Financial tools in a feasibility study of an IT project

LÓPEZ-RAMÍREZ, Lucina Karina*†, HERNÁNDEZ-RAMÍREZ, María Guadalupe, HIDALGO-BAEZA, María del Carmen

Universidad Tecnológica Fidel Velázquez, Calle Emiliano Zapata S/N Col. El Trafico Nicolás Romero Edo. México

Abstract

Proposing an improvement project gains greater certainty when carrying out a financial feasibility study that consists of evaluating aspects of technical, marketing, economic and financial costs. The most important is the financial study, which consists of determining the economic amount necessary to execute the project. Given the different needs, there is also a guideline for the integration of IT in an educational environment and generate changes in the teaching-learning process. Therefore the research arises as part of a project that generates an improvement in the process of justification of student absences for the Fidel Velázquez Technological University (UTFV), which proposes the standardization of the process in 9 academic divisions and to minimize the use of the Paper to print, in a web system.

This article raises, how to obtain financial viability for the development of the mentioned system. To determine if it was viable, the financial tools were used: internal rate of return (IRR), breakeven point, financial statement (income statement). The type of research was qualitative since it worked for six months with a group of students for the generation of the system.

Financial Tools, IT Project, Feasibility Study, Education, technology

---

---

* Correspondence to Author (email: ucinakarinalopez@gmail.com)

† Researcher contributing first author.

Introduction

This article shows the financial tools that are needed to determine the viability of a project in a specific way will focus on an IT project. The financial tools that were obtained are: the Internal Rate of Return (IRR) that consists of the time of investment recovery when it is financed by a bank. The equilibrium point when the income is equal to the expenses ie there is no loss or gain, the income statement being the accounting document where the utility of said project and present value (VP) is obtained, which determines to take our investment to a present moment that will be paid in the future. Financial tools are important because they allow to know the liquidity, solvency, productivity, indebtedness, profitability for a project of information technologies or another area of application.

Justification

The UTFV educational institution carries out COMECYT research projects with students graduated from Information Technology careers.

To know if a project is feasible, viable and profitable, it is necessary to carry out a financial viability study to specify the costs that are needed to start a business, allocation of resources, human, technical, economic and financial in order that in the future they can Make a new business that offers new opportunities as entrepreneurs. Financial viability allows them to determine the initial investment, their units sold, their sources of financing, unit cost and the time of investment recovery, obtaining information to qualify and obtain acceptance or rejection of it..

Problem

In UTFV, in the ICT career students present difficulties:

- When evaluating the financial part of an innovative project.

- Identify the variables that participate in the study.

- Application of formulas in financial viability.

So students have the need to apply these tools when they are presented with the situation of developing an IT project.

Hypotesis

A project is viable and profitable when we apply the tools of a financial study.

Objectives

General objective

Use financial tools that allow decision-making to evaluate the viability of an information technology project.

Specific objectives

- Identify, analyze and evaluate the various financial variables of an IT project.

- Channeling the importance of achieving financial viability in the investigation of a project.

Theoretical framework

The PMBOK guide defines the project as a temporary effort that is carried out to create a unique product, service or result. (Zandhuis, Snijders, & Wuttke, 2014).

On the other hand, (Suárez and Alonso, 2010) defines technology as the science that studies the technical means and processes used in the different branches of industry and business.

Information technology is the science that studies automated techniques and processes that act on data and information.

Computer science comes from the merging of the terms "information" and "automatic", which originally meant the performance of production or management tasks by means of (automatic) machines. (Suárez and Alonso, 2010).

Financial tool The financial analysis tools refer to four factors: investment, financing, dividend decisions and description of the company's financial situation (Münch Galindo, 2006)

Anibal Leon, 2007 in his article "What is education", education is a complex human and cultural process. In order to establish its purpose and its definition, it is necessary to consider the condition and nature of man and of culture as a whole, in its totality, for which each particularity makes sense by its connection and interdependence with others and with the whole.

The viability of the projects is a previous stage that integrates decision making and its subsequent implementation to develop a process of evaluation and self-evaluation to anticipate possible difficulties in the implementation of decisions.

Research Methodology

The research that is presented is under the qualitative approach, to facilitate the understanding of the topics the students were asked about financial concepts, their importance, advantages to synthesize the results obtained and use of the software as shown in table 1.

Tool	CONCEPT	FÓRMULA	IMPORTANCE	ANÁLYSIS	INTERPRETATIÓN	Software use
Tir	X	X	X	X	X	√
Breakeven	X	X	X	X	X	√
Financing	√	√	X	X	X	√
Initial investment	√	√	X	√	√	√
Keys	Si √	No X				

Table 1 Resultado de la observación.

As you can see on the table the students had little knowledge about the use of different financial tools, although if they have a lot of experience in the use of software that allowed them to do a documentary search to make the concepts, their analysis and application.

The research that is presented is under the qualitative approach (where one goes from a reality to be discovered, the natural language is used, one seeks to understand the context and / or the point of view of the social actor) since a study is carried out descriptive in a documentary and field way. The way of working was the review of publications, bibliographic sources.

Kind of investigation

The present investigation was carried out a descriptive study of the financial viability in the development of the project "System for Student Absenteeism"

Theoretical methods

The deductive method was used, considering the particular case to determine the financial viability in relation to the innovation project called "Student Notification System"

Scope of IT for society

The information technologies in a society are of vital importance from the social, political, cultural, economic point of view.

As the modern society evolves the need to expand and spread messages to more people grows, printed media and telecommunication were created, which still belong for their historical and functional significance, others of massive order directed to vast and heterogeneous public that mark the jump from interpersonal communication to that of the masses.

The IT, are modifying education in an admirable way, has changed both the way of teaching and the way of learning and of course the role of the teacher and the student, at the same time they change the learning objectives for the students since they will have to be trained to use, use and produce with the new media.

In addition, the teacher will have to change their communication strategies and assume their role as facilitators of student learning in cooperative environments to help them plan and achieve the objectives.

Three large information and communication systems make ICT a space in the global educational field: video, computer science and telecommunications, which together with a single purpose are valuable tools for the materialization of the knowledge acquired by the student.

"The rapid progress of Information and Communication Technologies modifies the way knowledge is developed, acquired and transmitted" (UNESCO, 1998).

Education must face the challenges posed by the new opportunities opened by technologies, which improve the way of producing, organizing, disseminating, controlling knowledge and accessing knowledge.

Equitable access to these technologies must be guaranteed at all levels of the education systems.

The technologies augur, in the educational field, the progressive disappearance of the restrictions of space and time in teaching and the adoption of a learning model more focused on the student.

At the same time, they favor the commercialization and globalization of Higher Education, as well as a new management model for their organization (Bricall, 2000).

The technological learning environments are effective, comfortable and motivating, and can be worrisome for those who have not dabbled as users in them and / or who do not handle them properly.

In these environments, learning is active, responsible, constructive, intentional, complex, contextual, participatory, interactive and reflective (Kustcher and St.Pierre, 2001), which allows, for those who interact with them, the possibility of taking advantage of them, but they may also have disadvantages due to misuse or decontextualization.

The ease of a project is explained in three areas: economic, social and financial.

Every day, public and private organizations have given themselves to the task of generating projects since it has become a management analysis and tool for strategic planning, they are becoming instruments in decision making.

Competition immersed in markets where consumers seek quality and service in products, companies seek new weapons that allow them to be more productive based on information and knowledge making decisions through allocating more resources and build new businesses.

When international markets arrive, it creates a more exhaustive reflection on the advantage of these, the new reconfiguration when designing and appropriating economic conglomerate operation processes.

The own models of a new economy as well as the vision of the decisions that turn into an atmosphere of competitive globalization together with uncertainty, establish a new way of thinking and managing projects.

Working with projects gives us a broader and fuller sense of project insertion and use of new technology.

It is important to recognize team work among different specialized experts from different areas where they join their efforts to identify, formulate, evaluate, negotiate and carry out projects that are guaranteeing decisions.

An investment generates benefits when studied and analyzed carefully before carrying out the entire process of a project. "Project management" places the situation of these scarce resources by investigating economic and social growth objectives.

When we formulate a project, we review aspects: economic, institutional, financial, technical, legal, environmental policy where resources are set to achieve the objectives.

The economic study examines the behavior of the variables: population growth rate, income levels, price of competitive goods, public service tariffs, consumption subsidies, opening of the external market, employment situation, tax laws, income distribution, etc.

At the conclusion of the market study, the size of the project is assessed by determining skills to reach the final consumer, with these results we start to the next study "the technician" selects the options that are best suited to the particularities.

Characteristics of a project

Establishment of short, medium and long term objectives in quantitative and qualitative terms where measurement mechanisms are used to compare the proposed parameters with those achieved.

The activities are linked to the objectives, so it takes an order from the beginning of the idea to the operation.

Established spatial or geographical location.

Follow up on projects to avoid costly deviations.

Every project must comply with a cycle, whose stages to consider are the following:

Preinvestment (identification, selection, formulation, evaluation, negotiation).

Investment (incorporation of human, physical and financial resources).

Operation (activity already aimed at production or service provision).

Evaluation (analysis and interpretation of information).

Identification of projects

The projects are axes of execution of the plans, since the objectives, policies, strategies, etc. are defined, the task of a project is to provide different ways to solve problems, needs, constraints and opportunities where there are variations that allow the increase of production, effectiveness of the goods and services of the activities of a process.

The identification of a problem starts from a diagnosis

Analysis or evaluation of investment projects

An investment project is a plan where it is determined to produce goods or services being profitable for a society.

On the other hand, the evaluation of an investment project includes the economic profitability where a need is satisfied in an effective, safe and profitable way.

When a project is carried out, three stages are listed:

Feasibility: preliminary study and general project scope.

Prefeasibility: based on an idea, the project and its characteristics are defined.

Feasibility: project execution showing detailed analysis.

When evaluating an investment project we create a structure where we avoid losses during the year, working with scientific bases that support the investment looking for a true scenario for the decision making giving way to execute financial strategies where it reaches an adequate profitability in the opportune time or the rejection of the project.

The first starting point of a project is the collection of information, then the calculation, as well as documents explaining the methodology of the parameters of doing, performing, costing and the benefits as a result of an analysis and assessment to establish a decision of acceptance or rejection.

A decision is based on a study applying a methodology listing all the factors that go into both the cause and effect of the project.

Nowadays an insightful investment requires a principle that argues it. When we carry out a well-organized and evaluated project and the results are positive, there is a need to carry out projects.

When analyzing a project, you can not avoid a risk, there are always events that are not considered controlled or not controlled.

The information that is presented definitively in a project must be reliable, all project information must include fine points in a comprehensive manner, so a document must be made that includes the following variables:

Market study

Determine the need for products and services in a market where the final decision is aimed at determining if market conditions are not an obstacle to carry out a project.

The investigation may consider the following elements:

a) Competition, there are four forces to consider: substitute products, potential competitor, buyers, suppliers.

b) Market: space where supply and demand forces flow where they exchange goods and services.

c) Demand: Quantity of goods and services that consumers are willing to buy.

d) Offer: goods and services that producers make available to the market.

Technical study:

It describes and delimits the fixed assets necessary for the creation of the optimal productive process destined to the progress of the project, using resources effectively and efficiently.

The outstanding elements of the best technical alternative are economic, however, we will also consider the qualitative components. The capacity of adaptation of the technology is different depending on the procedure of the raw material and the base of the levels of production.

Location feasibility

The location of the technology used in the project is paramount in this study. The reasons are the physical restrictions, operating and capital costs of different alternatives associated with each possible location. When we select an excellent location, our results show the maximum performance of the project.

The purpose is to ensure greater profits between different elections that are considered viable.

The components to determine an excellent location are:

a) Means and transportation costs.

b) Availability and cost of labor.

c) Sources of supply.

d) Environmental aspects.

e) Proximity of the market.

f) Costs and availability of markets.

g) Topography of soils.

h) Legal tax structure

i) Availability of water, energy and other supplies.

j) Communications

k) Possibility to get rid of waste.

Economic-financial study

(Baca, 2001) Indicates the best resources to direct the project and obtain the planned benefits. As a rule it is essential that the initial investment always be less than the yield will be obtained.

Financial statements of the project

Accounting satisfies the need for information that can be had by social groups linked to a specific economy whose scope of application is present, past and future knowledge of the economic and financial reality of the company.

Accounting is a dynamic social discipline, its evolution linked to the economic and social development of a society.

Accounting produces information of very different nature and content, which can be as varied as economic life and whose depth depends both on the sources where it is generated and the destination or purpose it is aimed at.

The financial statements have a periodic or recurrent nature means that those interested in the information of the company, have the need to know the result of the activities of the same at a certain time for reasons: legal, economic, financial, fiscal or information management general.

The financial statements are accounting documents that provide information on the financial position, financial performance, its variations and cash flows in a company at a given date in a financial year in a timely, accurate and accurate manner.

When completing the analysis and evaluation of investment projects, it is essential to create a financial representation whose starting point is operations with financial projections that focus on pro-forma financial statements, where they are basically the following:

Initial investment of the project

Enunciate the total of inputs and outputs where the initial costs and expenses of a project are determined. Its components are:

- Tax incentives.

– Costs and initial expenses.

– Net price paid for the capital good.

Project results status

State that shows the income and expenses that you expect to make in the project process.

General Balance of the Project

Evaluates the financial situation in the development of a project, where it establishes current assets and short-term liabilities (working capital).

Cash flow of the project

It reveals in an orderly and detailed manner the entry and exit operations that are expected to be carried out during the life of the project.

Financial evaluation

It perceives the economic and social profitability of a human need in an effective, safe and profitable way to allocate economic resources with the best alternative.

Each study has its own methodology and its peculiarities to adapt to any project. The applicable areas to evaluate the project are:

Installation of a totally new plant.

From the existing plant creating a new product.

Expansion through branches, or expansion of installed capacity.

Replacement of machinery due to obsolescence or insufficient capacity.

Budget

It is a short or long term planning tool where monetary units are expressed, sales, forecasts, costs, production requirements, etc.

Financial reasons

They are financial tools that allow us to analyze and interpret information contained in the financial statements. These reasons are divided into static, dynamic and mixed:

– Static:

– Dinamicas

– Mixed

The most common financial reasons to evaluate a project are:

Solvency ratio = (Total Assets) / (Total Liabilities)

Liquidity Ratio = liquid assets / short-term liabilities

Working capital ratio = current assets / short-term liabilities.

Net margin = Net income / Net Sales

ROI (Return on investment) = Net Income / Total Assets

ROE (Return on equit) = Net income / Equity

Methods of evaluation of an investment Project.

When we apply evaluation methods in a project immediately we know if a project is approved or rejected, the most common techniques are:

Recovery period: Determines the time necessary for the project to generate sufficient resources to recover the initial investment. This is worked from cash flows.

Advantage:

- Exactly the time in which the investment is recovered is known.

- It is easily calculated.

Disadvantages:

- Does not take into account the value of money over time.

- Does not consider the cash flows generated after the recovery period and thus discards projects that are highly profitable.

Discounted recovery period: evaluates the number of years that the company needs to recover the original investment with the difference of the previous one that it takes the future cash flows and brings them to the present at a discount rate.

Advantage:

- Exactly the time in which the investment is recovered is known.

- It is easily calculated.

Disadvantages:

It does not consider the cash flows generated after the recovery period and thus discards projects that are very profitable.

- Net present value method: To carry out this method, the present value of the net cash flows expected from an investment is obtained, discounted from the cost of capital and the initial cost of project disbursement is subtracted. If the present value is positive, the project must be positive otherwise it must be rejected.

- Internal rate of return or IRR method: It is the interest rate that is equal to the present value of the cash flows expected for the future or income with the initial cost of disbursement.

To evaluate the project, the IRR of the project must be compared with the capital cost rate. If the IRR is greater than the capital cost rate, the project is accepted if it is not rejected....

Advantage:

Consider the value of money over time.

Disadvantages:

- It does not work if there are negative cash flows in the project.

- The variations suffered by the IRR year after year.

The most common methods of evaluating profitability are the following:

- Rate of return on the original investment (iROI).

- Rate of return on average investment (iRIP)

- Present value (VP)

- Internal rate of return ®.

- Repayment time (nR)

The rate of return on investment (ROI) is usually expressed as a percentage. The annual net profit divided by the initial total investment represents the fraction that, multiplied by 100, is known as the percentage return on the investment. The usual procedure is to find the return on the original total investment, with the numerator being the value of the average net profit based on the formula:

$$ROI = \left[\frac{Ingresos - Gastos}{Gastos}\right] * 100$$

Y de esta manera la tasa de retorno sobre la inversión original, iROI, será:

However, due to the depreciation of the equipment during its useful life, it is often convenient to refer the estimated return rate to the average investment over the life of the project. The average investment (IP) is calculated as:

Being VLk = value of books in year k.

The rate of return on the original investment (iROI) is also known as the engineer's method, while the rate of return on average investment (ic) is a method preferred by accountants.

These methods give "point values" that are applicable to a particular year or to some chosen "average" year. They do not take inflation into account, nor the time value of money.

Present Value (VP) This method compares the present values (VP) of all cash flows with the original investment. It assumes equal opportunities for the re-investment of cash flows at a pre-assigned interest rate. This rate can be taken as the average value of the rate of return that the company obtains with its capital or it can be designated as the minimum acceptable return for the project. The present value of the project is equal to the difference between the present value of the annual funds flows and the initial investment. The net present value is a single amount referred to time zero and represents a reward if it is positive, or a failure if it is negative, for an interest rate chosen. Formula:

$$VP = \frac{VF}{(1 + i^n)}$$

Internal Rate of Return (IRR) This method takes into account the value of the money invested over time and is based on the part of the investment that has not been recovered at the end of each year during the useful life of the project.

A trial and error procedure is used to establish the interest rate that should be applied annually to the cash flow in such a way that the original investment is reduced to zero (or to the sale value plus land plus working capital) during the useful life of the project.

Therefore, the rate of return obtained is equivalent to the maximum interest rate that could be paid to obtain the money necessary to finance the investment and have it fully paid at the end of the useful life of the project.

Consequently, this method specifies the present value of all cash flows equal to zero and the internal rate of return, r, is calculated by trial and error. Formula

$$TIR = \sum_{T=0}^{n} \frac{Fn}{1 + i} = 0$$

Repayment time (Nr) It is defined as the minimum period of time theoretically necessary to recover the original investment in the form of the cash flows of the project. Generally, the original investment means only the initial depreciable fixed investment.

Formula:

$$PR = a + (^{b - c}/_d)$$

Where:

a = previous year immediately after the investment is recovered.

b = initial investment.

c = sum of previous cash flows.

d = FNE of the year in which the investment is satisfied.

Balance point: It is a method that organizes and presents the items of income and expenses of a company in the short term.

The economic charts of production show the costs, sales, profits that will vary according to the level of production, while other factors remain constant. These evaluations do not take into account the temporary value of the money and it is accepted that the data used for the decisions are reliable.

Results

A project must be viewed with a multidisciplinary approach since it requires not only software development. The phase of project initiation and planning are the priority stages for the development of projects in any area. The viability of the project allows the decision to carry out the project or not, these activities must be developed independently of the area of application.

IT students must assume the role of project leader knowing and understanding the financial tools to apply them, in the development of projects in the productive sector and services. With this project the students were able to understand each indicator or variable of the formulas that are applicable to calculate the financial viability, which could be verified through the Excel office tool.

The results obtained from the internal rate of return (IRR) and equilibrium point are shown in table 2 and 3.

	Cálculo de la TIR			
Datos	Inversión inicial	Ingresos	Valor salvamento	Periodo de análisis
	$ 139,781.00	$288,000.00	$ 11,289.00	3

$$P= A \left[\frac{(1+i)n-1}{i(1+i)n}\right] + \frac{VS}{(1+i)s}$$

$$139,781= 288,000 \left[\frac{(1+i)3-1}{i(1+i)3}\right] + \frac{11,289}{(1+i)3}$$

139,781	30564	(1+.10)3-1	11289
		.10(1+.10)3	(1+.10)3

TIR:	17.95%

Table 2 Calculation of the rate of return

f=P(1+i)ⁿ				TASA MENSUAL	TASA ANUAL
f=132000(1+0.336)3		$ 314,769.98		1.012	1.3846

año	interes	pago fin de año	deuda despues del pago		
0	0	0	$ 132,000.00		
1	$44,352.00	$ 44,352.00	$ 87,648.00		
2	$44,352.00	$ 44,352.00	$ 43,296.00		
3	$44,352.00	$ 44,352.00	-$ 1,056.00		

$$A= P \left[\frac{i(1+1)n}{i(1+i)-1}\right] \qquad A= P \frac{0.336(1+0.336)3}{(1+0.336)3-1}$$

132000[0.336(1+0.336)3

		0.73089701	96478.40532	8039.86711

año	interes	pago de fin de año	pago principal	deuda despues del pago	
0	0	0	0	$ 132,000.00	
1	$44,352.00	96478.40532	$ 52,126.41	$ 79,873.59	
2	$26,837.53	96478.40532	$ 69,640.88	$ 10,232.72	
3	$ 3,438.19	96478.40532	$ 93,040.21	$ -	

Table 3 Financing calculation.

Conclusions

The aim was to use financial tools such as: the equilibrium point where, adding up fixed and variable costs and equaling income in the third year, the company will not lose or win then report utility. The internal rate of return (IRR) of 17.95% was calculated, being recoverable in five years within the margin of acceptance in a project.

LÓPEZ-RAMÍREZ, Lucina Karina, HERNÁNDEZ-RAMÍREZ, María Guadalupe, HIDALGO-BAEZA, María del Carmen. Financial tools in a feasibility study of an IT project. Journal-Economic Systems 2017

The financing obtained with the 3% rate on the acquired loan will be paid in the third year.

The project "Reporting System of Student Absences" can be made considering an initial investment of $ 133,381.00 for the manufacturing of the system, providing profitability and successfully commercializing it.

References

Baca, G. (2001). *Evaluación de proyectos.* México: Mc Graw Hill

Findster. (2016). *Master Magazine*. Recuperado el 17 de 07 de 2017, de Master Magazine: https://www.mastermagazine.info/termino/5172.php

Münch Galindo, L. (2006). *Fundamentos de Administración.* Méxco: Trillas.

Zandhuis, A., Snijders, P., & Wuttke, T. (2014). *El Compañero de Bolsillo de la Guía del PMBOK* . Van Haren Publishing.