

“Feasibility study for the creation of a physical therapy center for pregnant women”

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Abstract.

Every organization is in the obligation to improve, renew or introduce, new tangible fixed actives to guarantee their presence in the market. These substantial modifications will undoubtedly require an amount of capital that will be transformed into technologies, raw materials, human resources, or other goods. For this it must have security if this performed process will be viable economically or not; besides knowing in advance the possible results of the investment.

Due to the importance that is before raised in the performance of the organizations, this present research was made with the objective to know the economic feasibility in the opening of a center of physical therapy for pregnant women within the city of Ibarra. Demonstrating its effectiveness to support the decision making process, and resulting that the project would be cost-effective and sustainable through the evaluation indicators, NPV \$35.399, 83; IRR 23%; Cost-Benefit ratio \$2.74.

To achieve the proposed objective, the application of various methods was required, which include: historical - logical, analytical - synthetic, empirical, statistical, etc.

Keywords

Feasibility study, financial administration, Economic risk, Internal Rate of Return, Net Present Value, Cost benefit ratio, payback period.

1. Introduction

The company is an organization that presents constant changes in all aspects that influence its development, this is due to the increase in the existing competitiveness that makes every day the demand of companies is expanded; this has been marked by entrepreneurship and initiative in people for the offer of products and services which go beyond what is expected by customers, seeking added value to maintain

their position in the market, is therefore the need to carry out an exhaustive analysis prior to the creation of the business which allows to know the development, solidity and sustainability of the same over time.

Finance is the essential part of the business since it is in charge of administration to ensure a secure future, it is done through financial indicators that contains a feasibility study, which reduces the risk of a failure in an investment.

When creating a new company it is necessary to take into account all the important aspects that influence it, especially the financial investment, since it will depend on this, the recovery of capital in the short, medium or long term. However, it must be taken into account that when creating a new business, not only do the owners benefit from the reimbursement of their investment, but also provides well-being to women who wish to lead a safe and healthy pregnancy, at the same time, open doors to people in need of remuneration, that is, new sources of employment are being generated, thus moving the country's economy.

Under the above mentioned, it has been considered to carry out a feasibility study for the creation of a physical therapy center for pregnant women in order to know whether or not this need exists in the city of Ibarra. This study is designed specifically for those women who are in the gestation stage that belong to the city of Ibarra, which will be determined as our population in the development of research.

2. Materials and Methods

Taking into account the analyzes of the financial administration, the elements that comprise it and its diverse approaches; the procedure that is used to carry out the feasibility study is detailed. This procedure consists of two phases and six stages:

Phase 1: Pre-feasibility study of the investment project.

The development of this stage will provide preliminary information on the proposed investment process to locate the researcher in what the investment consists of, how it originated, the financial and strategic situation of the entrepreneur. The key aspects to consider are:

Stage 1: Analysis of the opportunity of the product or service

- **Background.** Analysis of economic, commercial, ecological, social factors, etc., which determine the need for investment.
- **Characterization.** General information about the proposed investment, which defines the characteristics of the tourist facility, such as: location, installation's type, category, capacity, etc. In the case of accommodation facilities, the number of floors must be expressed.

Stage 2: Diagnosis of strategic positioning

- **Construction of the SWOT matrix.** This analysis covers the study of strategic factors, usually difficult to quantify, but to a certain extent will mark the qualitative position in which the investor is. The analysis is essentially qualitative, so you should add good doses of common sense. At this stage, the influence of internal and external factors for the investment project will be analyzed
- **Analysis of the financial situation.** In this respect, it is established through financial analysis to what extent the system generates money, as well as what elements impede its development

Phase 2: Evaluation of the investment project

This analysis covers four fundamental stages with the objective of obtaining and analyzing the information necessary for the evaluation of the investment project through valuation indicators. In order to comply with this objective, the following questions should be considered:

What types of products or services will be offered, characteristics of those that differentiate them from the competition, which market will penetrate, location, number of units to produce or market in a year, forms of distribution, unit selling price per product Or service, volume of possible revenue to be obtained for each product or service? Specific issues that allow to estimate the income in the duration of the project.

What resources do you really need, whether material, technological, human or financial, whether to buy new, suppliers, labor market, the opportunity of these, how much individually cost your acquisition?

Elemental issues that allow to estimate the costs of the project.

• Market Study

Objective: To estimate the magnitude of sales.

This study is done to obtain a fairly approximate notion of the variable demand, which later, for research interest will be transformed into income. From this analysis you will get a very useful parameter that is the cash flow or Cash Flow.

• Technical study

Objective: To define the operational conditions (technical) for the manufacture of the product or service. This study is done to obtain a fairly approximate notion of the Bid indicator to satisfy the Demand estimated in the previous stage. The information obtained associated with the capacity, later, for research interests, will be transformed into Costs and Assets.

At this stage it is very important to give answers to a considerable number of questions such as:

Who are the suppliers of raw materials, inputs, technology for each product? Classify them in A, B and C according to the level of guarantee of the supplies what difficulties could arise with supplies (type of supply) that endangers the project? How are they going to counter it? What is the capacity needed to install and the plant to guarantee the supply, work days per year and fertility level? How the maintenance plan of the project is conceived annually, both for the constructive part and for productive equipment, average duration time?

• Economic and Financial Evaluation

Objective: to analyze the basic economic attributes of the project: liquidity, profitability and economic risk.

From the economic analysis the corresponding economic evaluation is obtained as a result. At this point it is important to emphasize that the economic analysis must always be carried out in the first place without considering other people's finances. That is, it is simulated that the project is financed only with its own resources. This approach aims to determine whether the investment project is good or bad in itself

Determination of cash flow. Defined as the movement of funds for project operations, it is calculated as:

Cash Flow = Generated funds – Absorbed funds

Where:

Temporal horizon. It is an estimate that is made for the purposes of analyzing the useful life of the investment project.

Absorbed funds. It is calculated as:

Absorbed funds = Investment in Fixed + Investment in Current

Generated funds . It is calculated as :

Generated funds = Net Income (after tax) + Amortization

Once the project's cash flow has been known over the time horizon, its economic evaluation is based on the three economic attributes of the project: liquidity, profitability and economic risk.

Calculation of Liquidity. It is the project's ability to turn your assets into money without incurring principal losses. Which is measured as:

- **Payback period average**

$$\text{Payback period average} = \frac{\text{Initial investment}}{\text{Average cash inflow}}$$

Where:

$$\text{Average cash inflow} = \frac{\sum_{i=1}^n \text{Cash Flow}}{\text{years of project life}}$$

Payback period real. It is based on the accumulation of cash inflows to match the initial investment.

Decision criterion: The lower the Payback period, the better the project. It is convenient to compare it with similar projects in the market.

Calculation of Profitability. It is the ability of the project to generate surplus or return to the investor. The most commonly used profitability criteria are explained below.

Gross surplus. It is the total gain of the project in monetary terms. It is calculated as:

$$\text{Gross surplus} = \sum_{i=1}^n \text{Cash Flow} - \text{Initial investment}$$

Decision criterion: a project will be more profitable the greater it's gross surplus. Logically this must be greater than zero.

Net Present Value (NPV).

This indicator differs from the previous one in that it incorporates the chronological value of the money in the calculation, applying the updating of the flows of the future periods to bring them all to the present moment. In this way, all flows will be in pesos of the same year and can be added. The expression would be:

$$\text{NPV} = \sum_{i=0}^n \frac{\text{Cash flow}}{(1+k)^i} - \text{II}$$

Donde:

K is the discount rate, discount or the apparent opportunity cost of money for the investor and is determined as:

$$k = k_{\text{OR}} \left(\frac{\text{own resources (OR)}}{\text{OR} + \text{ER}} \right) + k_{\text{ER}}(1 - \text{Tax type}) \left(\frac{\text{external Resources (ER)}}{\text{OR} + \text{ER}} \right)$$

Donde:

$$k_{\text{OR}} = k_{\text{risk free}} + \text{risk premium}$$

Decision criterion: A project is considered feasible when the NPV is greater or much greater than zero.

Cost-Benefit ratio (R B/C).

It results in the updated cash flow that is obtained per monetary unit of initial investment, can be expressed as:

$$R_{B/C} = \frac{\sum_{i=1}^n \frac{\text{Cash Flow}}{(1+k)^i}}{\text{Initial investment}}$$

Decision criterion: The project is feasible when $R B / C \geq 1$.

Internal Rate of Return (IRR).

It is the compound interest rate that repays the project over the time horizon. The IRR expresses the percentage return obtained from the invested capital.

Decision criterion: a project is feasible if the IRR is greater than or equal to the cost of capital (k).

Economic Risk: The apparent accuracy of the results obtained in the economic analysis may be unrealistic since the mathematical rigor employed is based on a series of hypotheses. Usually, we want to know the probability of a catastrophic outcome for the projected investment.

- **Organizational Study**

Objective: To carry out the programming and organization of the project activities.

It specifies in more detail the project plan, in which a detailed list of the project activities and their duration, which is called the structure of the work breakdown, cannot be lacking. Finally, project staff are assigned to individual activities. In addition, work shifts must be taken into account. Training needs should also be assessed at different levels and during project stages.

3. Results

The following procedure is described below:

Phase 1: Pre-feasibility study of the investment project.

Stage 1: Analysis of the opportunity of the service

The need for pregnant women for good medical care and good care during their gestation process has advanced in recent years. The Mom & Baby physical therapy center aims to satisfy and meet the needs of pregnant mothers by obtaining moral, physical and psychological support through the different services provided.

For the center to start working optimally, it will be necessary to implement and acquire furniture, equipment, office supplies and materials necessary to effectively and efficiently execute each of the services for a set time according to each need.

The location of the physical therapy center aims to be accessible to people, especially pregnant mothers for their comfort; for which it has a property in the streets Puerto Rico and Juan Martinez de Orbe. This sector is considered a very quiet and especially spacious place to achieve what was expected. The present investment project seeks to satisfy the needs of future moms, as well as take care of their wellbeing.

Characterization of Investment

The implementation of the physical therapy center arises with the idea of satisfying needs of society and generating new sources of employment, thus being a private, independent and lucrative business for its owner.

Stage 2: Diagnosis of strategic positioning

In this stage of the project being a company in the process of creation there is no historical background or reference in which the researcher can base and build the SWOT matrix and thus visualize its strategic position in the environment, however for possible analysis the elaboration of the AOR matrix was applied.

Construction of the matrix AOR

Because it is not an existing company, the aforementioned matrix has been developed. This matrix is made for companies in the process of creation.

Table 1 Matrix AOR

ALLIES	OPPONENTS
<ul style="list-style-type: none"> • Ability to meet the needs of customers. • Pregnant women who require a rehabilitation and physical therapy center. • Highly qualified professionals will provide personalized service. • Financial institutions support development by granting loans for micro-enterprise entrepreneurship. 	<ul style="list-style-type: none"> • The new techniques of rehabilitation and technologies that advance day by day. • Clinics that provide similar services inside and outside the city. • Uncertainty in the recovery of investment, which would discourage potential investors. • Lack of collaboration of institutions in providing guidance.

OPPORTUNITIES	RISK
<ul style="list-style-type: none"> • Optimum use of the assets and infrastructure of the rehabilitation center. • Possibility of extending the line of services in the long term. • Possibility of entering other local markets in the long term. • High statistical indexes of pregnancy. 	<ul style="list-style-type: none"> • Introduction of similar companies in the market. • Lack of backing from a recognized brand. • High initial investment. • The labor instability of families.

Phase 2: Evaluation of the investment project

Stage 3: Market Study

Service Identification

The center for physical therapy and rehabilitation for pregnant women "Mom & Baby" is intended to meet the needs and expectations that occur before, during and after pregnancy through the provision of services such as prenatal courses, talks with the pregnant couple, relaxation massages, and preparation exercises for and after childbirth, courses and talks after childbirth, baby care, among others. Each one of them destined and destined to satisfy the needs that they have, the provision of the different services, will be made through trained and updated personnel in knowledge related to women, especially those that are in gestation.

Sample size

For the calculation of the sample, the data obtained at the Hospital San Vicente de Paul and the Hospital IESS of the city of Ibarra were taken as reference; starting from this information, the information was organized, as shown in the following table:

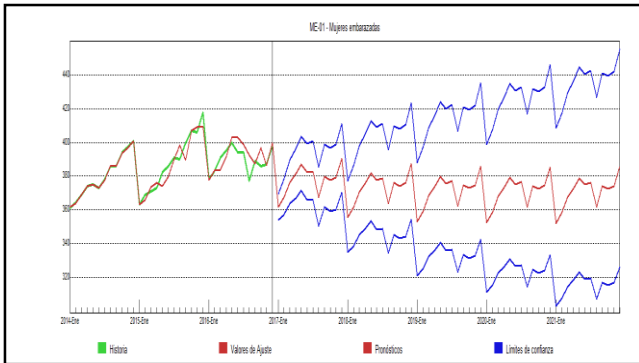
Table 2 Total population

Hospitales	Población
IESS hospital year 2014	1.037
IESS hospital year 2015	1.362
IESS hospital year 2016	1.330
San Vicente de Paul hospital year 2013	3.389
San Vicente de Paul hospital year 2014	3.500
San Vicente de Paul hospital year 2015	3.292
San Vicente de Paul hospital year 2016	3.324

With the information obtained, we proceeded to use this information to obtain data projected for the following

years with the support of professional software Forecast pro:

Graph 1 Forecast for the calculation of the sample



Market Segment

The population to which the project is addressed is all pregnant mothers who will use the different services provided by the "Mom & Baby" rehabilitation center, taking as a reference the total number of people who were given the poll.

Target market = $(334/355) = 0,94$

Identification of the Demand

For the identification of the demand has taken into account the possible users of pregnant women according to the application of the software forecast pro, the affirmative answers obtained in the surveys and in the market segment as shown in the following table:

The target audience using the 0.94 is multiplied by each of the forecast data in the month corresponding to the projection of each year.

Identification of the Offer

It is the capacity to cover monthly the different needs of the users of the rehabilitation center, i.e. the capacity that the rehabilitation center can cover according to its infrastructure, financial and human resources.

The following calculations have been carried out:

Taking into account the demand that counts, a pessimistic scenario has been chosen in which 30% is used for 2017, 50% for 2018, 70% for 2019 and 75% for the remaining years of the monthly demand.

Price analysis

In the analysis of prices and for the fixing of the same, the responses obtained in the survey have been taken into account, as well as the observation in a clinic located in the

Quito's city that provides similar services, allowing to establish a cost pattern for each Service that is previously established.

That is to say that with the answers obtained both in the survey and in the observation, the process that was carried out is to set a cost which will be below the value set by the competition and the survey, which will allow to cover the expenses that are necessary.

Determination of income

To determine the income, the coefficient obtained in the surveys was multiplied by the annual supply. This will allow us to know the number of people who would use for each service. After obtaining this result multiplied by the price of each service obtaining the annual income.

Table 3 Revenue per sale per year

PRICE OF SERVICE	YEAR 2017	YEAR 2018	YEAR 2019	YEAR 2020	YEAR 2021
\$35.00	14 457	23 824	33 197	35 505	35 481
\$30.00	3 671	6 050	8 431	9 017	9 011
\$50.00	17 593	28 992	40 399	43 207	43 178
\$30.00	8 376	13 803	19 233	20 570	20 556
\$40.00	4 436	7 311	10 187	10 895	10 888
Total	48 535	79 982	111 450	119 196	119 116

Stage 4: Technical Study

Macro location

The rehabilitation center for pregnant women "Mom & Baby" will be located in Ecuador Country, in the province of Imbabura.

Micro location

The rehabilitation center for pregnant women "Mom & Baby" will be located in the province of Imbabura, Ibarra city in the following direction Ciudadela el chofer II Etapa in the Streets Puerto Rico S / N and Juan Martinez de Orbe, since the entrepreneur of the project through their families in this case their parents are the ones who have the premises that will be used for that purpose, for reasons stated above will save rental costs. This place has been taken into account since it is located on the side of the city center and that being located in this point is near both the hospital of the IESS and

Hospital San Vicente de Paul, the place where it will be located is quiet and with a low level of auditory pollution.

Project Engineering

For the development of the activities of the "Mom & Baby" Rehabilitation Center, it will be necessary to make some physical adjustments to the place, which will be carried out by trained personnel in the area. After having consulted and explained the work, and in coordination with the architect and carpenter in charge of construction, they gave a total cost of \$ 4854.8.

Selection of suppliers

For the selection of suppliers, quality, price, guarantee and geographical location will be taken into account in order to establish commercial relationships that facilitate the acquisition of their products, services, inputs and raw materials. These factors will influence the cost of acquisition i.e. wholesale and direct purchase without intermediaries.

To start, the payment will be made in cash to avoid indebtedness.

Physical therapy center service process for pregnant women.

The service is intended to provide two fundamental processes: Process of purchase of raw materials and inputs and the provision of different services. A work regime is established from Monday to Saturday to provide the service. The process that will be carried out with each client is the explanation of the services offered, if it is arrived at according to the selection of the service, the price, the schedule and the form of payment; The client's data will be entered and a medical record will be generated, otherwise the customer will leave the customer and continue with the next customer.

The expenses associated with opening the business are: fixed assets \$ 2,365.68; Raw material and supplies (work object) \$ 1374, 80; the labor force \$ 46,654.00, and other expenses \$ 5,587.00 for the year 2017.

Stage 5: Financial evaluation of the investment Project

The data presented in this step, result from the preceding stages. The following table presents the different sales volumes, the different costs estimated according to the demand forecast, resulting in cash flows corresponding to five years of useful life.

Table 4 Projected Income Statement

DESCRIPTION	YEAR				
	2017	2018	2019	2020	2021
Income or sales	48.535	79.982	111.450	119.196	119.116
TOTAL OPERATING INCOME	48.535	79.982	111.450	119.196	119.116
(-) SERVICE COSTS	31.019	31.821	31.821	31.821	31.821
GROSS INCOME	17.516	48.160	79.628	87.374	87.294
(-) EXPENSES					
Administrative expenses	22.421	23.871	23.871	23.871	23.871
Selling expenses	175.00	65.00	65.00	65.00	65.00
Depreciation	2.365	2.365	2.365	2.365	2.365
TOTAL SPENDS	24.961	26.301	26.301	26.301	26.301
OPERATIONAL UTILITY	-7.445	21.858	53.326	61.073	60.992
(-) Financial expenses	10.109	10.109	10.109	10.109	10.109
Payment of Capital	6.240	6.872	7.568	8.335	9.180
Interest payment	3.869	3.237	2.541	1.774	929.93
UTILITY BEFORE TAXES	-17.555	11.748	43.216	50.963	50.882
(-) 15% Participati on Workers	0.00	1.762	6.482	7.644	7.632
INCOME BEFORE INCOME TAX	-17.555	9.986	36.734	43.318	43.250
(-) Income tax	0.00	2.197	8.081	9.530	9.515
NET PROFIT	-17.555	7.789	28.652	33.788	33.735

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Calculation of Liquidity

- **Payback period of money over time.**

Payback period= (Initial Investment)/ (average entry of cash)

$$\text{Payback period} = (20\ 325.75) / (17\ 282.10)$$

Payback period = **1.1761**

That is to say that the recovery of the invested capital will be from 1 year, 2 months.

Cost effectiveness

- **Surplus**

$$\text{Surplus} = -20\ 325.75 + 86\ 410.50 = \$\ 66\ 410.50$$

- **Net Present Value (NPV)**

In the elaboration of the NPV the flows obtained in the income statement were updated, using the annual interest rate that the bank charged for the loan of the money.

Annual interest rate = Capital cost (Ck) = 10, 13%.

$$\text{NPV} = -20\ 325 + \left(\frac{-15.940.79}{(1.10)^1} + \frac{6.422.38}{(1.10)^2} + \frac{21.451.06}{(1.10)^3} + \frac{22.969.29}{(1.10)^4} + \frac{20.823.64}{(1.10)^5} \right)$$

NPV= **\$35.399, 83**

- **Cost-Benefit ratio**

$$\text{RB/C} = \$\ 55.725,58 / \$\ 20.325,75$$

RB/C = **\$2,741625016**

Therefore of the result obtained the benefit is greater than one, the project is acceptable; that is to say that for every dollar that is invested it is expected to recover 2.74 dollars.

- **Internal Rate of Return (IRR)**

In the development of the TIR used the formula that makes Microsoft Excel available resulting in 28%, which means that the project is viable.

Economic risk.

For the analysis of this aspect of financial evaluation, we have taken into account the values obtained since the market study, without forgetting that a pessimistic scenario was set in the determination of the expected sales, and in the percentage of population that would be expected Obtain by potential users. Therefore financial indicators such as NPV, IRR, Rb / c, are on the pessimistic scenario and it would not be necessary to recalculate new scenarios, since the results obtained in the study determine that the project is economically viable.

The project will be accepted if:

$$\text{NPV} > 0$$

$$\text{RB/C} > 1$$

$$\text{IRR} > 10\%$$

$$\text{Payback Period} < 5 \text{ years}$$

The Decision Indicators of the Investment project are as follows:

$$\text{NPV} \quad \$35.399,83$$

$$\text{R B/C} \quad \$2,74$$

$$\text{IRR} \quad 23\%$$

$$\text{Payback Period} \quad 1.1761$$

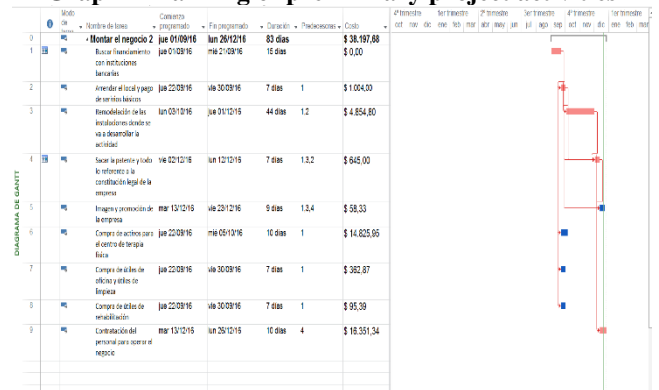
Therefore, according to the evaluation criteria for the opening of the Physical Therapy Center for Pregnant Women should be accepted.

Stage 6. Organizational Study

Scheduling project activities

To get a fairly close idea about the duration of the project, it has been decided to analyze the different activities that are required to start, that is, to know the activities that will be necessary to start the business. For this purpose it has been decided to use the Microsoft Project computer package, which will show the relationship between the activities among themselves, the costs involved in each one of them and the duration of the same as shown below.

Graph 2 Planning of preliminary project activities



This preliminary work is based on the estimated time for the preparation of the project in 83 days, which represents two months and 23 more days, at a cost of \$ 38,197.68.

Organizational strategy

The mission, vision, objectives, values and structure of the organization were designed. It also considered the legal framework necessary to take into account in the business as laws, regulations and codes.

4. Conclusions

There is a theoretical-conceptual basis on feasibility studies for the evaluation of investor processes. From the reviewed and studied procedures, market, engineering, organizational, and financial evaluation of the project as a final result of these studies are evidenced as a common factor.

The procedure chosen (Machado Orges 2016) to evaluate the feasibility of the business idea in the development of the research, constitutes an instrument that allows to solve the technical-professional problem formulated, due to its easy application.

The application of the selected tool allows to determine the feasibility of being able to carry out the opening of the physical therapy home for pregnant women in the city of Ibarra.

Author

Karen BENAVIDES was born in Ibarra, Imbabura, on August 2, 1992. She completed her primary studies at the “Unidad Educativa Particular Nuestra Señora de Fátima”, and later her secondary studies at the “Nacional Ibarra” School.

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It has several training certificates: **Management of public procurement portal. Good manufacturing practices. Training of internal auditors in Quality Management System. French course and approved the sufficiency of English in the Illinois English School occupational center.**

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