INVESTMENT SELECTION CRITERIA: CONSIDERATING RISK AND SOCIAL IMPACT THROUGHT THE SROI (SOCIAL RETURN ON INVESTMENT)

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The classical investment assessment criteria and the emergence of new methods have been addressed in this paper. These are responsible for measuring the social impact caused by investments, to study whether they are substitutes or can be complementary. All this is materialized in a case study where NPV criterion is implemented with the SROI for the same investment and it was found that they do not have to reach the same result. The person in charge of making the decision regarding investment will study the case to decide what is more convenient for the company, ensure profitability saving investment, or do it with an NPV close to 0 or even negative in exchange for creating value in society that indirectly impact positively on the future of the company.

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1. INTRODUCTION 1
2. METHODS OF INVESTMENT VALUATION 3
2.1 Static methods 3
2.2 Dynamic methods 3
3. MAIN VARIABLES TO MEASURE AN INVESTMENT 6
3.1 Net Cash Flows 6
3.2. The discount rate 7
4. INTRODUCTION OF RISK IN INVESTMENT ANALYSIS 9
4.1. The adjustment of the discount rate 9
4.2. Certainty equivalents 9
4.3. Introduction of risk by the expected value and variance of NPV 10
4.4. Sensitivity analysis 12
4.5. Scenario analysis 13
5. SOCIAL INVESTMENT 14
5.1 Impact investing 14
6. THE SROI METHOD 16
6.1 Principles of SROI method 18
6.2 Limitations of the SROI method 18
7. PRACTICAL IMPLEMENTATION 19
7.1 Classical selection criteria for investments: the NPV 20
7.2 SROI Method 22
9. CONCLUSION 26
10. REFERENCES 27

1. INTRODUCTION

According to Masse (1964), an investment is defined as the action by which the change of immediate and definite satisfaction which is renounced takes place. This happens against the hope that is acquired and that the invested good is the support. Accordingly, companies are willing to make a short-term sacrifice to obtain greater future profitability.

All companies were born from an investment and evolve through investments. Nowadays, the need for investment is essential for any company since the economic situation punishes those unproductive businesses.

The importance of investment is latent, but not all investments must be positive. An investment can bring high-value returns for the company, but it can also happen that its implementation involves not recouping the investments and, therefore, the investment result is negative.

There are several models of valuation of investments to assist in the decision whether or not to undertake investment. These models are divided into two main groups: static and dynamic. The difference between these two groups lies in the consideration of the time value of money. While the dynamic group considers this factor, the static one does not take it into account. This is a great advantage for dynamic methods since they are more closely adapted to reality.

Within the dynamic methods, the most used are the Net Present Value calculation (NPV) and the Internal Rate of Return (IRR), especially, according to Harvey and Graham (2002), nearly 75% of companies use both methods to assess their investment projects. But, as we will see, these methods are not the same for all enterprises, since the responsibility for its production is the responsible for introducing the risk parameters, which can produce a variation in the result of the same investment, depending on its development and, in turn, it is one of the major drawbacks of these methods.

As mentioned, it is understood that the sole purpose of the investment is to obtain a financial benefit. However, particularly in the last few years, the need to assess the social impact which involves an investment and possible ways to quantify it emerges with the public sector cutbacks in social services because they are not economically profitable. It must be reminded that one of the objectives of the public company is to undertake investments that, although they may not be profitable, involve a social benefit. But the public company is not only the main interested in assessing the social impact, since the private enterprise also needs to communicate the benefits created in society to enhance their corporate image, which in turn is beneficial for the company. So, in this case, it minds the difference between money balances and, in addition, an extra benefit that should be included when making a social investment, which will contribute to social good created with the investment. Thus, new investment valuation models are born, which not only give response to the economic viability of an investment, but they offer other complementary, together with the profitability data, which does not have to reach the same decision as the first one, on whether to undertake or not the investment, which will collect the amount of social benefit created.

Although there are several models to quantify the social return on investment, the most widespread is the SROI (Social Return On Investment) method.

The aim of this study is to analyze the various tools which are available for the chief financial officer (CFO) to calculate the profitability that will entail an investment. The main criteria for evaluating investments - the classics and in the case of social investment, the SROI model – are analyzed. Moreover, we will discuss which are the advantages and disadvantages of each of the methods.

There is a practical part in which a public investment consisting of the implementation of a train network from Castellón to Vinaroz. This part is important to record the difference between the different criteria previously selected. Based on this investment, we can observe the use of the main methods for selecting investments and the difference between the results of the classical criteria of investment selection against the SROI model is analyzed.

In order to achieve the objective of the work, this will be divided into three groups. In the first group, the main valuations of classic investments are analyzed, among which the NPV and IRR should be highlighted because they allow to be adjusted for the risk of the operation. We will go into these two criteria in depth, on the one hand, analyzing its main variables, net cash flows, and the discount rate. On the other hand, the main methods used to introduce risk for those selection criteria for investments are analyzed: the discount rate adjustment, certainty equivalents, statistical methods, sensitivity analysis and scenario approach. With all this described, the operation of the major classical criteria for investment selection is intended to be explained. Secondly, the method of valuation of investments is explained from the point of view of the social impact created. In this sense, the SROI method is explained, which is able to quantify the impact that an investment can create in society. The third large block of this paper implements the different methods of valuation of investment explained, making the theoretical foundations that have been described previously more visible.

This paper tries to clarify that, coexisting with the classical selection criteria, which are essential when analyzing any investment, a new one called SROI appears and rapidly expanding in this field, which does not try to be a new criterion to displace the previous, but become a complementary selection approach to the existing, which provides extra information about the investment, either to justify its realization with negative returns or to improve the stakeholders-facing image of the company .

2. METHODS OF INVESTMENT VALUATION

Before starting any investment project, it is essential to do a study in order to ensure that the project will provide benefits. To that end, there are some investment valuation methods to quantify the result of investments, reject those that are not beneficial and compare between those that are beneficial. There are two main groups of valuation methods: static and dynamic.

2.1 Static methods

The main feature of these methods is that they do not consider the time value of money, which has the great advantage of simplifying the calculation, but also a great disadvantage because they cannot reflect accurate results, only approximate ones. The main static methods are:

- Total Net Cash Flow by a committed unit. It reflects the monetary amount received by each monetary unit delivered. It is obtained by dividing the net cash flows from the initial outlay. If the result is more than 1, the project is accepted.
- Annual Average Net Cash Flow by committed currency unit. Like the previous method, it measures the units received by disbursement unit, but in annual averages. It is calculated by dividing the annual average net cash flows by the initial outlay.
- Payback (recovery period). It measures the time the investment takes to repay the initial outlay. According to this method, the investment that could equal before the net cash flows with the initial outlay will be accepted.
- Accounting rate of return. It is obtained by dividing the annual net profit (after deducting taxes and amortization) by the total investment. Under this method, the criteria for selecting investments will be ordered from largest to smallest ARR.

2.2 Dynamic methods

Dynamic methods are another set of criteria for selecting investments. The big difference between them and the static methods is in the time value of money that is assumed by the dynamic ones, the FCF are updated at the initial time of investment. This will mean that more immediate liquidity will bring more value to the investments because on the one hand the amount of money obtained can be reinvested getting a greater benefit; on the other hand, the money the company already has will not have risk.

According to a study by Graham and Harvey, these methods are most commonly used by most companies because they offer a much more realistic result than any static method.

There are two criteria within the dynamic methods: NPV and IRR.

2.2.1 The NPV

The criterion of Net Present Value (NPV) is a model that provides the absolute performance of an investment and it consists in updating all FCF to the present time and quantifying the result of investment in absolute terms. The formula of this criterion is shown as follows:

$$VAN = -A + \frac{Q1}{(1+k)} + \frac{Q2}{(1+k)^2} + \frac{Q3}{(1+k)^3} + \cdots + \frac{Qn}{(1+k)^n}$$

In the above expression, we can observe that the range is equal to the sum of the initial outlay (-A) to each of the cash flows (Q_n) that are updated to the starting time using a discount rate (k).

The discount rate shown in the expression is not the same for all companies and it is not fixed anywhere; the CFO will be the responsible for analyzing the operation and who will establish it considering the current interest rate in the market, the risk and specific features of the investment and the enterprise.

Once done the calculation, the investor can get three different results that will help in the decision to invest:

- NPV > 0. If the NPV is greater than 0, it means that the investment will bring a benefit upon the company and therefore, the investment project must be accepted.
- NPV = 0. If the NPV is equal to 0 means that the project will neither bring neither benefits nor losses. So, although the project may be accepted or rejected, it is usually refused, since the subjectivity used for the calculation of the FCF and the discount rate makes an inaccurate result and the limited scope of the result makes it enter into the zone of losses or negative NPV.
- NPV < 0. A negative NPV implies that the result of the operation will be negative and therefore, the investment project should be rejected.

As we have seen what is the NPV, its advantages can be summarized:

1. Simplicity of operation calculation.
2. Achievement of a common unit of measure amounts obtained at different times.

Disadvantages of NPV

The drawbacks of using the net present value criteria are mainly:

- The difficulty in calculating the exact discount rate or approximating it to the real one that the project will have. This discount rate will update the net cash flows to present value and, as discussed in Chapter 3, it is very difficult to calculate it accurately.
- The lack of realism in assuming that the FNC are not reinvested. This implies that it is assumed that the company would not bring profitability with excessive monetary that will lead the investment, which does not happen in reality.

2.2.2 The IRR

The criterion of the IRR is that one which equals the NPV to zero obtaining a rate that when compared with the discount rate used can assess whether the investment will be profitable. Therefore, it offers the relative return on investment. The expression is as follows:

$$-A + \frac{Q1}{(1+r)} + \frac{Q2}{(1+r)^2} + \frac{\mathrm{Q3}}{(1+r)^3} + \cdots + \frac{Qn}{(1+r)^n} = 0$$

In the expression, the unknown term is the r, representing the value of the IRR.

Following the criterion of the IRR, the project will be accepted as long as the internal rate of return is higher than the discount rate (r > k) because the profitability is higher than the average weighted cost of capital of the company.

The advantages of this approach are the same as the NPV, differing only in that the IRR provides the measure of relative profitability while the NPV provides a measure of absolute performance.

Disadvantages of IRR

As the NPV criterion, IRR is not free of criticism. In this case, there are more authors who are opposed to this method; even authors like Ross (1995) recommended eliminating the methodology of teaching in finance.

The authors Kelleher and MacCormack (2005) focus the criticisms of this selection criterion in the reinvestment rate, as they are generally high rates that generate the sum of the reinvested flows and give very high returns on projects as a result. Moreover, they can lead to wrong choices, as two projects with the same duration, cash flow and risk, and both get the same IRR, the decision of the investor can be different, but perhaps one is reinvesting the net cash flows to capital cost, and the other at a reinvestment rate too high.

These authors, although they recommend not using the IRR as selection criterion in order to reduce the distortion caused by the problem of reinvestment rate, propose to use a reinvestment rate equal to the cost of capital of the company, which will not be too high. This would significantly increase the IRR which would distort the final result, not too pessimistic.

3. MAIN VARIABLES TO MEASURE AN INVESTMENT

As seen above, the valuation criteria of investments have some disadvantages. But it is worth noting the following two main causes of the difference between the result obtained and the expected one: the calculation of the FNC and the discount rate used.

3.1 Net Cash Flows

When the profitability of an investment project is calculated, net cash flows previously calculated are assumed. However, the prediction can never be exact, so assuming that we can never know exactly the amount of cash flow, it should approximate as much as possible.

The following considerations should be taken into account when calculating the net cash flows:

First of all, it should be known that the cash flow is the difference between current payments and receipts, that is to say, the cash flow. Therefore, the idea of tackling the cash flows from an accounting point of view is ruled out, which would consider income and expenses that have not yet occurred.

The calculation of FCF should include taxes for each period, updated to the initial moment; the estimated needs of working capital, so that, regardless of the investment, the company continues to have sufficient funds for the activity; and the opportunity costs, the profitability which is not earn anymore by providing funds for the project.

Moreover, sunk costs which were generated before the investment should be ignored because they cannot be compensated by the investment. They are part of another company's activity and should not be taken into account because they can distort the result of the analysis.

The last aspect that may alter the result is the allocation of the overall costs of the enterprise. According to Sapag (2007), in this sense a thorough study of the overall costs of the company should be done. These costs are not directly related to the investment buy may affect it, therefore, only the proportionate share of these costs that affect investment should be implemented.

In addition to these individual aspects of the company, the effects of inflation and deflation (negative inflation) must be taken into account. Inflation can be defined as the rise in prices, while deflation gives name to the contrary circumstance. If we believe that they may have a great significance for the result, the expected inflation in the discount rate can be inserted, which will provide FCF in real terms, if not; the discount rate is the nominal.

In response to these aforementioned considerations, we can draw the following table for the calculation of net cash flows:

Activity income
-Activity costs
-Other costs
-Tax on operations
= Net cash flow from operations
-Change in working capital
-Capital investment and disinvestment
= Net Cash Flow

Chart 1. Net Cash Flows. (Brealey et al, 2005)

3.2. The discount rate

According to Lumby and Jones (2003), the discount rate is defined as the opportunity cost of capital employed on a project; to be acceptable, the project must generate a return at least equal to that available in other investment.

If it is important to predict cash flows, so it is to use an appropriate discount rate because, although net cash flows approach almost exactly, if the discount rate is not correct, it can lead to accepting unprofitable projects or to reject projects that are profitable to a company. Besides the calculation, the discount rate also becomes relevant when comparing projects, since this reflects the cost of capital for each project, in particular, which will depend on many factors and each company will have one. Specifically, the author Mascareñas (2001) identifies three main groups of determinants: economic conditions, which will mark a type of interest rate in force beyond the expectations of investors; the discount rate will increase if inflation is expected, otherwise it will decrease; market conditions, in this regard La Porta et. al. (2002) argue that investors seek investments in places where their money is safer, so that the higher security offered by the market where the company operates will attract more investment and thus increase profitability; and finally the financial and operating conditions of the company, the greater the financial burden of a company, its discount rate will increase as it will be financed with more difficulty.

We can generally define the discount rate as the risk-free interest rate plus a variable portion which includes the specific risk of each investment project. There is not a single method for calculating this variable, although the Capital Asset Pricing Model is usually used, the options are varied and the responsible for analysing the project is who will choose and use the most appropriate one. Among the great variety, three different ways to calculate the discount rate are highlighted:

1) Use a calculated rate in similar projects, i.e. if the company has already completed a project with similar characteristics and in the same temporal space or it has the data of a foreign investment, but with similar characteristics, there is the possibility to consider using the same discount rate as the rate variation from one project to another is minimal.
2) Add a risk rate previously estimated by the project manager. Although this option is not advisable and it is rarely the preferred option, it is another existing methodology.
3) Use methods of assessment of the discount rate, where we find the method of capital asset pricing model (CAPM). This last option is the most used, as it closely approaches the result to the real capital cost of the operation.

3.2.1. The CAPM model

The CAPM model is the most widely used approach for estimating the reality and for its simplicity of calculation. Its main objective is to estimate the profitability of each asset based on its risk and determine an appropriate indicator to estimate risk.

The model is not free of criticism since it assumes a number of assumptions that are far from reality. The author Damodaran summarises the three large assumptions of this model:

1) There is no non-systemic risk through diversification, only the systemic risk is taken into account so that investors require higher returns to riskier investments.
2) There is a known risk-free rate; the investor should just face the risk of the future price of an asset in which he will invest.
3) The value of the asset does not vary by competition as perfect competition is assumed.

The desired return is obtained by the following formula:

$$Ei = Rf + \beta(Em - Rf)$$

Where:

E_i: return on assets

R_f: return on risk-free assets

E_m: expected return

β: risk premium

When the expression is analysed, a positive relationship between the level of risk and the expected level of performance is observed. Therefore, the higher risk the assets have, the higher the performance will be. The key parameter is the calculated expression β, which symbolise the return on assets in market return movements; it measures the systematic risk on an asset as opposed to market risk.

Main criticism of the CAPM model

The assumption of some hypotheses that are not usually met causes that a hundred per cent model compliance cannot be assumed, but the absence of a model that approximates more the result makes the CAPM the most valid when calculating the discount rate. Velez-Pareja (2011) summarises the major conditions that undermine the credibility of the model:

- No efficient market. Many markets are minimal and manipulated.
- Difficulties to calculate the beta of many companies, since approximately 99.5% of the companies are not publicly traded.
- Lack of sufficient information from the stock market.
- Insufficient diversification of the shareholder to assume that there is no systemic risk.

Despite these major drawbacks, the defenders of this model argue more options that would minimize these “failures” of the model, based mainly on the use of accounting data rather than share data, so that data does not depend on markets.

4. INTRODUCTION OF RISK IN INVESTMENT ANALYSIS

A key factor when analysing investment is the uncertainty about what will happen during the investment life, the risk. It would happen since failure forecasts and future unexpected adverse economic situation to an environmental disaster. We cannot predict what will happen in the future, and the longer the life of the investment project, the more difficult it will bring the net cash flows to what might happen, but luckily there are several methods to introduce the variable of risk in the investment project.

Among the different valuation methods, the NPV will serve as a basis to explain the different ways of introducing the risk in the investment analysis. The main methods of introducing risk analysis on the Net Present Value are detailed below:

4.1. The adjustment of the discount rate

This method consists of adjusting the discount rate, or profitability of the project, to which the expected risk premium is added. Thus, the investor can compare the profitability between different projects with different risk levels. The big advantage is the simplicity of calculation, since you just have to add a risk premium to profitability already calculated:

$$s = k + p$$

Where:

S: new discount rate

K: discount rate without introducing the risk

P: risk premium

Thus, having opted for this method, the NPV formula presented above will be modified as follows:

$$VAN = -A + \sum_{j=1}^{n} \frac{Q_j}{(1+s)^j}$$

4.2. Certainty equivalents

The certainty equivalent method is similar to the adjustment of the discount rate, although in this case the calculated net cash flows are the ones that are adjusted. They are reduced by a coefficient representing the specific risk of each of them, so it is expected that the more distant in time the flow is calculated, the greater the reduction will be, because the uncertainty is higher in more remote periods. As with the adjustment of the discount rate method, the main advantage is the simplicity of calculation. Moreover, there is no formula to calculate the rates of reduction, which reduces the reliability of the method.

The reduction coefficients have a value between 0 and1, and they will be multiplied by the net cash flow of each year. The higher the risk, the nearer to 0 the ratio will be, and, if not, the closest to 1. The net cash flows are calculated as shown below:

$$FNC\ ajustado = \alpha_j + Q_j$$

Whereupon, following this modification, the NPV expression should be as shown below:

$$VAN = -A + \sum_{j=1}^{n} \frac{\alpha_j Q_j}{(1+k)^j}$$

4.3. Introduction of risk by the expected value and variance of NPV

If the above methods applied risk to the net cash flows and the discount rate already calculated, in this case, there is concern about the estimation process of them. The purpose is to calculate the expected value and variance of NPV but to reach this point; first the expected values and variances of the net cash flows should be calculated.

In order to calculate the expectation and variance of the NCF, the authors Aragó, Cabedo, et al. (2013) propose the following three methods:

Discrete variable, information in terms of probability

In this first case, the net cash flow in terms of probability is known, what values can take the net cash flow (Q_{jr}) and its probability of occurrence (P_{jr}).

Therefore, the expected value of net cash flow equals the sum of the products of the possible values for the corresponding probabilities:

$$E(Q_j) = \sum_{r=1}^{m} Q_{jr} P_{jr}$$

On the other hand, the variance of net cash flow is obtained as:

$$VAR(Q_j) = \sigma^2(Q_j) = \sum_{r=1}^{m} (Q_{jr} - E(Q_j))^2 \, P_{jr}$$

Uniform or rectangular distribution

In this distribution the potential value of the net cash flow is a continuous variable, that within the same range will have the same probability of occurrence, and within the range, the lower limit will represent the minimum or pessimistic value and the upper limit will represent the maximum or optimistic value.

In this case, the expected value of the net cash flow is obtained as:

$$E(Q_j) = \frac{Q_{jb} + Q_{ja}}{2}$$

And the variance as:

$$\sigma^2(Q_j) = \frac{(Q_{jb} - Q_{ja})^2}{12}$$

Where:

Q_{jb}: upper limit
Q_{ja}: lower limit

Triangular distribution

In this case, the net cash flow is a random variable which may take delimited values by here data: a pessimistic value, an optimistic one, and one that will be the most probable. If we define:

Q_{ja}: pessimistic net cash flow

Q_{jb}: most probable net cash flow

Q_{jc}: optimistic net cash flow

We can calculate the expected value of the NFC as:

$$E(Q_j) = \frac{Q_{ja}+Q_{jb}+Q_{jc}}{3}$$

And the variance as:

$$\sigma^2(Q_j) = \frac{(Q_{jc} - Q_{ja})^2 - (Q_{jb} - Q_{ja})(Q_{jc} - Q_{jb})}{18}$$

Once calculated the expected value of the net cash flow and its variance, the expected value and variance of the NPV must be calculated:

NPV variance:

$$\sigma^2(VAN) = \left(\sigma(Q_0) + \sum_{j=1}^{n} \frac{\sigma(Q_j)}{(1+k)^j}\right)^2$$

NPV expected value:

$$E(VAN) = E(Q_0) + \sum_{j=1}^{n} \frac{E(Q_j)}{(1+k)^j}$$

To these calculated values, the risk can be added by adjusting the discount rate or the method of certainty equivalents seen before. However, with all the information available, you can make statistical inferences under a certain behavior in probability to learn more data about the result of the investment, to know the probability that the project is profitable or to calculate a confidence interval in which the result of the investment will be. For this purpose, two methods can be used: assuming that the NPV approximately follows a normal distribution and, on the other hand, applying the Tchebycheff inequality.

4.3.1. Normal distribution of the net present value

As it has been shown above, we have an uncertainty model, so the NPV is considered a random variable. According to the Central Limit Theorem, if there are enough independent observations with average E(xj) and variance σ2(Xj), it is assumed that it tends towards a normal distribution (Gaussian Bell/Gauss Curve).

To approximate the NPV with a normal distribution, we assume that net cash flows, including the initial outlay, are independent random variables and that the number is equal to or greater than 10.

$$VAN \sim N(E(VAN), \sigma(VAN))$$

Following this distribution, different questions may arise as the probability that the NPV is between two numbers or if it exceeds a certain amount, either greater than 0 to know if it is profitable or greater than a certain amount to meet the expectation of the investment.

To approximate the NPV with a normal distribution is debatable since it assumes that the NFC are independent of each other, however, some successful historical results lend credibility to the model.

4.3.2. Tchebycheff inequality

Tchebycheff theorem is based on the NPV variable that does not follow any distribution, so we use this method based on a random variable. In the case of the study, the NPV, its average (μ) and standard deviation (σ), to which an arbitrary positive number (h) is added. Joining parameters, Tchebycheff inequality is represented as follows:

$$P(|VAN - \mu| \geq h\sigma) \leq \frac{1}{h^2}.$$

By this expression, the variance of the random variable (NPV) can be calculated within a range defined by the average plus/minus h times the standard deviation. That is, it allows establishing probabilities of occurrence within intervals.

The advantage of this method is that it is not necessary to know which distribution is to proceed to its calculation, in addition to offering probabilities that are very practical when it comes to making the decision to invest or not. By contrast, the limitation of this method is that it only provides an approximation, that is to say, you can get to know how likely NPV will be close to an estimated average.

4.4. Sensitivity analysis

Sensitivity analysis is an indirect method of introducing the risk since its purpose is to compare the variation in the final outcome if any of the main parameters vary. In the case of the NPV, the initial outlay (A), the different variables that form the NFC of each year (Q_j) (for example, in the case study the price of the ticket, the cost of electricity, the maintenance costs, etc.), the lifetime of the investment (n) and the discount rate (k).

In this method, the *ceteris paribus* clause is assumed, i.e., varying one of the greatest magnitudes, the others remain constant.

The procedure in the sensitivity analysis is to perform several NPV calculations, each calculation with the variation of the considered magnitude, in order to know which would be the result if some figures or others would be given in large magnitudes.

4.5. Scenario analysis

The scenario approach is, like the sensitivity analysis, another indirect method of introducing the risk. In this case, several scenarios arise, although there are not a defined number of scenarios to raise, but every investor can raise as many scenarios as they want, there are usually three: one pessimistic, one normal and one optimistic.

Within each scenario, a different forecast of large magnitudes may be raised. If this is the optimistic scenario, the forecasts will be improved; however, if it is the pessimistic one, they will be worsened. Finally, in the normal scenario, the initial forecasts of investment will be reflected.

With the proposed scenarios, the investor can observe and compare how the result would be if future situations worsen or improve and that they make his forecast was wrong. This way, the investor can get an idea of how much he could win or lose, or win over his forecasts.

5. SOCIAL INVESTMENT

In recent years, we are living in a time of economic crisis and it is when companies are more challenged by looking for their own good carrying out actions that may be considered harmful to society. For this reason, a boom of Corporate Social Responsibility (CSR) is occurring. That is, in short, contribute to improving the social, economic and environmental situation.

A company that adopts the CSR is not only limited to meet the marked laws, but it goes beyond this carrying out actions such as creating decent conditions of work and care of its workers, implement company policies to protect the environment, involve employees in best practices of CSR or make unprofitable investments that generate a good to society.

CSR can be beneficial for the company in terms of image, especially in terms of image towards the stakeholders, which could lead to medium/long term for a better position in the market that entails more activity/best results.

5.1 Impact investing

With the new latent desire of the companies, and in order to cover any needs of the population or to improve their situation, a new type of investment is born. On the one hand, this seeks social benefit, and, on the other hand, it also wants to make a profit from it.

So far the possibility that these concepts could be linked was not contemplated, being clearly differentiated, on the one hand, from traditional investment, whose only goal is profitability for the company, and on the other hand philanthropy was there, whose profitability was not a factor, but it only intended to make a “good deed”. In this regard, for example, we can think of patrons who bought artworks and exposed them to anyone who wished to contemplate them.

This “new” type of investment brings the company, on the one hand, the economic benefit that every company seeks and, on the other hand, it provides an image that will bring all the benefits described in the Corporate Social Responsibility.

The dilemma about this type of investment arises when the possibility of quantifying the social benefits previously created because we cannot forget that, despite being shown the benefits that can have a good CSR, the company continues to be owed to its major stakeholders, which will require high profitability to continue relying on the current managers.

With this dilemma in mind, there is no reason not to quantify the social benefit created, in order to demonstrate that not only economic returns care, but carrying out impact investing entails a return hitherto hidden.

The profitability or benefit that social investment generates is not reflected in any financial statement. The financial statement as the profit and loss account, the balance or the cash flow statement reflects only what can be counted, the quantifiable. Thus, some companies decide to submit an annual CSR report in which all the actions undertaken in the interests of society or environment appear.

With all this in mind, several methodologies to quantify the return obtained from a social investment arise, although they all have in common the fact that none is free from the subjectivity of who has performed it, none can give an accurate result and, therefore, is free from any criticism.

The author Narrillos (2012) considers that the most important valuation methods are:

- IRIS. "Impact Reporting and Investment Standards". It was created in 2008 by the American institutions The Rockefeler Foundation, The Acumen Fund and B Lab. It enables comparison between companies in the same sector based on data from the company and using impact indicators. The limitations of this method are that it does not offer the profitability of social investment as such, but offers comparisons between companies in terms of their social involvement and always in the same sector.
- GIIRS. "Global Impact Investing Ratings System". It was created by the Rockefeler Foundation and its purpose is to give ratings to companies according to their social investments. Its ratings do not take into account financial aspects, but only based on the analysis of social investments. In this case, the limitation is similar to the previous one because what you get is a qualification regarding the involvement of business in society.
- Social accounting. This methodology to quantify the benefit of social investments is previously described; it is to prepare an annual report containing all the actions that entail a social or environmental benefit. Although it is not mandatory development, many companies choose to do it for the best brand image. In countries like the United Kingdom, such reports must necessarily be attached to the financial statements. In this case, the limitation is that only one report describing the actions taken is obtained and each interested individual will assess for himself the benefit that they involve to the company.
- The SROI method, “Social Return On Investment” , originally appeared in 1997 devised by REDF in the United States and has been developed to achieve a model that has been openly accepted as the best method to quantify and analyses the impact of social investment, the version of The SROI Network International. This method is being internationally accepted and will be developed in point 6.

6. THE SROI METHOD

The SROI method has been developed since 1997 up to the latest version in 2009, devised by the authors Nicholls, Lawlor, Neitzert and Goodspeed in their work “A guide to Social Return On Investment” (2009), which will be the method developed in this paper.

The fundamental aim of the method is none other than to find out what impact has social investment that can bring to the company useful information to make strategic decisions, organize resources, improve its social image or see how far they are interested to invest socially. In conclusion, it seeks to quantify the impact of an investment in monetary terms, how many euros of impact have each euro spent.

The SROI method can be divided into two types of analysis depending on the type of company or investment analysed:

- Retrospective. For this type of analysis, historical data on investments already made are used, from which its data are known or a business data already in operation, which wants to calculate what its impact is.
- Prospective. In this method, the investment or the company is not yet operational and it calculates the impact that the action to be performed will create if the data provided in the analysis are met.

Before going into the development of the method, it is suitable to be clear that the SROI method is based on the social impacts to throw a result. To clarify this concept, the author Narrillos (2012) uses the “Creating Impact Chain”:

Chart 2: Creating Impact chain. Hugo Narrillos (2012)

This chain describes the process until the number of impacts that will create a company with its shares or investment. Starting with the first stage, we can find:

- **Inputs.** They reflect what it is needed to make the investment, as a monetary investment and those specific investment costs.
- **Activities.** It is what is done, for example, investment in public services like a commuter rail network or the construction of a soup kitchen.
- **Results.** It is the result of the activity which is measurable. Following the examples above, it would be the people boarding the train or those that go to the soup kitchen.

- **Changes.** They reflect the obtained change in society as a result of the investment. The improvement created of public transport or the improvement in health that can be nurtured well through soup kitchen service.
- **Impacts.** They differ from the changes because they are a direct result of the investment; however, the changes are an indirect result of it. The impacts are the result of displacement, deadweight, attribution and decrements, which must be subtracted from the changes.
- **Displacement.** It quantifies the damage that the investment or the company has had on others, in the example, the number of people who will cease to catch the bus or those who will cease to resort to similar associations to a soup kitchen.
- **Deadweight.** It expresses whether changes might have occurred if the investment is not carried out.
- **Attribution.** It is the percentage of changes that cannot be attributed to investment.
- **Decrements.** They reflect the deterioration of changes over time, this part is generally applied to investments over a year.
- **Lens adjustments.** This last phase of the chain appears with the development of the investment, when the impacts that are occurring are unexpected, adjustments can be made in order to achieve the goal.

Creating Impact Chain greatly facilitates the understanding of the method, since the remainder of the method is a simple division:

$$SROI = \frac{\text{Current value of impacts}}{\text{Current value of investment}}$$

In this formula, there are two key factors. On the one hand, the current value of the impacts which reflects the calculated value in the fourth status of the chain and in the denominator of the equation is the current value of an investment, that is, the update of the net cash flows that the investment will have if only the side of profitability is considered.

The result of the formula offers a ratio that represents the amount of social impact per monetary unit spent, or, to make it more representative, the number of social impact euros per each euro invested. The result can take any value, but it must be above one to consider that it is profitable in terms of social benefit.

The SROI ratio does not provide a decision tool to accept or reject an investment, but provides more information to the company that may be considered to make the investment. For example, it may not be a profitable investment in a public institution from the economic point of view, but by SROI ratio it can be demonstrated that the investment would generate a great social benefit, so its realizations may be advisable.

As shown above, the most complex part of the calculation lies in the measuring impact. The authors Nicholls et al. (2012) propose a series of steps until reaching the final ratio that facilitates the process of development in the last publication of the SROI guide:

1. Establish the scope and identify the stakeholders. The purpose of this first part is to measure the scope that the investment will have what stakeholders and how many people will be affected.
2. Create a map of outcomes. What changes investment will cause.
3. Demonstrate the outcomes and give them value. In this section, we must look for a way to measure change, for example through surveys, studies, etc.; to quantify the monetary value of the change created.

4. Establish the impact. This part is the fourth stage of the Value creation chain. It quantifies the impact created directly with investment, subtracting all that has changed, but has not been intentionally caused.
5. Calculate the SROI ratio. With the economic data on investment and the quantified impact data, there is the need to calculate the percentage of social change that will lead each monetary unit spent.

In conclusion, the SROI model presents its great difficulty in calculating the impacts, a fact that will be developed in detail in the practical part of the work.

6.1 Principles of SROI method

Once the process of SROI method has been explained, the authors of the method say that seven basic principles must be met to reach an outcome:

1. Involve stakeholders. It is vital to have all stakeholders during the study to obtain enough real data so that the ratio approximates the maximum to the real impact.
2. Understand what changes. Analyse the changes that are going to produce actually, and do not make changes that do not know for sure that can occur just to obtain a better ratio. Following the first principle, discussing with stakeholders what will really change and how it will do.
3. Assess the important things. Many social benefits are accompanied by others inevitably and in principle may not be included in the study, so everything that will change should be appreciated, but this is not the original purpose of the investment.
4. Include only the essentials. While in the previous point it is recommended that all important changes that can happen should be included, at this point it is clarified because only that which will actually involve a significant change should be included.
5. No claim in excess. Subjectivity in this analysis is latent so that one of the principles tries to clarify that only what is demonstrable and calculated on the basis of real data with stakeholders should be included.
6. Be transparent. This principle goes hand in hand with the above principle, subjectivity should be set aside at the time of the calculation and include all existing data, although they impair the result of the ratio.
7. Check the result. Once the investment is started up, impacts achieved must be carefully checked and deviations are shown with the original objectives, in this way, decisions can be corrected.

6.2 Limitations of the SROI method

When you think about the limitations of the method, the first one that undoubtedly comes to mind is the subjectivity used, the method, although a comprehensive study is conducted, it is not free of estimates that will hardly be met exactly.

Besides the main problem, for many companies conduct a SROI study can lead to a very high spending that would not be appropriate to carry, in addition to having to involve all stakeholders who may not be interested in getting involved in the project, making the study difficult.

At the limitations of SROI method should be added those from the classical analysis of investments, since the denominator of the ratio is not more than the current value of an investment from a purely economic point of view. That is, the NPV of the project, which, as seen in section 2.2.of this work, has major drawback, such as the current calculation of net cash flows or the correct determination of the discount rate.

7. PRACTICAL IMPLEMENTATION

In order to put into practice all the exposed criteria, there is a practical case in which Renfe installed a commuter rail network in the northern part of the province of Castellón. The network consists of a line linking the municipalities of Castellón and Vinaroz, also through the municipalities where there are already existing roads: Benicassim, Oropesa, La Ribera de Cabanes, Torreblanca, Alcalà de Xivert, Santa Magdalena and Benicarló. Being a network in use, the project does not include costs as an adaptation of roads or works at the stations since they are already currently in operation.

Therefore, what is necessary to run the project into operation is the purchase of a railway series 477 of Renfe, valued at € 2.854.807,50 and starting it up, which will generate a cost per kilometre of €3.05 for each train car, specifically the acquired train has three coaches, so the total cost per kilometre amounts to €9.15. Both the cost of the train and the cost per kilometre have been obtained from the annual reports of 2013 and 2007 respectively of FGC[2] (Ferrocarrils de Catalunya). This cost per kilometre includes all fees associated with the movement of a train, roads and stations maintenance, electricity, etc. The company ADIF (Administrator of Railway Infrastructures) will be in charge of all of them.

The length of the network is 72 km[3] and, according to an own analysis based on the existing schedule for medium-distance trains applied to the standard working hours, it is considered that all the working slot is covered with 6 daily journeys. A total of 420 kilometres a day is obtained by multiplying the distance by the daily trips, at a rate of €3.05 each one of them, the annual total cost achieved is €1.442.772.

On the other hand, incomes must be considered. Two variables are needed to calculate them, on the one hand, the travellers, and, on the other hand, the ticket price. To calculate travellers, there has been made a study of commuter networks in Spain based on a report by the VIA LIBRE[4] magazine and there has been an average between the two commuter networks in operation with a greater resemblance to the alleged in Castellón, as to municipalities through which goes and people (consulted in the INE) of the province. These two networks are those of Zaragoza and Santander, and the average of the two amounts to 637500 passengers, that will be the supposed for Castellón. This fact would mean 1746 passengers per day, which would lead to a train occupation of 41%, a data that reinforces the prognosis of travellers made.

Current rates on the network of Valencia[5] have been used for the calculation of the average price of the ticket. These fares have been implemented in the network designed in the project, resulting in an average ticket price of €2.55.

The total revenue amounts to € 1.625.625,00 per year, as a result of the product between travelers and the average ticket price.

[2] https://www.fgc.cat/downloads/continguts_corporatius/informes_anuals/memoria_anual07_cast.pdf
[3] http://www.distanciasentreciudades.com/
[4] http://www.vialibre-ffe.com/pdf/4-Anuario2012_Viajeros_Cercan%C3%ADas.pdf
[5] http://www.renfe.com/viajeros/cercanias/

7.1 Classical selection criteria for investments: the NPV

Within the classical investment selection criteria, the NPV is used to calculate the profitability and introduce the risk using the methods described in section 4.

7.1.1 NFC obtainment and discount rate

The initial outlay of the train (€ 2,854,807.50), the annual costs of circulation (€ 1,442,772), the annual income (€ 1,442,772) and the annual amortization of the train (€ 71,370.19) are taken into account in order to get the net cash flows (NCT). According to the analysis of its last Annual Accounts published in 2013[6], the tax rate facing Renfe is 9%, so this tax burden is added to the NCT.

The duration of the investment project is fixed at 40 years, which coincide with the train lifetime. It is decided not to extend it further as it is not possible to know the cost that will have to prolong the service either by the acquisition of a new train or the restoration of the existing.

The other key factor in the classical selection criteria is the discount rate. Three data are necessary to calculate it: the market beta of the company, the risk-free rate and the risk premium.

The first data is obtained by another company that performs the same activity, but this must be listed because the company is not listed on any market. In this regard, the company CAF, which manufactures both trains and railway equipment, is the responsible for making the train that is acquired for the project. The market beta of this company, which will also be applied to the project, is 0.612.

The risk-free rate is obtained from the data of the Spanish 10-year bond. At the time of the consultation, it was 1.28%[7]. To establish the risk premium, the fact used is the average in Spain in 2015, calculated by Fernandez (2015) which is found in 5.9%, although it is assumed 6% in the project.

With all this information, it is available to calculate the CAPM, which will be equal to the discount rate of the investment project. CAPM calculation gives a value of 4.953%.

7.1.2 Risk introduction

With the NCT and the discount rate already calculated, the value of NPV can be obtained, which is - € 1,102,703.68. However, if this value is accepted, it is assumed that the predictions made are accurate and that there will not be any future distortion in forecasts. Obviously, this is not the case in reality, so risk methods are introduced, which will include in the NPV the effect of the errors that could be committed in the initial forecasts. The following methods to introduce the risk have been used:

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6 http://www.renfe.com/docs/Cuentas%20anuales%20e%20informe%20de%20gestion%202013%20de%20Renfe%20Viajeros%20SA.pdf

7 http://www.eleconomista.es/bono/bono-espana-10-years

- Adjusting the discount rate

In this method, a higher risk percentage than the discount rate is applied. In this case, a 2% has been added to the initial rate, being at 6.95%, which lowers the value of the initial NPV to € -1,501,752.58.

- Certainty equivalents

This method involves giving a value to net cash flows according to their probability of occurrence, so that, the first years, the discount will be small and over the years, the flows will be lower. The calculations for the first two periods and for the last ones are shown below:

Probability	100%	98,13%	…	47,89%	47%
n	0	1	…	39	40
NCT	€ -2.854.807,50	€101.449,36	…	€101.449,36	€101.449,36
Settled NCT	€ -2.854.807,50	€99.552,27	…	€48.587,22	€47.678,65

Chart 3. Certainty equivalents

In this case, the result of the NPV is €- 1,494,856.95.

Statistical methods

The purpose of these methods is to provide the occurrence probability of a fixed NPV, in the example, the probability that the NPV is greater than or less than 0 and greater than or less than 2.000.000€ is being sought. These probabilities are sought with the uniform and triangular distributions and the occurrence probability are as follows:

PROBABILITIES				
	RECTANGULAR STRUCTURE		TRIANGULAR STRUCTURE	
	Z	p	Z	p
P NPV >0	2,009856966	2%	1,319593131	9%
P NPV <0	2,009856966	98%	1,319593131	91%
P NPV >2000000	5,060405493	0%	3,437659119	0%
p NPV<2000000	5,060405493	100%	3,437659119	100%

Chart 4. Statistical Behavior of NPV

- Sensitivity analysis

This analysis shows how sensitive the NPV is in relation to variations in key variables. For the calculation of the sensitivity of the NPV, Excel Solver tool is used, which facilitates the calculation. In the case study, the percentage that should vary the variables to get a positive NPV is sought, obtaining the following table:

Summary table: Sensitivity Analysis			
	Initial value	Modified value	Variation
Train price	2854807,5 €	2063151,5 €	-28%
Cost per km	3,05 €	2,90 €	-5%
Number of passengers	637500	665015	4%
Average ticket price	2,55 €	2,66 €	4%

Chart 5. Sensitivity analysis

- Scenario analysis

In this analysis, we can observe what would happen if the predictions deviate from the expected. In this respect, two things can happen: the predictions are worse than expected, so a pessimistic scenario is created, or predictions are better than what happens in reality, so an optimistic scenario is created.

In this case, three scenarios have been created: an optimistic, another neutral, in which the initial investment data are collected, and a pessimistic. For the optimistic one, it is assumed an increase of 15% of the passengers and a decrease of 10% in the cost of circulation. A contrary scenario is raised for the pessimistic one, a decrease of 15% of travelers and an increase of 10% in the circulation cost.

The results of the three scenarios are as follows:

	NPV
Pessimistic	€-7.632.548,25
Neutral	€-1.102.703,68
Optimistic	€4.997.144,22

Chart 6. Scenario analysis

7.2 SROI Method

The aim of this method is to quantify the number of euros obtained in social benefit for each euro spent. It is necessary to stop each of the steps described above to reach this amount.

7.2.1 Establish the scope and identify the stakeholders

In this first stage, the project should be shaped. In this case, as already described, the company should only deal with the purchase of a series 477 train of Renfe, amounting to € 2,854,807.50 because the other resources are already available. In terms of duration, it has been set at 40 years for being the train lifetime, according to data from the 2013 annual report of the FGC.

Secondly, the project stakeholders must be identified and involved. According to discussions with Hugo Narrillos, president of the SROI network in Spain, it has been agreed that, for this first approach to the calculation of the SROI generated by a commuter train network, it will be analysed the impact that the investment creates in students and workers at UJI and people who may be affected by this. For this purpose, the key stakeholders are students of the university that come from municipalities of the North of Castellón and the room landlords in Castellón. This

consideration leaves out important stakeholders such as the councils which the train passes through or the Castellón Provincial Council, which are excluded as stakeholders because there are not enough resources to engage them. If we include them, this can distort the result, in addition to these interest groups excluded, others can be included such as the UJI itself or people with limited mobility from municipalities (access to hospitals, entertainment, etc.).

To involve stakeholders, surveys have been conducted in which the need of the commuter train service is evident. In the survey, people are classified according to their occupation and common activities (job, studies, etc.) outside their municipality of residence, if so, they are asked about the use that they would give to a commuter train network and whether this would be beneficial for them. Of all the respondents, 76 residents in the north of the province of Castellan have responded to the survey, 21 unemployed and 55 studying or working in a municipality other than their own. At the same time, 6 of the unemployed say that they can only travel using public transport, so that they would use the commuter service to have more opportunities; in the case of students and workers – employed-, 36 of them say that they would use the service, with greater or lesser frequency. This survey is evidence that the service would improve their living conditions.

7.2.2. Create a map of outcomes

In this map, the main stakeholders in the project are shown, including those large excluded. For this, the following table is prepared:

Students	They will have more income because they save on renting a room
Unemployed	More job opportunities by having greater mobility
Residents in municipalities	More mobility towards services in large urban centres
Public institutions	More economic activity and better-living standard of the population Possible service subsidies
Other transport companies	Reduction of the customer number
Landlords	They will have less income because they have fewer students who want to rent

Chart 7. Stakeholder map

7.2.3. Provide evidence of the outcomes and give them a value

We need to use studies and statistics available to assign a value to outcomes since the survey does not collect a large enough sample to reflect the true image of the entire population.

To estimate how many students will use the service, a study from the University of Valencia is used, which states that on average, 64.3% of students reside in the family home. This data, along with an approximation of the students from the north of Castellón done by the Rectorate of the UJI[8], results in 643 students that will use the commuter train.

[8] Based on the report in the newspaper Mediterráneo http://www.elperiodicomediterraneo.com/m/noticias/castellon/uji-ya-tiene-alumnos-700-municipios-espanoles_76376.html

On the other hand, some survey data and a personal estimate are used to quantify the number of unoccupied rooms. The prognosis is: 30 rooms will not be rented due to the commuter train service.

7.2.4. Impact establishment

In this part, some figures must be put to those established impacts. For that, data collection is detailed below:

- To quantify the impact on students, the value of the average rent of a room in Castellón, 200€ (own study), is multiplied by the number of students estimated in the previous section, 643.
- Finally, to introduce the displacement, the variable of rooms that will remain vacant is presented, which is estimated at 30 according to some information received in the surveys to the stakeholders. These rooms multiplied by the same average price used in student rooms offer the negative impact on investment.

The data obtained are presented in the following table:

Stakeholders	Impact Description	Establishment	Duration	Impact	Current value
Students	Higher income	Savings on rent minus train ticket	40	€1.157.400,00	€6.695.659,67
Landlords	Lower income	Number of rooms per average price	40	€-72.000,00	€-416.526,26

Chart 8. Impacts created

7.2.5. SROI calculation

After analyzing the impacts and having calculated the current value of the investment in the previous section, the values in the formula should be introduced to obtain the social return that will create the investment:

$$SROI = \frac{€6.279.133,40}{€2.854.807,50} = €2,20$$

The current value of the impacts created minus displacement is in the numerator, and the value of the input in the first year appears in the denominator. Calculating the ratio results in 2.20. The interpretations of it are that for each €1 of investment, €2.20 is obtained of social impact, or that each euro invested will return €2.20 to society.

7.2.6. Generate, use and certify

This process is the one that follows once the investment is made, the relationship with stakeholders affected should be kept by communicating the value that investment is creating for them, continue measuring investment and verifying the calculations done in the predictions are correct. In case of not fulfilling the desired impact, it should be adjusted to bring it closer to the target.

Then, the impact-creation chain of the investment project is shown below:

Chart 9. Impact-creation chain of commuter trains

9. CONCLUSION

In this work, we have seen two approaches for analysing an investment, from the point of view of profitability, purely economic, how much has been disbursed and how much is earned; and from the point of view of the effects on society that investment brings. These two points of view are not necessarily incompatible, both can be used to analyse an investment project. In fact, the use of SROI is increasingly widespread because, along with the classic selection criteria, it provides complementary information that can, on the one hand, decide if making an investment or another, or justify an investment with negative profitability, as in the studied case and, of course, use the social benefit to enhance the reputation of the company with regard to the stakeholders.

In this paper, we have analysed the main classic selection criteria available for the investment analysts, even if the NPV has been used. This is neither the preferred method nor the most effective, but perhaps it is the most graphic when analysing the risk introduction seen before. In addition, it is the criterion most widely used along with IRR.

In the practical example, using all the methods of risk introduction, it is shown that the investment profitability is negative, but, as evidenced by the sensitivity analysis, changes not superior than 5% can mean a positive profitability.

On the other hand, the calculation of SROI ratio, which, as explained in Section 6, represents the social benefit per euro of investment, has been done. In this case, we have obtained a ratio of 2.20€. Consequently, on the one hand, we have obtained a negative profitability close to 0, even using statistical methods there is a chance of being positive, and, on the other hand, an SROI ratio greater than the unit is obtained, which means that the investment is beneficial for society.

With the data shown in the table of the manager to decide whether to make the investment or not, the discussion in the irruption of the SROI method in the finance world is opened. It has an investment with negative profitability, although close to 0, which is beneficial to the society. In this case, what should be done? The company must decide whether to risk losing money for winning in terms of social reputation, which can bring new revenues through brand image, or to save money on investment in exchange for losing that positive “publicity” that would make an investment with social benefits.

In short, we are in a time of change in which the rise of Corporate Social Responsibility is bringing new ways to visualise the investments of each company, and it may not be far-off when a social impact analysis must be attached along with the investment analysis, whether SROI or any other method, existing or yet to be developed. In fact, in countries like the UK, the proposal is already on the table of the leaders.

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