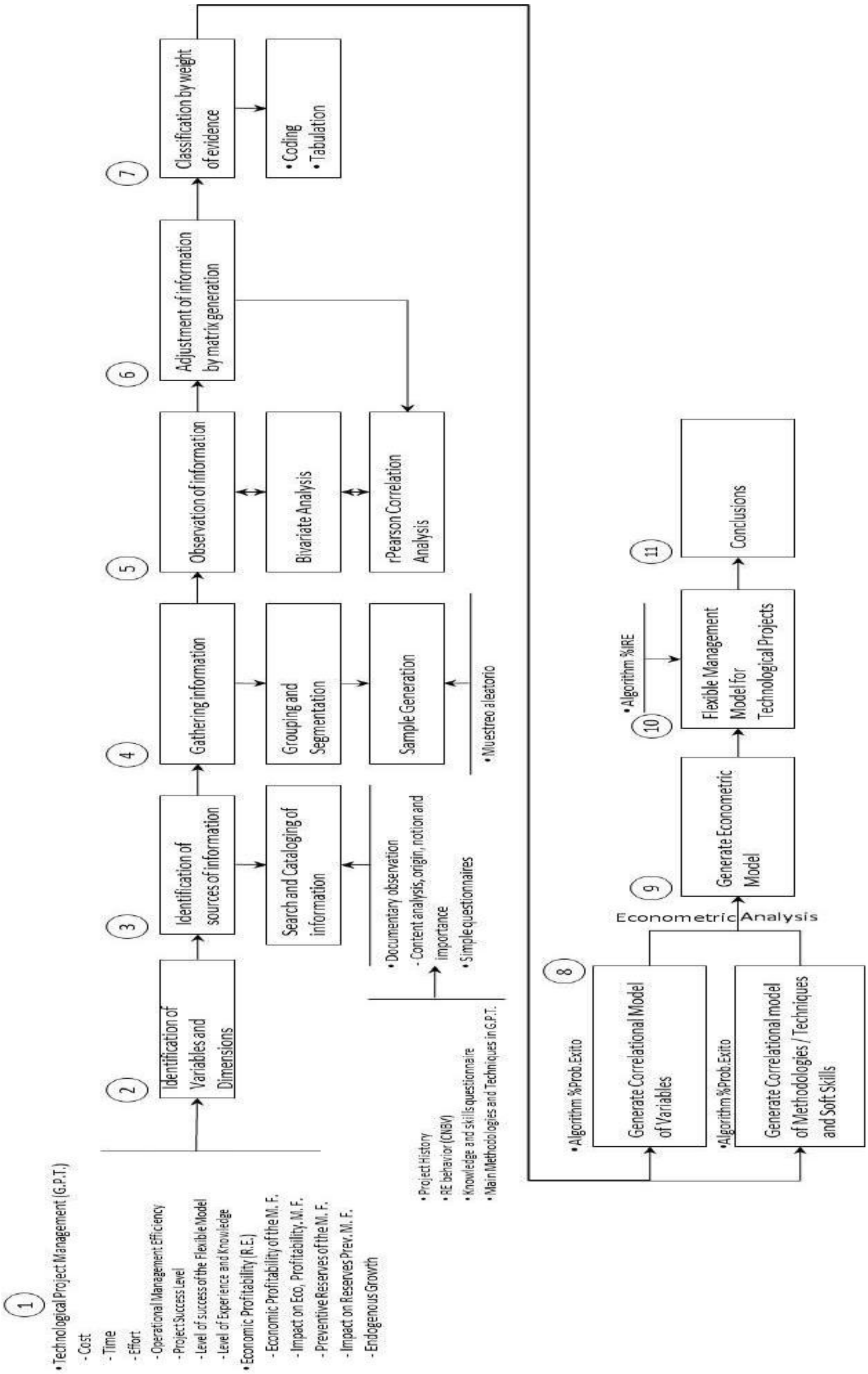
Based on what has been stated by some authors such as Sierra (2007), Bunge (2013), Green (2008) and Hernández-Sampieri (2018), the following application scheme was elaborated (see Figure 3) that details the operational flow used for the investigation and analysis of the independent and dependent variables with their corresponding dimensions, which consists of the following steps:

1. Identification of the list of independent, dependent variables and the dimensions associated with each variable (Sierra, 1983).
2. Identification of the characteristics of the independent, dependent variables and the corresponding dimensions (according to the operationalization matrix) (Sierra, 1983; Hernández-Sampieri & Mendoza, 2018).
3. Identification of the sources of information, the criteria for searching and cataloguing the information for the research are established. Sources of information (Sierra, 1983; Hernández-Sampieri & Mendoza, 2018):
    - Historical information of the management of technological projects of the banking institution.
    - Financial information on economic profitability published by the National Banking and Securities Commission and the Bank of Mexico (CNBV, 2017).
    - Survey of Knowledge and Skills by Role (Sierra, 1983; Lucas, 1988).
    - Main techniques and methodologies for the management of technological projects published by Global Standards and Publications (2017).

    For which it was used:
    - Documentary observation: Analysis of content, origin, notion and importance (Sierra, 1983; Hernández-Sampieri & Mendoza, 2018).
    - Simple questionnaire to obtain cognitive information for each role identified in the defined samples (Sierra, 1983; Hernández-Sampieri & Mendoza, 2018).
4. Step fouris in:
    - Information gathering: database extraction and questionnaire application (Sierra, 1983; Walpole & Myers, 2012) .
    - Grouping and segmentation: grouping by type of variable, period, roles, the calculation of composite variables is performed. Variables and their dimensions are grouped based on their nature, amplitude of the units of observation, level of abstraction, character of the elements of variation and position in the relationship that unites two or more variables or dimensions with each other. The qualitative and quantitative variables and dimensions were identified, the latter segmented and grouped (numerical series divided for operational and synthesis effects in intervals) by: discrete (restricted to certain values within its range) and continuous (can take any value within its range) (Sierra, 1983; Sampieri, 2018; Walpole, 2012).
    - Sample generation: through the random sampling method applied to the determined samples, the list of candidates for the application of the questionnaire is obtained (Walpole, 2012).

5. It runs:
   - Observation of the selected information.
   - Application of bivariate analysis technique to determine the relationship between the dependent and independent variables (Sierra, 1983).
   - Application of Pearson correlation analysis (index that measures the degree of covariation between different linearly related variables) for the variables and between the dimensions of each one (Sierra, 1983).
6. Adjustment of the information by matrix generation (generating composite variables by crossing the dimensions of the variables with each other) to improve the weight of the evidence, and reincorporate the new variables/composite dimensions to the bivariate analysis and Correlation coefficient *r* of Pearson (Walpole & Myers, 2012; Sierra, 1983).
7. This step consists of two stages:
   - Classify and prioritize the analysis of variables and dimensions according to the weight of the evidence of the information (Sierra, 1983; Walpole & Myers, 2012).
   - Data encoding and tabulation for database generation.(Walpole & Myers, 2012)
8. Execution and generation of correlational and econometric analysis:
   - Generate correlational model of variables (dependent vs independent and its dimensions) and econometric model, for the latter will be used the model of Robert Lucas that analyzes the variation of economic growth (economic profitability) as a function of the change in factors (Sierra, 1983; Lucas, 1988; Walpole, 2012):
     - Capital (monetary amount) (comes from variable: GPT, RE).
     - Amount of work (comes from variable: GPT).
     - Technological impact (comes from variable: GPT).
     - Human Capital (cognitive skills, comes from variable: GPT).
9. Generation and verification of the econometric model (Lucas, 1988; Green, 2008; Gujarati & Porter, 2010).
10. Associate the econometric model with the level of success of the Flexible Model of Management of Technological Projects (Green, 2008; Walpole, 2012; Gujarati & Porter, 2010).
11. Detail and present conclusions (Sierra, 1983).

Figure 3. Application Scheme.



Source: Own elaboration based on the management of technological projects for the banking sector that details the sequence of activities carried out during the research.

Therefore, the relationship between GPT and economic profitability could be affected in conjunction with the financial health of multiple banking institutions. To determine the relationship between GPT and RE we made the operationalization of these two variables, see Tables 1 e 2.

Table 1. Operationalization Matrix of the independent variable.

Independent Variable: Technological Project Management			
Variable	Definition	Dimensions	Indicators
Management of Technological Projects (GPT by its acronym in spanish)	Management of technological projects through the different stages of their operational cycle until their conclusion	Compliance in Cost CC	Direct costs Indirect costs Total project cost Project Planned Cost % Compliance in Cost
		Compliance in Time CT	Final Project Time in days Project actual start date Actual project completion date Planned start date of the project Project Planned End Date Project end time in hours Planned Project Time in days Planned Project Time in hours Unit Cost per Hour Total Hours of Workday % Compliance in Time
		Compliance Effort CE	Final project effort Planned Project Effort % Compliance in Effort
		Efficiency in Operational Management EGO	Average of the sum of: % Compliance in Cost % Compliance in Time % Compliance in Effort
		Project Success Level NeP	Average of the sum of: % Compliance in Cost % Compliance in Time % Compliance in Effort % Level of Experience and Knowledge
		Level of success of the Flexible Model NeMF	Average of the sum of: % Project success level %Level of Experience and Knowledge (%NEC) on Methodologies or Techniques
		Level of Experience and Knowledge NEC	%Level of Experience and Knowledge (%NEC) on Methodologies or Techniques: Association of Methodology or Technique to the profile of Risk Management Association of Methodology or Technique to the Program Manager profile Association of Methodology or Technique to the Project Manager profile Association of Methodology or Technique to the profile of Technical Leader

Source: Own elaboration.

Table 2. Operationalization Matrix of the dependent variable.

Dependent Variable: Economic Profitability			
Variable	Definition	Dimensions	Indicators
Economic Profitability (RE by its acronym in spanish)	Determines the income-generating capacity of the company's assets or invested capital and is independent of the financial structure or composition of liabilities	Economic Profitability of the Flexible Model RentEMF	Expected Economic Benefit Rate Total Project Cost %Level of success of the Flexible Model
		Impact on the Economic Profitability of the Flexible Model IRentMF	Economic Profitability of the Flexible Model ROE (Economic Profitability) Accounting Capital
		Preventive Reserves of the Flexible Model ResPMF	Economic Profitability of the Flexible Model Amount of Preventive Reserves Total Portfolio
		Impact on The Preventive Reserves of the Flexible Model IResPMF	Amount of Preventive Reserves Preventive Reserves of the Flexible Model Total Portfolio
		Endogenous Growth CEG	Indicator of Technological Progress Human Capital Indicator Monetary Capital Amount of Work Endogenous Growth Indicator

Source: Own elaboration.

The research hypothesizes that a flexible model of technology project management (GPT) based on the performance indices of cost, time, effort, and cognitive skills for the area of financial risks is positively related to the economic profitability (RE) of a Mexican banking institution. For the fieldwork, a universe of data or base of the sample of projects that are partially or totally related to financial risks was considered, consisting of the set of projects that have been carried out from 2005 to 2019 of the second Mexican banking institution best positioned in the country's financial market, currently (see Table 3):

Table 3. Data samples from the sample base.

Sample	Valid Cases	Lost cases	Total
Projects 100% related to Financial Risks	306	7	313
Projects partially related to Financial Risks	2,206	0	2,206
Sample Basis	2,512	7	2,519

Source: Own elaboration with SPSS version 25.

5. Results and Discussion

Ater analyzing the total universe data from 2,519 projects related to the management of financial risks, two main groups were found. Those that are one hundred percent related to the management and modification of financial risks and those that are only partially related; that is, that have something to do with financial risks, but not significantly (no more than 5% ratio). From the base of the sample, 313 cases were completely linked to financial risks, whose sampling fraction represents 12.4% of the universe with an elevation coefficient of 8.04. It was decided to use the sample in its entirety without subjecting it to the random sampling technique to avoid as much as possible the error of two queues and discounting the lost cases (7) or non-standardized; the maximum estimation error (Ɛ) is determined at a confidence level of 95% (Sierra, 1983):

$x = Casos\ perdidos$

$$p = \frac{x}{n} = \frac{7}{313} = 0.022 \quad (5)$$

$$z(0.95) = 1.96 \; Constant\ for\ confidence\ level\ q\ of\ 95\%$$

$$\mathcal{E} = z\sqrt{\frac{pq}{n}} = 1.96\sqrt{\frac{(0.022)(0.95)}{313}} = 0.0160 \quad (6)$$

With a ratio p = 0.022 the maximum estimation error will be 0.0160 for a confidence level "q" of 95%.

The calculation of the confidence level interval is determined by:

$$p \pm \mathcal{E} = 0.022 \pm 0.0160 \quad (7)$$

So the confidence level fluctuates between (0.006, 0.038). With confidence, a level of 95% the proportion of non-normalized information records is between 0.006, and 0.038.

For the evaluation of the cognitive aspect, the final sample of 313 projects and the samples for each role involved in the management of technological projects were identified, taking into account that the same role may be associated with one or more projects (see Table 4).

Table 4. Cognitive aspect data samples from the sample base.

Sample	Valid Cases	Lost cases	Total
Risk Executives	31	0	31
Program Managers	20	0	20
Project Managers	56	1	57
Technical Leaders	45	0	45
End sample	152	1	153

Source: Own elaboration.

For Economic Profitability and its dimensions, it was reviewed historical documents of a numerical or statistical type (Sierra, 1983), issued by the National Banking and Securities Commission. They were related to the Financial Reasons of the banking entities, belonging to the Multiple Banking sector, and necessary for the calculation of the indicators: a). RentEMF, b). %IRentEMF, c). ResPMF, d). %IResPMF, of the flexible model detailed through the use of the Explanatory Observation technique. The data were observed using the type of cross-sectional or sectional research for a period that covered 52 monthly periods between the years 2014, 2015, 2016, 2017, 2018 and until the month of August 2019.

In the same way and criteria, documents were used for the indicators associated with the variable of Management of Technological Projects and its dimensions, a). % Compliance Cost, b). % Compliance Time, c). % Compliance Effort, d). % EGO, e). % Nep, f). % NeMF, and g). % NEC, recovering the historical information of GPT (313 projects) of the observed banking institution. The calculation of the indicators indicated was carried out based on the algorithms deduced by explanatory observation, described in the section of the flexible model of this article where the related equations are specified.

To determine the Level of Experience and Knowledge (NEC), data from the profiles of the Risk Management Executive, *Program Managers* of the project office, *Project Managers* of the project office and the Technical Leader of Information Technology (IT), linked to each project, were used.

The Flexible Technology Project Management Model

Based on the documentary and explanatory observation made, the corresponding algorithms of the GPT and the RE that are exposed below were determined:

- Cost Compliance (%CC) (PMI, 2008).

$$\%\ Compliance\ Cost = \frac{Total\ project\ cost}{Project\ Planned\ Cost} \quad (8)$$

- Compliance in Time (%CT) (PMI, 2008).

$$\text{\% Compliance Time} = \frac{\text{Final Project Time (days) x Unit Cost p/hr x Hrs Daily working hours}}{\text{Project Planned Time (days) x Unit Cost p/hr x Hrs Daily working hours}} \quad (9)$$

- Compliance in Effort (%CE) (PMI, 2008).

$$\text{\% Compliance Effort} = \frac{\text{Final Project Effort (hrs) x Unit Cost p/hr}}{\text{Planned Project Effort (hrs) x Unit Cost p/hr}} \quad (10)$$

- Efficiency in Operational Management (% EgO) (PMI, 2008).

$$\text{\% EgO} = \text{Average (\% Compliance Cost + \% Compliance Time + \% Compliance Effort)} \quad (11)$$

- Project success level (%NeP) (PMI, 2008).

$$\text{\% NeP} = \sum_{n=1}^{m=7} \left(\frac{a1}{m} + \frac{a2}{m} + \frac{a3}{m} + \frac{a4}{m} + \frac{a5}{m} + \frac{a6}{m} + \frac{a7}{m} \ldots \right) \quad (12)$$

- Level of success of the Flexible Model (% NeMF) (Izar, 2015; Del Río, 1998; PMI, 2008; Lucas, 1988).

$$\text{\% NeMF} = \mathit{Promedio}(\text{\% NEC} + \text{\% NeP}) \quad (13)$$

- Level of Experience and Knowledge (% NEC) (Del Río, 1998; PMI, 2008; Lucas, 1988).

$$\text{\% NEC} = \text{\% CalMetTec}$$

$$\text{\% CalMetTec} = \frac{\frac{\text{Real value Profile}}{\text{Expected value Profile}} + \frac{\text{Real value A.Academic}}{\text{Expected value A.Academic}} + \frac{\text{Real value Tech.Met}}{\text{Expected value Tech.Met.}}}{n} \quad (14)$$

- Economic Profitability of the Flexible Model (RentEMF) (CNBV, 2019).

$$\text{RentEMF (Economic Profitability of the Flexible Model)} = \text{\% Expected Economic Benefit Rate per Projec} \quad (15)$$

- Indicator of the Economic Profitability of the Flexible Model (%IRentEMF) (CNBV, 2019).

$$\text{\%IRentEMF (Impact on Economic Profitability of the Flexible Model)} = \frac{\text{RentEMF}}{\text{Economic Profitability (ROE) x Stockholders' Equity}} \quad (16)$$

- Flexible Model Preventive Reserves (ResPMF) (Dornbusch & Fischer, 1994; IMF, 2019).

$$\text{ResPMF} = \left(\frac{\text{Amount Preventive Reserves}}{\text{Total Portfolio}} \right) \text{ x RentEMF} \quad (17)$$

- Flexible Model Preventive Reserves Indicator (%IResPMF) (Dornbusch & Fischer, 1994; IMF, 2019).

$$\text{\%IResPMF} = \left(\frac{\text{Amount Preventive Reserves} - \text{ResPMF}}{\text{Total Portfolio}} \right) \quad (18)$$

- Endogenous or Economic Growth (Lucas, 1988).

$$y = AK^{\alpha}(\mu HL) \quad (19)$$

After having applied each of the algorithms of the model to the data obtained, the resulting interrelation was appreciated through the Pearson product-momentum correlation coefficient. Table 5 shows the correlation of the variables dependent Economic Profitability (%RE) and independent Management of Technological Projects (%GPT) with the dimensions; the value of the significance (Sig. or *p* value) and the number of cases of the sample space represented by N are also indicated.

The two asterisks (**) values of coefficients mean that the correlation is significant at the bilateral level of 0.01, that is, it represents a 99% confidence that the correlation is true with a 1% probability of error. For data appearing with one asterisk (*) means that the correlation is significant at the bilateral level of 0.05, with 95% confidence that the correlation is true and a 5% chance of error in that it is not.

Table 5. Correlation Coefficients Variables and Dimensions.

Correlations

		%CC	%CT	%CE	%NeP	%EgO	%NEC	%NeMF	RentEMF	%IRentEMF	ResPMF	%IResPMF	%IProgTec	%CapHum	CapMon	CantTrab
%GPT	Correlation of Pearson	.815**	.817**	0.061	.974**	.986**	.332**	.808**	0.107	0.094	0.106	-0.049	.763**	0.074	.136*	.153**
	Sig. (bilateral)	0.000	0.000	0.284	0.000	0.000	0.000	0.000	0.058	0.098	0.060	0.388	0.000	0.190	0.017	0.007
	N	313	313	313	313	313	313	313	313	313	313	313	313	313	306	313
%RE	Correlation of Pearson	-0.067	-0.005	0.020	-0.059	-0.040	-0.063	-0.068	0.036	0.037	0.041	1.000**	.526**	.774**	0.019	0.026
	Sig. (bilateral)	0.241	0.934	0.720	0.300	0.479	0.270	0.228	0.523	0.512	0.469	0.000	0.000	0.000	0.735	0.647
	N	313	313	313	313	313	313	313	313	313	313	313	313	313	306	313

**.The correlation is significant at the 0.01 level (bilateral)
*.The correlation is significant at the 0.05 level (bilateral)

Source: Own elaboration.

Most of the correlations of the variable Management of Technological Projects are between -0.049 to 0.332, that is, from very low negative to positive low (9 correlations). Four are from the range of 0.763 to 0.817, it is, a high positive correlation, and two correlations are very high at 0.974 and 0.986 Level of Project Success and Efficiency in Operational Management.

For Economic Profitability, most of the correlations are in the range of -0.068 to 0.526 from very low to moderate positive negative (13 correlations). The high positive correlation with the Human Capital indicator stands out with a value of 0.774 and a correlation with a large positive value of 1,000 large and perfect for the dimension of the Preventive Reserves Indicator of the Flexible Model.

For the review of econometric trends and behavior of endogenous or economic growth, the Eviews version 9.0 tool was used, applying the linear regression technique to the results obtained (51 valid observations per monthly grouping), by executing the algorithms of the Lucas (1988) model of Endogenous Growth, where Human Capital is incorporated as a significant endogenous part of economic growth. Linear regression was applied to the monthly tabulation for the indicators of the endogenous growth dimension of the Economic Profitability. Once the dimension of the Level of Experience and Knowledge (%NEC) was integrated into the calculation; the components of Lucas' algorithm are Technological Progress Indicator (A), Human Capital Indicator (H), Monetary Capital (K), Amount of Labor (L) and Economic Profitability (the dimension of the Economic Profitability Indicator of the Flexible Model was used) (Green, 2008; Walpole, 2012; Gujarati, 2010). The result of the analysis is shown in Table 6.

Table 6. Statistical Descriptive of the Economic Growth dimension.

Dependent Variable: IRentEMF
Method: LeastSquares
Date: 11/10/19 Time: 17:28
Sample: 2014M10 2019M08
Includedobservations: 51

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.79E-08	9.68E-07	0.059759	0.9526
A	-3.67E-07	4.36E-07	-0.842275	0.404
K	-8.59E-12	3.61E-13	-23.818	0
H	2.54E-07	1.33E-06	0.190703	0.8496
L	3.55E-09	1.32E-10	26.81701	0

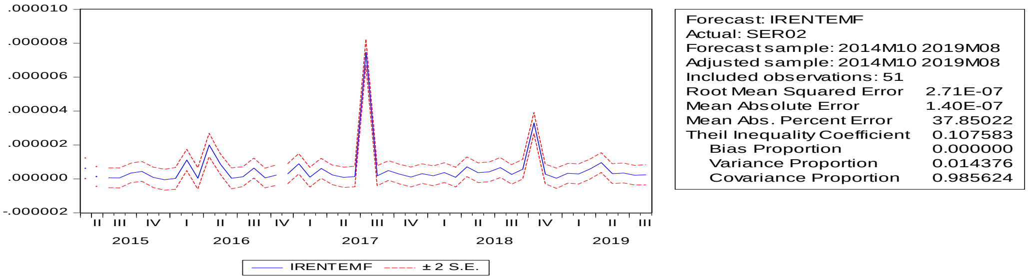
R-squared	0.944116	Mean dependentvar	5.56E-07
Adjusted R-squared	0.939256	S.D. dependentvar	1.16E-06
S.E. of regression	2.85E-07	Akaikeinfocriterion	-27.20729
Sum squaredresid	3.75E-12	Schwarzcriterion	-27.01789
Log likelihood	698.7859	Hannan-Quinncriter.	-27.13492
F-statistic	194.2827	Durbin-Watson stat	1.724039
Prob(F-statistic)	0.000000		

Source: Elaboration with Eviews v9.0 tool based on financial data derived from the flexible model

From a perspective of measuring the goodness of the joint statistical fit of the model, it shows that the R-squared indicates the behavior of the dependent variable (RE) is justified with 94.41% of the behavior of the independent factors. In addition, it represents a 94.41% validity in which the model is correlational with a confidence level of 95% and a margin of error of 5% deducted by the Prob value (F-statitc) = 0.000 which is <= 0.05 (Green, 2008; Walpole, 2012; Gujarati, 2010).

The Durbin-Watson statistical indicator with a value of 1.724039 in addition to the joint result of *p* value (Prob F) = 0.000000, indicates that the model has no autocorrelation; this means that there is independence between the terms of the model (there is no positive or negative autocorrelation). Figure 4 shows the econometric behavior of the ER variable, based on the indicators of endogenous growth (this tabulation is between the periods October 2014 to august 2019). The statistical indicators of square error (2.71E-07), absolute error (1.40E-07) and the percentage of absolute error (37.85%), indicate how far the data are from the arithmetic mean; the coefficient of inequality (0.1075) that oscillates between 0 and 1 and that by definition the closer it is to zero, means that the model has a perfect fit as in this case. This indicator is made up of the Bias ratio (0.000) which indicates how far the mean of the prediction is from the observed arithmetic mean. The indicator of the proportion of variance (0.01437) which shows the variation of the prediction against the observed variation and the indicator of proportion of the covariance (0.9856), which measures the systematic errors of the prediction (Green, 2008; Walpole, 2012; Gujarati, 2010).

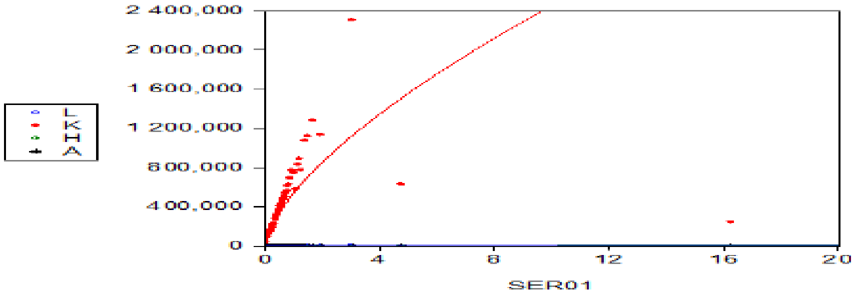
Figure 4. Forecast of the behavior of the RE with the indicators of Endogenous Growth.



Source: Elaboration with Eviews v9.0 tool based on financial data derived from the flexible model.

Figure 5 shows the forecast of the behavior of the dispersion of the data obtained for endogenous growth based on the linear behavior of indicators A, K, H and L. They in the axis of the "x", where the forecast of an upward upward trend of the economic profitability of the flexible model in the axis of the "y" and with the determinant of endogenous human capital integrated in the Lucas' algorithm (1988). This information is consistent and aligned with the information presented in Figure 2 and Table 6 of the Pearson Product-Momentum Correlation Coefficient for the variables and dimensions of the research.

Figure 5. Dispersion with trend of Economic Profitability with the indicators of Endogenous Growth.



Source: Elaboration with Eviews v9.0 tool based on financial data derived from the flexible model.

Model Assessment

Assessment of model

From the selection of 313 projects related entirely to the areas of financial risk from a total universe of 2 519 projects, of which 2 206 were projects related to financial risks in a non-significant way (less than 5% relationship), the way in which the ER variables are correlated was analyzed. GPT and its dimensions, in addition to identifying the cognitive skills (the only aspect of knowledge without a degree of depth) of the roles involved in the management of each project, generate flexibility and dynamism. As well as the joint way in which they positively affect the success of the projects and therefore, the economic profitability of the banking institution (IPMA, 2019; PMI, 2008; Dornbusch & Fischer, 1994; Lucas, 1988; Sierra, 1983).

Based on the empirical data, obtained from Pearson's correlation coefficient *r*, it was identified that, within the most representative correlations for the GPT variable greater than 0.5, 6 correlations ranging from 0.763 to 0.986 were found. With high to very high positive correlation, the highest value being the Level of Success of the Project and The Efficiency in Operational Management 0.974 and 0.986 respectively. Additionally, congruence is established with the results of some of the quality factors contemplated by Piattini (2003), in the development and maintenance of the software.

For the variable RE, the high positive correlation with the Human Capital indicator stands out with a value of 0.774 and a correlation with a value of 1,000 positive large and perfect for the dimension of the Preventive Reserves Indicator of the Flexible Model (Lucas, 1988; CNBV, 2019; Piattini, 2003).

From the algorithms defined for the flexible model of management of technological projects, the relationships between the indicators and dimensions, it can be seen that the Indicator of the Economic Profitability of the Flexible Model (%IRentEMF), is associated with the calculation of the RE (%RentEMF). Here, the level of success of the Flexible Model (%NeMF) includes both the Level of success of the Project (%NeP) and the Level of Experience and Knowledge (%NEC) (cognitive aspect). Integrating, indicators of Compliance in Cost (%CC), Compliance in Time (%CT), Compliance in Effort (%CE), and the components of the Level of Experience and Knowledge associated with the roles of Risk. Also, Executives, *Program Managers*, *Project Managers* and Technical Leaders, showed a positive correlation between the variables and their dimensions with a positive impact on Economic Profitability (%IRentEMF). All are derived from the application of the proposed flexible model of management of technological projects (IPMA, 2019; PMI, 2008; Dornbusch & Fischer, 1994; Lucas, 1988; Sierra, 1983; Gujarati, 2010; Piattini, 2003; Green 2008).

All of that, allows us to establish that a flexible model of Technological Project Management -flexible depending on the variation and behavior of the dimension of the Level of Experience and Knowledge, evaluated for the management profiles involved- positively affects the economic profitability (%IRentEMF). This for the banking institution in proportion to the change in the level of success of the flexible model project (%NeMF), and, the qualification of the cognitive level of the management roles associated with the project (%NEC). The better-qualified people the greater the chances of success of the project, and therefore better improvement of economic profitability. Likewise, the decrease in the monetary level of preventive reserves (%IResPMF), these results being consistent with the observed econometric behavior of economic profitability and corroborated with the application of the endogenous growth model of Robert Lucas (1988) (PMI, 2008; Dornbusch & Fischer, 1994; Lucas, 1988; Gujarati, 2010; Piattini, 2003).

Traditional technological projects model for the areas of financial risks do not contemplate the assignment of the cognitive aspect (on knowledge of techniques and methodologies for management) of the people, nor do they establish the quantitative crossing of the impact on the economic profitability of the institution. Therefore, the perception of the degree of importance and economic impact that the successful achievement of a project has is easily lost and is subject exclusively to the recovery of the expense. The investment involved in the project under performance guidelines in terms of cost, time, and effort, independent and detached from the needs in time and opportunity on the solutions that each project will provide to meet the needs of the business areas are missed (IPMA, 2019; PMI, 2008; Dornbusch & Fischer, 1994).

The results presented are congruent with the silver neoclassical econometric vision initially taken by Arrow (1962), which points out that investment is not only the carrier of technological change but is the source; Romer (1986), which integrates Human Capital into the estimation of endogenous growth and whose main objective was to explain technical progress to explain output growth. The Solow model (1956), is considered a neo-exogenous model, which focused on investment in education and research and development as the origin of technological change, proposing mainly the integration of technical change in economic growth. The endogenous growth model that considers an internal variable the Human Capital proposed by Lucas in 1988 and, finally, the neo-vintage model of Romer (1990), differs from the neo-classical models in that in addition to the integration of human capital, it considers that the growth rate of efficiency at work is dependent on the savings of the community.

Lucas's model (1988) used in this research, incorporates the human capital factor and integrates the evaluation of cognitive skills (experience, acquired knowledge, and academic preparation). This is a fundamental pillar for economic growth, unlike the main neoclassical reference Solow-Swan, which takes human capital as an exogenous source that affects per capita income, this model considers human capital as an endogenous source in the equation and important responsible for economic growth (Green, 2008; Gujarati, 2010; Piattini, 2003; Lucas, 1988).

6. Conclusion

Economic shock events that trigger fluctuations in macroeconomic and microeconomic indicators, affect financial systems, and have a direct impact on traditional banking (recruitment and placement). The risk assessment schemes for the granting of credit under the responsibility of the areas of financial risk in multiple banking, want to predict such crisis events, timely limiting the allocation of credit under conflict situations.

Financial risk areas depend on the management of technological projects to have the opportunity of auxiliary technical alternatives in the performance of their functions. More, to attend that in accordance with the provisions of the BIS in 2019 which dictates, through its Basilea agency, to update the models of risk assessment and uncertainty of default and consent to credit. That must be of a monthly nature to preventively determine the level of solvency, and minimize as far as possible, the materialization of risks in the face of short, medium, and long-term crisis periods that may trigger the indicators of delinquency and, therefore, the possibility of failing to comply with the fiscal and economic obligations contracted.

The generation and updating of risk models demand an increase in operational efficiency and good performance of the management tasks of technological projects. In order to ensure the solutions needed by banks to generate and update on time, through correct and accurate calculations. This is the evaluation and rendering of financial accounts, especially those that affect the accounting capital of the institution.

With the inclusion of the flexible management model, cost performance improves by 25%, the time or duration of projects decreases by 10%, the effort in person-hours decreases by 6.2%, and the indicator of cognitive skills based on the success of the projects improves by 26%, solved with the arithmetic mean applied on the data sample.

The impact on economic profitability based on the performance of the level of success of the project, operational efficiency, preventive reserves, and cognitive skills, resulted in a positive impact of 21% weighted, extracted from the arithmetic mean of the values analyzed.

For the forecast of the level of success of the projects managed in the risk area of the Mexican banking institution, a 23% improvement was determined, according to the results obtained in the research.

The flexible model of management of technological projects defined solves the lack of a model that relates the management of technological projects with economic profitability, through the correlational crossing and the incorporation of the evaluation of human capital that gives flexibility to the model based on cognitive skills. It is verified that endogenous or economic growth as expressed in the work carried out by Lucas (1988) is positively related to the proportional variation of the factors that make it up, considering the human capital involved according to their level of experience and knowledge acquired as endogenous. Additionally, it provides a substantial improvement in operational efficiency and in the level of probability of success of technological projects in terms of their management and execution.

7. Recommendations for Future Research

- Study the impact on the organizational structure of the banking institution in case of implementing the flexible model of management of technological projects in the banking sector.
- Analyze the impact if the indicator of technological progress of endogenous growth is added in operational efficiency for the management of technological projects.
- Analyze the impact if the indicator of amount of work of endogenous growth is added in operational efficiency for the management of technological projects.
- Analyze the impact if the indicator of monetary capital of endogenous growth is added on operational efficiency for the management of technological projects.
- Study the effect on the operational efficiency of technology project management and the level of success of projects if floating organizational structures and floating roles were incorporated.
- Analyze the effect if indicators of soft skills (leadership, teamwork, negotiation, communication) are incorporated in the human capital dimension and determine the impact on the flexible model of management of technological projects.
- Study the effect if emotional intelligence indicators are incorporated in the human capital dimension and determine the impact on the flexible model of management of technological projects.

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