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Evaluation Tools for Transport Infrastructures: Social Return On Investments

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Abstract

In this paper we analyse the Social Return On Investment (SROI) as a form of evaluation that contributes to a wider analysis of investments. SROI offers an overview of how change has been generated and experienced by beneficiaries and stakeholders. The method uses monetary values to represent the social and economic results of investments infrastructure investments, by calculating the impact created for each euro invested in the project and expressing this impact in the form of a ratio. However, the emphasis is more on creating economic and environmentally sustainable values than on the financial aspect. Nevertheless, SROI is designed to stimulate funding by private as well as public entities of innovation in, and wider provision, of programs for remediating or preventing the absence of proper evaluations. We verified the empirical applicability of SROI for the evaluation of projects in the transport sector. Finally, we discussed a case study related to the evaluation of a rail services renovation plan aimed at modernizing the local rolling stock.

Keywords: Evaluation; SROI; Infrastructure investments; Transport sector. Rail services.

1. Introduction

Social impact assessment for providers of public services is increasingly gaining the attention of both regulators and citizens in developed countries. More specifically, it is becoming functional not only for internal and external performance measurement but also as means to attract funds, skilled workers and other resources and as guidance to fulfil organizational mission (Nicholls, 2009). It also gives support to the decision-making process.

In the light of the continuing reduction of the grant-giving financing scheme to the third sector, measures of social impact are becoming increasingly central to funds acquisition. The need to deliver social value in a long-term financial and environment sustainable context has urged the importance of monitoring public services performance

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through external and credible measures that jointly takes into considerations both financials and social values.

Such an emerging attention on “social value” has the straightforward potential to overcome the traditional evaluation models of infrastructure intervention. Indeed, there is an increasing recognition for new and accurate measures able to adequately account for the social, economic and environmental value that results from each public infrastructure intervention.

Based on the principles of "social accounting" and “cost-benefit analysis”, this paper investigates whether Social Return On Investment (SROI) can be employed as an effective and credible methodology for measuring the (socio-economic) value of infrastructural investment projects. SROI is a framework for measuring and accounting for a broader concept of value and contributes to a wider analysis of investments offering an overview of how change has been generated and experienced by beneficiaries and stakeholders. Although it makes use of monetary values to represent the social and economic results of infrastructure investments, the model is designed to measure the effective sustainable social and environmental value that is expected to be created by the project and to stimulate funding by private, public entities and national and supranational large infrastructural investment programs remediating or preventing the absence of proper sustainable social and environmental evaluations.

Although sizable literature conceptually describing SROI is available, empirical applications are still rare. As a result, there is the need to explore the technical challenges and the limitations in the on the field implementation of the methodology. We also filled this gap with the aim of contributing: a) to the development of standards and common practices in the application of SROI for the evaluation of infrastructural projects and, b) to reduce the subjectivities implicit in the implementation of the methodology that makes controversial both analysis and comparison across SROI figures.

This paper represents an original contribution as little published research exists which explicitly investigate whether SROI can capture both social and financial implications of infrastructural investment projects and discuss the effectiveness and the limitations of SROI at capturing and measuring the social value of infrastructural interventions.

The rest of the paper is organised as follows: methodological and empirical issues are illustrated in paragraph 2. In Section 3 the empirical application of a SROI analysis for the evaluation of investment projects in the transport sector is discussed. A case study referred to the rail sector is included in paragraph 4. Concluding remarks close the paper.

2. SROI: methodological and empirical issues

Cost–benefit analysis (CBA) and social accounting (SA) have traditionally been employed for the economic evaluation of public investment policies and programs. Recently, attempts have been done trying to incorporate social impact into these analyses (see for instance Fujiwara and Campbell, 2011). Nevertheless, SROI has gained predominant attention as tool able to straightforwardly measure the net social return of an investment project. SROI is an economic analysis derived from the CBA which incorporates, social, environmental and economic costs and benefits in the attempt to evidence a wider measure of value that overcomes the classical financial perspective of evaluation. It’s holistic perspective and the monetization approach for non-monetary impacts evaluations are undoubtedly its most attractive features.

SROI is a ratio of costs to social outcomes that makes use of financial proxies to convert social returns into a monetary value. Such an approach permits to account for intangible and not monetary outcomes in a common, clear and comparable unit of measurement that facilitates discussions and decisions. It was originally developed by the Roberts Enterprise Development Fund (REDF) in the mid '90s. The immediacy of its interpretations makes it easy to understand, use and divulgate at all levels (for instance, a SROI ratio of 2.5:1 means that an investment of a Euro delivers 2.5 Euros of social value).

Operationally speaking, there are several approaches for calculating SROI. Nevertheless, it is common practice to conduct six main activities for its estimation:

a) Establishing scope and identifying key stakeholders. In a SROI analysis stakeholders are people or organisations that are positively or negatively impacted because of the activity being analysed. Their identification and the accurate delimitation of what the analysis is going to cover (aims and scope) clarify the boundaries of the analysis and fix the basis for the other stages.

b) Mapping outcomes. An impact map detailing how the use of certain resources delivers activities which results in outcomes for stakeholders is expected to be delivered at this stage.

c) Outcomes evidencing and evaluation. Outcomes indicators are identified and used to collect data on their occurring. Monetary values are associated to each outcome.

d) Establishing impact. Part of the outcome would have happened anyway or is the result of other factors. This stage estimates the proportion of the outcome that can be assumed being added by the project under evaluation, that is its real impact over stakeholders.

e) SROI calculation. Positive and negative benefits are actualized and added, then confronted to the value of the investment. Sensitivity analysis are encouraged at this stage.

f) Reporting. The detailed communication of the analysis and of the results concludes the process permitting a broader dissemination and sharing of the findings.

The methodology is well suited both for ex ante analysis aiming at estimating the social-economic impact of prospective investment projects and ex post examinations aiming at assessing the actual impact of a project/activity/company. In forecasting activities SROI reveals itself to be a powerful tool in helping to arrange the project in a way that maximize its expected impact and in understanding the key drivers of its social value. The versatility of the methodology permits to capture diverse user's experience and culture across space and time, that is it recognizes (and prices) that different stakeholders in different situations or different moment in time can value significantly differently a same impact. Like any other evaluation model, SROI is based upon assumptions, estimates and subjectivities that require high professionality, skill and judgement by the evaluator.

Some technical issues challenge the practical implementation of SROI and potentially distort its effectiveness, especially in the infrastructural project context. First, this kind of investments spans its utility over a very long-time horizon, typically much longer than any other business project. The identification of the correct time-horizon is crucial to conduct an effective analysis. Consequently, the discount rate should be selected in accordance to the time horizons over which the analysis is carried out. Moreover, different projects may require different time horizons of analysis and different discount rates. While appealing and easy to implement, the widely used practice of employing

national agency's indications on the reference of time horizons and on the value of discount rates leads to potentially highly incorrect SROI results (on the inconsistencies of regulators estimations of the cost of capital see Fernandez, 2019).

Second, SROI users must accurately assess the real social outcomes of the project under evaluation. This requires, among other, the isolation of the specific social impact of the intervention which can be particularly difficult in the case more projects and other already existing infrastructures are connected (Pathak and Dattani, 2014).

Mulgan (2010) criticized the large liberty implicit in the estimate of many social costs and paybacks, which have the power to dramatically affects the final calculated value. Others argued that the monetization procedure of SROI leads to an underestimation of the real social value created (see for instance J. McLoughlin et al. 2009, Watson et al., 2016). Concerns also rise for a comparative use of SROI (SROI network, 2012). Indeed, while it is undeniable its usefulness in tracking socio-economic performances of a single organization or of a single investment project over time it is to be cautious its employment for comparisons among different organizations or projects.

3. On the application of SROI in the transport sector

In principle, each project of the public sector must prove its validity independently from the expenditure program of which it is part. Many expenditure centres and some part of balance sheets strictly refer to the sector to which investments are linked. This, in a managerial view, simplifies procedures and, means that in the short- and medium-term programming, what is important is the relative superiority of a project in comparison with others, rather than its absolute validity in the light of general criteria. In addition, in a developed public sector, the number of projects which must be evaluated may be thousands per year. Thus, the development of the decision-making process should be extremely difficult without differentiating the projects because of their belonging to a specific sector and take advantage of the economies of specialization which come from adequate division of labour within the administration.

In the following, characteristics of projects in the transport sector will be examined, paying attention to problems linked to the analysis of this sector. There exist several motivations which justify public intervention in the transport sector. In short, they can be listed as follows:

1. The construction of infrastructures in the transport sector requires an enormous financial outflow due to the lack of shareability of such interventions and to the high value assumed by the capital to output ratio. This renders investments unattractive and uninteresting to the private sector, unless a long monopolistic profit is ensured;
2. The possibility of using efficient and relatively low-cost transport services is pre-requisite for economic and social development, but the private sector, before a certain degree of development, is unable in turn to supply adequate services;
3. Public intervention is also necessary to guarantee transport safety and to limit the negative impact on the environment;
4. The transport network must be planned taking account of the demand in the sense of considering the requests of mobility which come from different social groups. It must also be considered the localization of productive activities and it must be coordinated in accordance with transport networks of border countries.

Therefore, the government objective in the transport sector is to ensure an efficient communication network in terms of distribution, quality and costs, either for goods or

for passengers, substituting or coordinating private supply which, sometimes, appears to be inadequate.

When investment projects regarding the transport sector are analysed, very different expenditure programs are considered, and they are necessarily interrelated. For example, interventions may regard the sub-sector of roads, that of railways, of ports or airports and, consequently, a great variety of projects is possible. Projects which refer to the road system may have as their aim the construction of rural roads, motorways, roads destined to stimulate the development of some areas and, on the other hand, the improvement of existing roads. Projects in the railway system may refer to the opening or the closing of a railway line, improvement of existing lines through the implementation of high-speed or underground lines and, finally, they involve the efficiency and the modernization of clearing points of goods. As for ports, many projects are concerned with the widening of mooring possibilities, construction of silos, implementation of an effective range of services for the clearing of goods and, finally, the improvement of ferry-boats services for goods as well as for passengers. As for projects which are linked to air transport, generally, they ultimately involve the construction of new airports and the organization of services in the airports.

Notwithstanding the existence of these heterogeneous types of investments, characteristics of financial analysis and of economic analysis, in many cases, are very similar. Suppose, for example, that a committee, responsible for the transport sector, wishes to evaluate the project of a new motorway with a route which links city A to city B. Suppose, also, that this project has the aim of improving traffic which is extremely congested on the existing road (this may be due to narrowness of the road or to its poor condition) and that the linkage between the two cities is also ensured by a railway. Now, to individuate cash-flows, first of all, costs must be considered. These costs relate typical investments necessary for the construction of a road and to running costs which refer, in particular, to maintenance costs. As for proceeds, they consist in inflows which come from the payment of tolls and from contributions. A crucial aspect of this analysis is that, besides, the estimated costs (for which, generally, standard costs per kilometre are used), tariff cash flows must be calculated with great care. These depend on the function of the future demand of users which depends, in turn, on the opportunity cost of choosing the new road instead of the railway. If it is assumed that the railway tariff is under the control of the same public committee, it is evident that, in general, the project cannot be analysed, not even in financial terms, without the joint consideration of other transport possibilities. These interrelations are typical in this area of public sector interventions.

In such a context SROI may be helpful in overcoming some of the cost-benefit analysis limits (Wright, Nelson, Cooper and Murphy, 2009):

1. Difficulties in foreseeing demand; that is, as in the aforementioned example, it is difficult to evaluate motorway traffic when the life-time of the project is considered;
2. Considerable presence of “intangible effects”, as for example pollution and the visual quality of the countryside;
3. The problem of economic evaluation of social costs connected to road accidents;
4. The problem of economic evaluation of time-saving during the travel activity.

Regarding the first aspect, it must be born in mind that transport demand is a derived demand. Therefore, it may depend on production volume, on the localization of industrial, agricultural and tourist activities, on the geographic distribution of population and its income characteristics, and so on. On the other hand, if we consider the demand

for a particular mode of transport, for example that for a motorway, this is strictly linked to its price and to the speed and the safety of an eventual alternative mode of transport. In fact, in the aforementioned example, traffic volume on the motorway depends on the efficiency of the railway mode because it covers the same route. In addition, the considerable presence of intangible effects brings about some problems of quantification, solved by SROI using monetary units. Further, if benefits are considered, it is quite evident that the share of benefits which do not have a clear market reference, in some projects, is of great importance. Thus, in these cases, project validity vitally depends on the evaluation of the effects of noise, pollution and saving of time, and on the quality of SROI evaluation.

The use of SROI for the evaluation of infrastructure investments in the transport sector, have positive and negative outcomes. One of the positive things is related to the fact that SROI include information on the value that society would attribute to outcomes of specific programs or investments (Yates and Marra, 2017a). Another relevant advantage of SROI is the increasing dissemination of analytical skills and practice spilling from the public over the private sector in a continuous iterative interaction, where information is generated at the local level. As Cordes (2017) outlined SROI is more suitable than CBA for the evaluation of public infrastructure investments since CBA has a narrower economic focus. Finally, it must be outlined that the use of SROI for the evaluation of investment projects permits to rank programs based on their net contributions to the society (Yates, Marra, 2017b). Nonetheless, SROI present some problems linked to imprecise measures of benefits and costs and to the employment it can use crude methods to estimate impacts.

4. A case study: renewal of rolling stock

The investment under evaluation consists in the purchase by a regional government of 3 single-deck ETR 324 “Jazz” type electric trains in a 4-box configuration approved for operation on the RFI (Rete Ferroviaria Italiana) network and authorized for use on the Trenitalia service network, destined to replace an equal quantity of 3-piece PR trains with 4 pieces low floor, registered in 1975 (towed carriages) and 1977 (semi-pilot carriages), by now obsolete in terms of performance and comfort.

The investment, which is part of the overall plan to modernize the rolling stock used in the context of regional rail services, is aimed at raising the quality of the supply in order to make rail transport more competitive, and therefore attractive. Specifically, the new rolling stock will be used to make travel easier and to modernize the fleet.

All this is consistent with the national strategy for the renewal of rolling stock for local public transport, which provides for the extraordinary renewal of the fleet (buses, trains, etc.), with the aim of achieving a significant reduction in the average seniority, thus reaching the European standards. Moreover, this intervention aims at contributing to the 13% reduction target for greenhouse gases envisaged by the National Reform Plan.

In particular, the regional government has undertaken a policy of modernizing the railway system, acting on the infrastructural side, with a renewal campaign for rolling stock, both automotive and railway, and with the imposition of new quality-oriented service contracts and to the quantity of services. In particular, as regards the rolling stock, the objective is to completely renew the fleet of regional trains by 2027.

The evaluation methodology adopted is in conformity with both the guidelines formulated by the Evaluation and Verification Committee of Public Investments for

projects exceeding 5.164 M€ and the “Guide to the analysis of investment projects 2014 - Evaluation tools for policy Committee 2014-2020" of the European Commission - Directorate General of Regional and Urban Policy European Commission.

The analysis of financial sustainability and economic convenience is developed starting from the data relating to the management costs and revenues, before and after operations, supplemented by the estimate of the direct and indirect benefits generated by the intervention. In the next sub-sections, we mainly focus on economic and social aspects linked to the project.

4.1 Input parameters and benefits for the community

The values estimated in this section form the basis for the evaluation and monetization of the benefits for the community due to the realization of the intervention necessary for the subsequent development of the economic analysis.

The non-discounted economic value of the benefits generated by the intervention in question is calculated over a period of 27 years (period 2018-2045). The estimates of the benefits carried out were calculated by assuming the absence of an increase in demand, based on the considerations set out below. As for the reduction of travel times for better rolling stock performance, the quantification of the benefit linked to the best performance of the new electric trains derives from the elaboration of data derived from simulations carried out by Trenitalia / RFI, hypothesizing their operational use like that of the Reference Scenario trainsets.

From the prudential comparison of the technical data and the performance of the new electric trains (Project Scenario) with the same data and performances referring to the RS material (Reference Scenario), we assume an average reduction in travel times estimated in 5 minutes, linked to the best performance of new trains during traction, braking and reaching top speed. Therefore, with the same braking start speed and approach speed at the stop, it is noted that an ETR324 records a smaller braking space, with a consequent reduction in braking times.

Even the acceleration curve is certainly more powerful than RS trains. This greater acceleration, combined with an optimal distribution of traction, makes it possible to recover further time when restarting from the stations.

The calculated saving, therefore, is estimated as the differential between the time taken by a RS train already in operation and an ETR324 electric train. The time saving benefit will be enhanced and, therefore, concretely perceived by users following the foreseeable change in service hours when all the ongoing and planned investments are realized, and the new service contract is signed. Therefore, the temporal benefit will be taken into account starting from 2020.

The number of users who will benefit from the aforementioned reduction in travel times has been estimated at 952,000 passengers / year.

Regarding the time value (VOT - Value of Time), reference was made to the unit costs indicated in the RAILPAG Railway Project Appraisal Guidelines by the European Commission and the European Investment Bank (2005) for an average user, below reported:

- monetary value of time for business trips 20 € / h
- monetary value of time for commuting commutes € 8 / h
- monetary value of time for free time shifts 6 € / h

These values have been discounted to the year in which the work enters into service according to an average inflation rate of 1.9%.

The updated values become:

• monetary value of time for business trips € 23.06 / h
• monetary value of time for commuting commutes € 9.44 / h
• monetary value of time for Free Time transfers € 7.08 / h

The breakdown of movements by reason on the regional rail network, derived from regional planning documents, is shown below:

- systematic home-work movements 49%
- study 37%
- others 14%

Assuming that the percentage relating to the "other" reason is attributable to half of the business trips and for the other to free time, an estimated annual benefit of approximately € 655,784 is obtained.

As for the increased passenger comfort, the economic quantification is linked to the use of the new jazz-type electric trains which is considered appropriate as it justifies the investment with the need to renew the fleet, in order to provide services that can actually be appreciated by users.

First of all, it should be noted that qualitative surveys carried out on the national territory highlighted the increase of the importance of the level of comfort in the users' perception of the quality of the service. In particular, as part of a sample survey carried out in another region, for 20,110 users of regional trains, the importance of comfort among the variables that allowed the perception of an improvement in the level of service was clearly revealed. Indeed, more than 32% of travelers believe that the modernization and comfort of the fleet have helped to improve the service; the cleanliness of the vehicles the other most important variable.

In the absence of ad hoc investigations by Trenitalia for the monetary estimate of comfort, as well as an estimate of the willingness to pay (WTP, it was considered appropriate to proceed with the application of the rule of half indicated in the "Guide to the cost-benefit analysis of the projects 'investment' 2014", with a necessary change. This rule allows an appreciation of the qualitative elements linked to an investment in the absence of other direct quantifications.

The rule-of-half suggests the determination of the reduction of the generalized cost of transport following the implementation of the new investment. This derives from the improvement of the service offering conditions which, in turn, generate a consumer surplus. The quantification in this case, however, will not be applied exclusively to the hypothetical increase in demand, but to the entire demand already expressed since the greater comfort will be enjoyed by the entire current demand. Specifically, it was decided to quantitatively determine the comfort considering the general cost, thus determined as follow:

$$GC = p + v_t$$

where:
GC indicated generalized cost,
p is the average unit price paid for the journey on the railway line
v_t is the value of the unitary time saved.

The quantification of the comfort and therefore of the additional benefit following the investment will be quantified in half of the new generalized cost as follows:

Comfort value = GC / 2

In particular:
p = € 3.60 (average rate)
v_t = 778.980 / 952.000 = € 0.82
(where 778.980 is the value of the time saved, 952,000 is the number of annual trips)
GC = € 3.60 + € 0.82 = € 4.2
Value of unitary comfort = ½ GC = € 2.21
Total annual comfort value = € 2.21 x € 952,000 = € 2,103,920.

4.2 Other externalities generated by the investment

The use of new trains in operation, replacing rolling stock with an average age of over 40 years, determines an overall reduction in external costs - as the effects on the natural environment and on the social context induced by individual transport activities - impacting on the three levels of externalities, closely integrated with each other:

- a first level of externality connected to the interaction between transport and environmental resources;
- a second level related to interactions within the transport sector;
- and a third level connected to the interaction between transport and the other sectors of production and consumption.

As regard to the first level of externalities, the new electric trains, with the same number of passengers transported and infrastructural and service conditions, have a better energy efficiency, with a consequent small reduction in consumption and a relative reduction in CO_2 equivalents emissions, connected to the peculiar structure of the traction that optimizes braking and acceleration phases.

In this regard, it should be noted that Trenitalia, in the calls for tenders for the purchase of a total of 450 new trains asked manufacturers, as a reward criterion for the award, the maximum of technology and innovation to contain energy consumption and environmental impact, pushing industry to take a significant leap forward.

The result that follows is that the winning trainsets will have cutting-edge technological solutions, capable of guaranteeing consumption much lower than those recorded by current trains. Light alloys, high efficiency of electrical equipment, natural ventilation motors, CO_2 sensors to better calibrate the use of the air conditioning of the carriages, but also analysis of the life cycle of the product, recyclability close to 100 percent, space for transport and recharging electric bikes and much more.

Therefore, in the lifetime of the new 450 convoys, it will be possible to avoid the emission of almost 4.5 million tons of CO_2, which in the same period would be able to absorb a forest with no less than 15 million trees.

Based on what has been said, it is possible to estimate a benefit, connected to the lower externality in terms of CO_2 emissions, equal to 10,000 t during the useful life of an ETR 324, assumed equal to 25 years, for an annual saving of 400 t / train.

This modal effect, connected to a lower number of users who will use the private vehicle in favor of the train, will produce less air and noise pollution, a contribution to the greenhouse effect (in terms of lower CO_2 production) and a reduction in the level of

congestion and accidents. All the aforementioned externalities have repercussions in terms of damage to citizens' health (in the short term in particular air and noise pollution and accidents) which, following the modal switch, will be reduced.

Conversely, the lower number of users of private transport can produce some negative externalities in terms of greater costs for the community for the lower purchase of:

• car insurance products (hypothesized as an increase in the selling price imposed by the insurer to recover the economic value of the lower stipulations of car insurance contracts policies registered following the lower use of the private vehicle);

• fuel (assumed to be an increase in the selling price imposed by the operator to recover the economic value of the lower number of liters of fuel sold following the lower use of the private vehicle);

• automobiles (hypothesized as an increase in the selling price imposed by the manufacturer / dealer to recover the economic value of the lower number of cars sold following the lower use of private vehicles).

At the scale of the project in question it is clear that the net balance, between positive and negative externalities, is certainly positive. In this regard, it is sufficient to point out that the already modest modal diversions from road to rail allow a consequent reduction in claims and, therefore, the production of benefits for the community, given the monetary value reported in the literature for estimating the external costs of accidents, which quantifies the value of human life in 1,625,621 (€ 2005) / deceased, the value of serious wounds in 213,294 (€ 2005) / injured and the value of slight wounds in 18,490 (€ 2005) / injured.

4.3 Economic analysis and SROI

The methodological procedure adopted to carry out the economic analysis, by considering also SROI, complies with the criteria established by the valuation techniques of public utility investments (according to the manual prepared by the Public Investment Evaluation Unit of the Ministry of the Budget and Economic Planning).

All the analyses were carried out considering the community's point of view, in fact, the individual cost and benefit items from transfers (taxes) have been purified, because, in the case in which the investor is represented by a public administration, it does not influence the feasibility assessment of the work.

For the purposes of the economic analysis of the investment, only the variables relating to the generalized costs of transport were considered, since, as shown in the previous sub-section, the demand was not considered in the diversion from private cars to the railway vehicles.

Basically, in the analysis, in order to increase its level of reliability, only the "direct effects" of the intervention were considered, i.e. those attributable to the undeniable issues "surely" question affected by the introduction of new rolling stock in the exercise, neglecting the "indirect" benefits and those that cannot be monetized.

The procedure used, therefore, represents a sectorial approach to analysis that tends to make explicit only the effects that can be directly monetized.

The criteria adopted for the analysis are:

a) the following profitability indicators have been adopted among the different investment analysis techniques in the transport sector:

• Economic Internal Return Rate (EIRR);

• Economic Net Present Net Value (ENPV);

• SROI, in the form of an adjusted ratio which comes from discounted benefit / discounted costs (B/C).

b) as a method of calculating the benefits, the "user savings method" was adopted, which considers the direct benefits of the investment as a reduction in the generalized costs of transporting the user, expressed in economic terms, which derive from the realization of the investment;

c) the period of analysis was extended to the period 2018-2043;

d) the period of planning, financing and commissioning of the rolling stock has been assumed, as per schedule, equal to 2 years;

e) the residual value of the rolling stock was assumed to be 952,150 euros (market price to be corrected);

f) the social discount rate was assumed, based on the indications of Transport Ministry, equal to 3.0%;

g) the economic analysis was conducted at constant prices and without considering the effects due to the differential devaluation of the factors; this leads to excluding the variation in unit prices and costs that go into the formation of benefits;

The process followed in the elaborations consists of several successive phases:

I. evaluation of the benefits induced by the project by comparison in the two configurations "with" and "without" project;

II. estimate of economic profitability parameters;

III. sensitivity analysis of the results according to the elementary parameters concurrent to their determination.

While the total amount of economic benefits in the "intervention" situation arises from the sum of external economic benefits and the amount of internal benefits assessed similarly to the "without" scenario. Therefore, the total value, equal to € 5,563,006, is given by the sum of the internal economic benefits, equal to € 2,757,182, and by the external ones equal to € 2,805,824. Specifically, the overall economic benefits are:

- in 2018, € 2,757,182;
- in 2019 equal to 5,007,466 euros (2,757,182 euros + 2,211,920 euros - that is external benefits without time saving + 38,364 euros relating to the collection of the sale of ferrous material);
- from 2020 to 2042, € 5,748,082 (€ 2,757,182 + € 2,990,900 - the external benefits)
- in 2043, equal to 6,549,031 euros (5,748,082 euros + 800,949 euros of residual economic value).

The analyses carried out configure the intervention as a generator of significant economic benefits for the community, in fact the economic convenience indicators assume the following values:

ENPV = €. 38811730

EIRR = 25.53%

SROI = 4.00.

The level of SROI is quite appreciable and interesting. It indicates a return for the society of 4 € if 1 € is invested. This attempt of monetizing outcomes produces a single money metric that can facilitate comparisons with other projects. SROI makes it possible to appreciate the social benefits directly related to public spending and therefore to have an immediate perception of the social benefits generated by public funds allocated to projects or plans.

5. Conclusions

At this point it is evident that the evaluation methods used here, although characterized by simplicity, have some limitations which, in turn, bring about some problems. First, the criteria are not the results of a specific approach suggested by the traditional theory, but a compromise between the several approaches. As for financial analysis, it is clear enough that it is not applied in a strict sense because it does not consider the expected cash flows which should be referred to the precise decision-center to which the expenditure is linked. In addition, it is not a financial analysis because constant prices are used, even though they are modified by consideration of the relative prices trend, and because the used costs and benefits are external and often do not involve monetary transactions, as for example the travel time for motorway users. On the other hand, it cannot be stated that the economic analysis has been carried out with respect for the most accepted economic theory. In fact, evaluators do not use a homogeneous numèraire for the evaluation of costs and benefits, and specific assumptions are formulated in particular when benefits must be expressed in monetary terms. This is also the case of SROI. It is clear, therefore, that in absence of a clear scheme the economic evaluation is still affected by a high degree of subjective discretion.

From the case study examined it emerges that the economic analysis configures the intervention as a generator of significant economic benefits for the community, in fact all the indicators of economic convenience assume significant values (ENPV 38.811.730 Euro, EIRR 25.53% and SROI 4.00).

To verify the robustness of the summary economic convenience indicators calculated and to include the element of uncertainty, the risk scenario has been briefly described and a sensitivity analysis has been carried out which highlighted the robustness of the estimated indicators associated with the investment.

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