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Consumer surplus and macro valuation of tourism projects

Abstract: There cannot be a tourism industry without projects. These projects can take different forms, such as development of attractions, accommodation, entertainment, transport, new resorts, congress centre, events, ski infrastructure, etc.. They all involve considerable investment. This paper focuses on five topics. First, it focuses on the nature of investment appraisal and explores the difference between micro and macro approaches. Secondly, attention is paid to externalities in tourism. Indeed many projects belong to the general tourism infrastructure, and the benefits do not only accrue to the paymaster, who may not consider the negative effects. In other words, externalities must be taken into account. A third section deals with the identification of cost and benefit items or the cost-benefit scheme. Environmental costs are an important part of the scheme. In the same section we proceed with the quantification and valuation of cost and benefit items and the calculation of the NPV (net present value) and IRR (internal rate of return). In a fourth part we pay special attention to the valuation of the consumer surplus of non-priced tourism resources and more particularly to two methods often applied to measure the consumer surplus: 'The Travel Cost Method' and 'The Contingent Method' A fifth part of the paper is focused on CBA versus economic impact analysis.
Keywords: computable general equilibrium, contingent valuation method, cost-benefit analysis, economic impact analysis, externalities, I-O appraisal, Internal Rate of Return (IRR), investment appraisal, Net Present Value (NPV), travel cost method, willingness to pay, zonal travel cost method.
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Introduction

Long experience in the tourism sector has taught us that many investment decisions are very emotional; wrong investment appraisal methods are applied and/or

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the right method is used incorrectly. Therefore, special attention to investment appraisal is very important.

Most projects in the tourism sector are the initiative of individuals or companies–tourism or financial – and here the classic investment appraisal methods apply [Vanhove 2011]. However, in tourism, more than in any other sector, the investor (or what we call the 'paymaster') is not a company or a tourism entrepreneur but the public sector. Indeed many projects belong to the general tourism infrastructure and the benefits do not only accrue to the paymaster, who may not consider the negative effects (This can also be the case for a project in the private sector). In other words, externalities must be taken into account. In such a case, the classic methods of investment appraisal are insufficient. Tourism is clearly an economic sector in which social cost-benefit analysis (CBA) is applicable [Burgan & Mules 2001].

A project can be appraised from the micro or the macro point of view. In the first case only benefits (receipts) and costs for the investor (private or public) come into the picture. In the second case the benefit and cost items are large in number and of different natures. The total impact of the project for the destination should be taken into account. Application of CBA is the correct method [see also Vanhove 2013].

For many tourism projects the discounted cash flow approach is insufficient. Social cost–benefit analysis is more useful. Referring to Prest and Turvey [1967], CBA can be defined as: 'a practical way of assessing the desirability of projects, where it is important to take a long view (in the sense of looking at repercussions in the more distant as well as in the near future) and a wide view (in the sense of allowing for side effects of many kinds on many persons, industries, regions etc.) i.e. it implies the enumeration and evaluation of all the relevant costs and benefits'.

In addition to the cash flows the calculations take account of all the changes in social benefits and social costs that result from the project reducing them to monetary terms and discounting them to a present value from which the capital cost may be subtracted in order to obtain the net present value. Social CBA is by definition a macro-approach. We set the macro-economic costs and benefits against each other. Costs are defined in a special way – what level of output would have been reached if the factors of production were utilized in the rest of the economy? – i.e. costs of the project are measured in terms of its opportunity costs. Benefits are the additional benefits to the community that result from the realization of the project. The fundamental objective of a CBA is to complete the private economic calculations with figures for the economic benefits and costs of a project to its consumers and society as a whole. Some authors use the term 'social cost benefit analysis'(SCBA).

CBA is directly related to the externalities. 'External benefits' is a frequently used term in tourism. What do we understand by external benefits and are there also external costs? [see Vanhove 2011].

1. Externalities and tourism

'Externalities' is one of the vaguest and most ambiguous terms in economic science. We find a useful description in Boardman et al. [2001], who describe an *externality* as an effect that production or consumption has on third parties – people not involved in the production or consumption of an item. It is a by-product of production or consumption for which there is no market. 'No market' is not an essential part of the definition, and is not always correct [see also Bull 1995].

Other authors use the expression 'external effects' instead of 'externalities' [Sugden & Williams 1988; Mishan 1994]. They consider the social costs and benefits of a (private or public) project rather than the financial outlays and receipts that would be considered by decision-makers in private (or public) firms. There are several reasons for expecting social costs and benefits to be different from private (public) outlays and receipts. Indeed, externalities or external effects may occur for a wide variety of reasons. Some result because a particular type of technology is used (e.g. deterioration of the landscape caused by transport of electricity). Others result because of interdependencies or synergies between producers and consumers of different groups of producers A third group of externalities occurs because of networking (e.g. a convention centre stimulates the turnover of hotels and restaurants). Others arise because of negative effects on competitive projects, companies or events.

It is clear from the above that there are positive and negative externalities. The first group produces benefits, whilst the latter imposes social costs. Stabler et al. [2010] categorize externalities as follows:

- Consumer on consumer,
- Producer on consumer,
- Producer on producer,
- Consumer on producer.

'Externalities' is a generic term that is used, rightly or wrongly, to justify many projects. Furthermore, in many studies several terms are used to cover externalities – indirect effects, spillover effects, induced effects, stemming effects, pecuniary effects, side effects, etc.. Many consultants in the tourism sector abuse externalities to inflate the so-called benefits of a project. Therefore, to avoid such abuses it seems appropriate to start with identification of the types of externalities.

One can make a distinction between three types of negative and three types of positive externalities: 'unpaid' costs and benefits; 'underpaid' costs and benefits and positive and negative side effects.

1.1. Negative externalities

The first category of negative externalities is *unpaid costs*. Any project or event is the initiative of a person, firm or public body. Who pays for or finances the pro-

ject is not important; we call the investor the paymaster. At this level the paymaster is responsible for the investment costs and the running costs of the project, but he also cashes in the direct payments of the consumer (e.g. entrance fees to participate in an event, the use of a ski-lift etc.). We call this the 'project' or 'micro' level.

However, in most cases the paymaster does not pay for all the costs of the project or event. Many projects provoke a lot of economic, social and/or environmental costs for which the investor does not pay. There is no free lunch. A third party will pay the bill or suffer inconvenience [Vanhove 2003; Stabler, Papatheodorou & Sinclair 2010].

Typical examples of unpaid costs in the tourism sector include water pollution, noise, traffic congestion, destruction of landscape, etc..

In the case of *underpaid costs* some costs are taken into account but not at the full price. A typical example is the expropriation of land for a big event at a price below the market value. This brings us to the notion of opportunity costs. Cost should be measured as opportunity costs.

'Opportunity costs' is another economic term that leads to a lot of interpretation problems and misunderstandings. Any tourism project requires resources that could be used to produce other goods or services instead. Tourism projects such as festivals, sporting events, theme parks, winter sports infrastructure, for example, require labour, land, capital and/or equipment. The resources used for these purposes cannot be used to produce other goods or services. Almost all public or private projects incur opportunity costs. Conceptually, these costs equal the value of the goods and services that would have been produced had the resources used in carrying them out been used instead in the best alternative way [Boardman et al. 2001]. In other words, production elsewhere is foregone.

As stated above, cost items should be measured as opportunity costs. In efficient markets, opportunity costs are equal to market prices. However, markets are not always efficient. Let us suppose that the Olympic Games are to take place in a region or country with very high unemployment. In the construction phase of the necessary infrastructure (e.g. new stadia, new sport infrastructure) and in the running of the games, hundreds or thousands of unemployed find jobs. All of them are paid a normal salary. These salaries are included in the investment and running costs at the micro-level. However, costs should be measured as opportunity costs. What are the opportunity costs of an unemployed person? His or her best alternative is probably unemployment. The corresponding contribution of unemployed people to the national product is zero (unemployment benefit is a pure transfer). There is no production (goods or services) foregone. This type of underpayment of costs is quite often a very important item in project appraisal from a macro point of view. This might be even more the case in a tourist rather than in an industrial region. Many tourism regions have high unemployment.

A third group of negative externalities relates to *side effects* on competitive projects or events. We all know of situations where a new tourism project is competing with an existing production unit in the same region – for example a new congress centre is built in a place close to a city which already has good congress facilities. In such circumstances a reduction in the turnover of the existing product can be expected. The corresponding reduction of value added should be considered as a cost item for the new event or congress centre.

1.2. Positive externalities

Again, *unpaid benefits* are the first category of positive externalities. Not all benefits of a project or an event accrue to the investor. In tourism there are many possible unpaid benefits, such as the promotion effect, international exposure, increase of property value, etc..

However, in other cases the consumer does not always pay the full price of a product or service or we are confronted with *underpaid benefits*. If the consumer pays less than the market price for a service (e.g. a performance) – benefits are measured in terms of market prices – it seems obvious that there is an underpayment of benefits.

The situation becomes more complicated when we consider the consumers' willingness to pay. This brings us to the notion of consumer surplus. The latter is one of the foundations of cost–benefit analysis [Pearce 1983; Boardman et al. 2001].

A demand curve indicates the quantities of goods or services that individuals purchase at various prices. In Figure 1, a downward-sloped demand curve is illustrated as line P_1F. The key is the link between demand schedules and the willingness to pay (WTP). Figure 1 illustrates that there is at least one consumer who is willing to pay a price of P_1 for one unit of service X. Similarly, there is at least one person who would pay a price of P_2 for the second unit of X, and there is someone who would pay P_3 for the third unit of X and so forth. The message from this exercise is that the area under the demand curve, or the sum of all the unit-wide rectangles, closely approximates to the WTP for X by all members of society. In other words, the triangle P_1P_4C and the rectangle P_4CX_3O in Figure 1 approximate society's WTP for a given amount of X, in this case the amount X_3. Thus the sum of the triangle and the rectangular approximates the total gross benefits society would receive from consuming X_3 units of service X. The consumers pay P_4 to the producers of the tourism service. In this case, the net benefits from consuming X_3 units equal the area below the demand curve but above the price line P_4C. This triangle P_1P_4C is called the consumer surplus. When demand curves are known consumer surplus is one of the basic concepts in CBA to value impacts. The reason why consumer surplus is so important to CBA is that changes in consumer surplus can be used as reasonable approximations of society's WTP policy changes [Boardman et al. 2001].

To show how the concept of consumer surplus can be used in CBA, consider a project that results in a price change. We take a price reduction in Figure 1 from P_4 to P_5. This would result in a benefit to consumers equal to the area of the trapezoid P_4CFP_5. It follows both because consumers gain from paying a lower price for the X_3 units they previously purchased and because they gain from the consumption of $X_3 - X_4$ additional units.

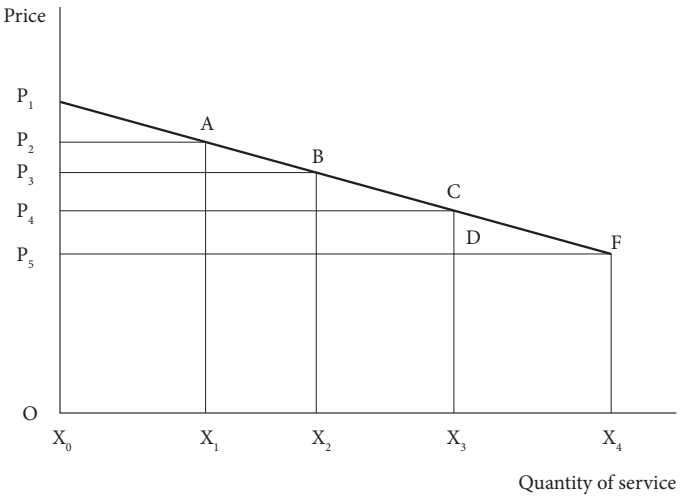

Figure 1. Consumer surplus

If there is an increase in the price, there is a loss of consumer surplus. However, if the price increases results from an imposed tax there is no loss but a simple transfer – money is transferred from consumers to the government. From the perspective of society as a whole, its net impact is zero.

Changes in consumers' surplus are measures of the effects on the welfare of individuals of changes in the prices of goods that they consume. Individuals may be affected in a very similar way if there are changes in the costs of 'factor prices' (such as labour, the use of capital and land) that they supply.

Such changes are said to lead to changes in producers' surplus [Sugden & Williams 1988]. Producer surplus is the supply-side equivalent to consumer surplus. To define producer surplus, we refer to Figure 2. At a price of P_1, the producers receive revenues equal to the area represented by the rectangular area OP_1BX_1. The difference between this rectangular area and the area of the rectangle under the supply curve S, that is the area AP_1B, is called producer surplus. Indeed, some producers are willing to produce at a price lower than P_1.

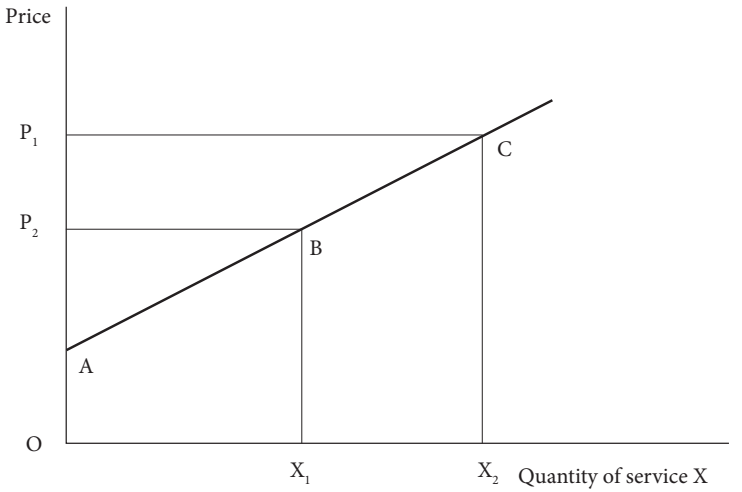

Figure 2. Producer surplus

Thus, producer surplus equals the revenues from selling X_1 less the variable costs required to produce X_1 – or the sum of total producer surplus and opportunity costs (that is areas $AP_1B + OABX_1$) corresponds to total revenues. According to Burgan and Mules [2001] producer surplus represents the return to producers for units of production up to and including the last unit above and beyond the cost of resources involved in the production. The assumption is that resources are used at their opportunity costs.

Price changes that are due to a project result in impacts on producers that can be valued in terms of changes in producer surplus. An increase in price to P_2 increases producer surplus (or economic profits) by P_1P_2CB [Boardman et al. 2001].

Most tourism projects or events have a positive impact on the turnover of many other production units such as hotels, restaurants, pubs, taxis, souvenir shops, etc., known as the *side effects* on complementary activities. It is not the turnover that counts but the additional value added created. Quite often the additional value added in complementary activities is many times greater than the value added at the micro-level.

These complementary activities have, in their turn, an impact on intermediate deliveries. We call them indirect effects (indirect income).

Care must be taken with secondary effects due to spending of earned direct and indirect income or induced effects (induced income). Should we take into account the portion of incomes resulting from an event spent by the recipients? This brings us to the famous multiplier effects, more particularly the induced effects. We have to be careful with induced effects.

2. CBA in the four steps

CBA is a practical way of assessing the desirability of projects, where it is important to take a long view and a wide view – i.e. it implies the enumeration and evaluation of all relevant costs and benefits. In CBA we try to consider all of the costs and benefits to society as a whole. That is the reason why some people refer to CBA as social cost–benefit analysis. For Boardman et al. [2001], cost–benefit analysis 'is a policy assessment method that quantifies in monetary terms the value of all policy consequences to all members of society. The net social benefits measure the value of the policy. Social benefits minus social costs equal net social benefits'. The broad purpose of CBA is to help in social decision-making.

The foundations of CBA are the Pareto efficiency, opportunity costs, willingness to pay (see consumer surplus) and producer surplus. An allocation is Pareto-efficient if no alternative allocation can make at least one person better off without making anyone else worse off. An allocation is inefficient, therefore, if an alternative allocation can be found that would make at least one person better off without making anyone else worse off. Boardman et al. state that 'one would have to be malevolent not to want to achieve Pareto efficiency – why forgo gains to persons that would not inflict losses on others?'. These writers make the link between positive net benefits and Pareto efficiency. If a policy has positive net benefits, then it is possible to find a set of transfers, or side payments, that makes at least one person better off without making anyone else worse off. A full understanding of this link requires some knowledge of how to measure costs and benefits in CBA. It is necessary to consider willingness to pay as the method for valuing the outputs of the policy and opportunity costs as the method for valuing the resources required to implement the policy. However, The application of CBA does not necessarily result in a Paretian improvement. According to Tisdell and Hartley [2008] gainers do not necessarily compensate the losers so some may be worse off than before the change. We refer to the items of the scheme in Table 1. In this case the income distribution issue arises. That is an aspect that we disregard in practical CBA applications. Income distribution is a political matter.

The costs are measured in terms of its opportunity costs. Benefits are the additional benefits to the community that would result from the realization of the project. Costs and benefits of a project are the timelines of consumption foregone and provided.

In a CBA, there are four important steps:

1. Identification of the cost and benefit items
2. Quantification of the cost and benefit items
3. Valuation of the cost and benefit items
4. Calculation of net present value (NPV) and/or internal rate of return (IRR).

2.1. Identification of cost and benefit items

The identification of cost and benefit items is directly related to the externalities dealt with earlier in this chapter. Table 1 might be helpful in identifying the cost and benefit items from the viewpoint of society as a whole. We applied this scheme for the first time in 1971 for the study 'The micro and macro profitability of a congress centre in Bruges' [WES 1971]. Four levels of costs and benefits can be distinguished. The first level is the micro-level, also called the project or paymaster's level – in other words who pays for the project? The other three levels are related to the externalities dealt with earlier in this chapter.

This is not the only possible cost-benefit scheme. Another possible scheme is described by Scherly and Breiter [2002] and Stabler, Papatheodorou and Sinclair [2010].

2.2. Quantification of cost and benefit items

The next step is to express the items of Table 1 in quantitative terms – arrivals, nights, metres, cubic metres, volumes, etc.. We can be confronted with two possibilities; either the cost and benefit items are measurable, which is the normal situation, or the items cannot be expressed in a quantitative unit; in that case they are called intangible items. A typical intangible cost item is a destruction of the natural beauty of a landscape.

Table 1. Cost-benefit scheme

Level	Costs	Benefits
Project or paymaster's	Investment costs Running costs	Direct receipts
'Unpaid' level	Unpaid use of factors of production	Unpaid satisfaction of needs
'Underpayment' level	Underpayment of factors of production	Underpayment of products and services
Side effects	Side effects on competitors	Side effects on complementary sectors, firms or projects

With respect to the quantification of cost and benefit items, a number of principles should be respected. The first is quite evident – it is important to avoid double counting. The cost–benefit scheme can be very helpful in avoiding one or more cost or benefit items being counted twice but even so double counting is not impossible. The development of a camping area cannot lead to higher land value of the area and

to additional value added created in the accommodation firms on the site; it should be either higher land value or additional value added.

More important is the application of the 'base case' or the 'with and without' principle rather than the 'before and after' principle. The base case is a 'do nothing' option. The 'do nothing' option requires a clear description of what is likely to occur in the absence of a project (policy change).The 'with and without' principle compares the tourism development of the project with the situation that would occur without the project – in other words it is an evaluation in terms of the difference it makes. The 'before and after' principle attributes to a project effects that are not caused by it but which occur because of the passage of time or for other irrelevant reasons (e.g. what were the costs before the new facility was implemented, and what will they be afterwards?).

An example makes it clear. The construction of a congress centre in a city will boost the number of nights stayed. It would be incorrect to attribute all additional nights to the congress centre; the number of nights would still probably have increased without the congress centre. The 'with and without' leads in this case to a lower benefit than the 'before and after'. However, there are cases where we have the opposite situation (e.g. a declining trend of nights in the city where the congress centre is built).

Furthermore it is important to emphasize that in Table 1 technological spillovers should be taken into account insofar as they alter the physical production possibilities of other producers or the satisfaction that consumers can obtain from given resources. On the other hand, pecuniary spillovers should not be taken into account if the sole effect is through prices of products or factors. There are cases involving transfers of resources from one group in the economy to another.

With respect to events crowding-out effects, expenditure switching and retained expenditure should be considered in the quantification of the different items [Ryan 1998; Ryan & Locker 2001].

2.3. Valuation of cost and benefit items

A third step in CBA is the valuation of the quantified items; the latter must be expressed in monetary units for each period of time over the economic life of the project.

In general market prices are considered to be a proxy of the social valuations; market prices of final outputs indicate the 'proper' valuation of benefits and market prices of resources the 'proper' valuation of costs. 'The prices placed on goods and services through the exchange process afford a means of measuring the value attached to those goods and services by those who participate in the exchange, and provide a basis for evaluating project effects in monetary terms' [US Government, Federal Inter-Agency River Basin Committee, Subcommittee on Benefits and Costs, 1950 – *The Green Book*].

In evaluating costs attention should always be fixed on estimating the social opportunity cost of the resources used in the project; in other words, the social value of goods and services that would have been produced if the resources had been employed in the next best alternative public or private use. For most goods and services bought by public authorities from commercial firms, as well as for labour hired in competition with private sector, the market price is an adequate measure of social opportunity cost.

In practice there is not always a market price. In these cases a shadow price or accounting price can be used [Sassone & Schaffer 1978; Mishan 1994; Bull 1995; Boardman et al. 2001]. This is the price an economist attributes to a good or a factor postulating that it is more appropriate than the existing price, if any. So the price of a water purification plant down the river can be the shadow price for the waste water from a big tourism project discharged into the river and for which the tourism project is not charged.

Many writers reserve the term 'shadow price' for outputs that are not sold in a direct market. However, shadow prices may also be used to correct the underestimation or overestimation of the value of a particular resource.

Other price standards in the absence of market prices include (see section 4):
- The alternative production cost
- Individuals' willingness to pay
- Surrogate prices based on the behaviour of economic agents (travel costs)
- The prices of similar products elsewhere.

There are still items that cannot be measured such as the improvement of a landscape by a park (in the opposite case, the value of destruction of a landscape) or increase or decrease in the rate of juvenile delinquency due to tourism development.

Sometimes there is opposition to the application of CBA because of the existence of intangible and/or non-measurable cost or benefit items. This is not an adequate argument. We should recognize that some items cannot be expressed in monetary terms without saying that those items should be neglected. Therefore we recommend adding (beside the table of quantifiable items) a qualitative table with costs and benefits that are intangible and/or not measurable. We call this an itemisation of the non-measurable physical benefits and costs associated with the project; it is suggested that a short description of the expected intangible effects should be added. This itemization can be helpful for the decision-makers of the project.

Very often the question is raised as to what should be done in case of price inflation and relative price changes. As a rule we recommend the application of constant prices. For convenience this will usually be the price level in the first year. Adjustments need not be made for inflation or general price increases. Uniform change in all prices can be ignored and have no influence on the value of NPV or IRR. Adjustments need to be made for relative price changes. If some prices are likely to change relative to others this should be reflected in CBA. The rule of con-

stant price also applies to the discount rate. The market interest rate is very often a combination of real interest and the inflation rate.

Stabler et al. [2010] refer to a number of methods which have been developed to value environmental attributes and which could be applied to the valuation of non-priced tourism resources:

- Contingent valuation
- Choice modelling
- Hedonic pricing
- Travel costs
- Combination of these.

Most of these methods relate to willingness to pay. The 'travel cost method' and the 'Contingent valuation method' are quite often used (see next section).

A special case is when there are adjustments to the market prices relative to taxes and subsidies. Indirect taxes are a cost to those who pay them but do not necessarily reflect economic costs to the country or the region as a whole in the sense that an increase of tax does not mean that more economic resources are required. From the viewpoint of the economy taxes and subsidies must be viewed as transfer payments which normally should be excluded in valuating the costs of a project. Thus an import tax on beef consumed in the tourism sector should not be regarded as a cost to the economy since it merely represents a transfer from the hotelkeeper to the government. Conversely, a grant for vegetable growing is clearly a benefit to the farmer but is not a benefit to the economy.

On the benefit side an indirect tax on final output should be deducted as a cost by the producer paying it but it should not be deducted from the valuation of the benefits for social cost–benefit analysis. In practice market prices (including VAT) are the yardstick to evaluate benefits based on the principle of 'willingness to pay'. Indirect taxes are part of the price people are willing to pay. In any case indirect taxes paid by foreigners are a net benefit for the country; in tourism, the share of inbound tourism can be very important. All purchases must be cleared of VAT and other sales taxes. A tax paid to the government is a tax paid to society. This can lead to a real difference in profitability between a social cost–benefit application and a pure financial assessment.

This rule cannot be applied in all circumstances. A higher tax for pure budgetary reasons has nothing to do with willingness to pay. Thus a higher tax on fuel leads to higher transport cost savings in a CBA of a new highway project but in this case the tax has a pure transfer effect and does not contribute to any increase of welfare.

2.4. Calculation of NPV and IRR

Now we have all the elements to calculate the NPV or IRR for tourism projects. Table 1 can be transformed into the form of a calculation table [see Vanhove 2011].

For each cost and benefit item a column is provided (there can be more than one column for each generic cost and benefit item).

A crucial point in the NPV calculation is the choice of the discount rate [see also Stabler, Papatheodorou & Sinclair 2010]. The role of the discount rate is two-fold. Firstly, it makes costs and benefits accruing at different points of time commensurable. Secondly, in considering the net benefits achieved by an investment project attention has to be paid to its costs which means the foregone opportunity. The role of the discount rate is to help to ensure that these forgone opportunities which are themselves time lines of costs and benefits, are properly taken into account. The foregone opportunities can be in the public sector (consumption or investment) or the private sector (consumption or investment). In other words the discounting is necessary to allow for the time factor and the cost of capital.

3. Measurement of consumer surplus or willingness to pay

Consumer surplus is in many CBA applications an important item. This is the case for many recreation projects and events with no or a low entrance fee. This brings us to the question of valuation of non-priced tourism resources. We find two methods in literature: (a) the travel cost method (TCM) and (b) the contingent valuation method (CVM). The TCM is based on market behaviour or revealed preference while CVM methods (there are several variants) provide a stated preference framework by asking respondents about their willingness to pay (WTP) or willingness to accept [Greiner & Rolfe 2004].

3.1. Travel cost method

The method is based on the premise that the costs of using a tourist area (e.g. recreational site) can be considered as a proxy measure of visitors' willingness to pay and thus their valuation of those sites. Let us suppose that visitors do not pay to gain entry to a recreation site which is often the case. They have incurred expenditure implicitly or explicitly to travel to it. This can be used as a measure of the valuation of that site [Tisdell 2006]. It involves the travel costs incurred by visitors to a tourist site (e.g. a museum) plus any entry fee as a proxy for their effective price for visiting the area.

The TCM has two different forms. The first one concerns trips generated by individuals. The second relates to trips on a zonal base and is called zonal travel cost method (ZTCM). The operational core of the ZTCM is the trip generation function [Boardman et al., 2001]. This measures the relative frequency of visits to a recrea-

tion site from the different zones in relation to the travel cost involved in visiting the recreation site. In other words the ZTCM is based on actual visitors rather than potential visitors. The ZTCM implies the specification of the zones from which users of the site originate (concentric rings or isotime lines around the recreation site on a map). Based on a pure theoretical example Figure 3 gives the relation between average total cost per person (TC) and average visits per person (V) for zones' A through E.

Suppose that people from zone C actually pay only $65 for each visit(based on the Boardman example). The consumer surplus for someone from zone C is obtained by adding the consumer surpluses associated with each visit across all trips ($90 – $65 = $25 for the first visit, $85-$65= $20 for the second visit , and $15, $10, $5 , and $0 for the third, fourth, fifth, and sixth visits respectively) which equals $75. This amount is represented by the area of the shaded triangle in Figure 3. For more details about the method we refer to Boardman et al. [2001] and Herath [2004].

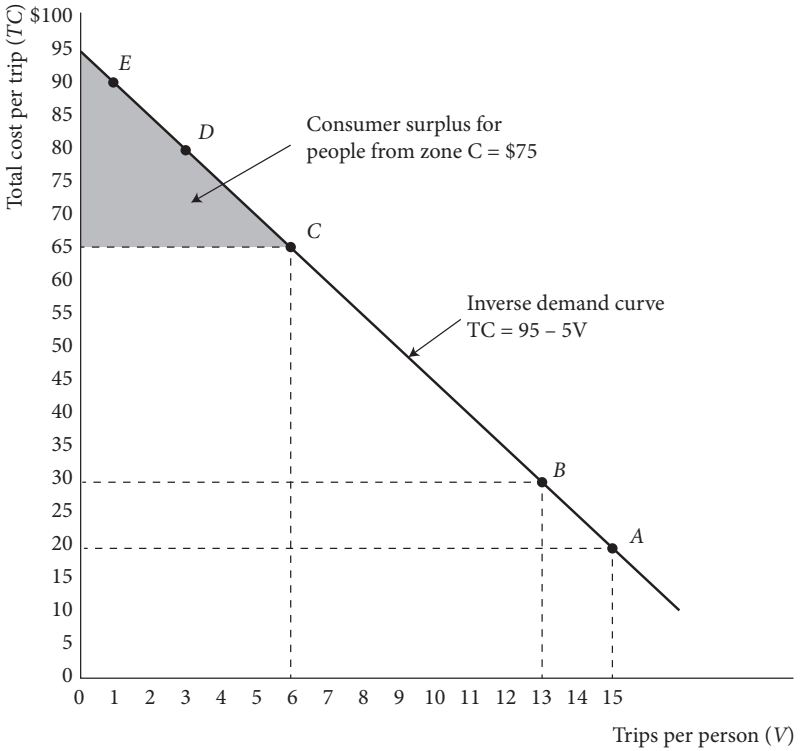

Figure 3. ZTCM and consumer surplus
Source: [Boardman et al. 2001]

3.2. Contingent valuation method

The contingent valuation method is a well-established stated preference technique for the estimation of the economic value of non-market resources. The underpinning of the method is the assumption that individuals can be induced to reveal their true willingness to pay for non-monetary goods through their behaviour in hypothetical markets [see Boardman et al. 2001; Herath & Kennedy 2004; Greiner & Rolfe 2004; Tisdell 2006; Herrero, Sanz & Dervisa 2011]. This method has several variants. The most frequently used models are:

- The open-ended model (respondents are asked to state their maximum WTP but no values are suggested).
- The iterative bidding model (proposes a series of amounts until respondents reveal their maximum WTP – increasing or decreasing).
- The dichotomous choice model (respondents are asked whether they would participate in an activity if it were to cost them € X. The € X bid amount offered to any given respondent is randomly chosen from a predetermined set of bid amounts distributed over the survey sample. Only 'yes' or 'no' are required to these pre-specified bid amounts). Table 4 shows a histogram of dichotomous-choice responses [see Boardman et al. 2001].

Figure 4 shows the distribution of responses to bid prices in the form of a histogram. The bid prices are shown on the horizontal axis (from $0 to $100). The vertical axis measures the percentage of respondents who answer 'yes' to the bid price offered to them. The resultant curve in Figure 4 may be viewed as the demand curve. The area under the curve provides an estimate of the individual's willingness-to pay. If the values of X are evenly spread, then the histogram can be used to obtain an estimate of the average individual's WTP by applying the formula:

$$WTP = v \sum_{k=0}^{n} (\text{probability acceptance at price } kv)$$

where:

v – the interval between prices (with of the individual bars),

n – number of values of X (number of bars).

Boardman et al. underline that researchers rarely work directly from the histogram of accepted bids. Estimates are usually made by estimating a statistical model for predicting the probability that an individual with specific characteristics will accept a particular bid price.

Prudence is always called for in applying CVM especially in case of sensitive (political) matters. Furthermore CVM and TCM do not always lead to the same result. [see Herath & Kennedy 2004].

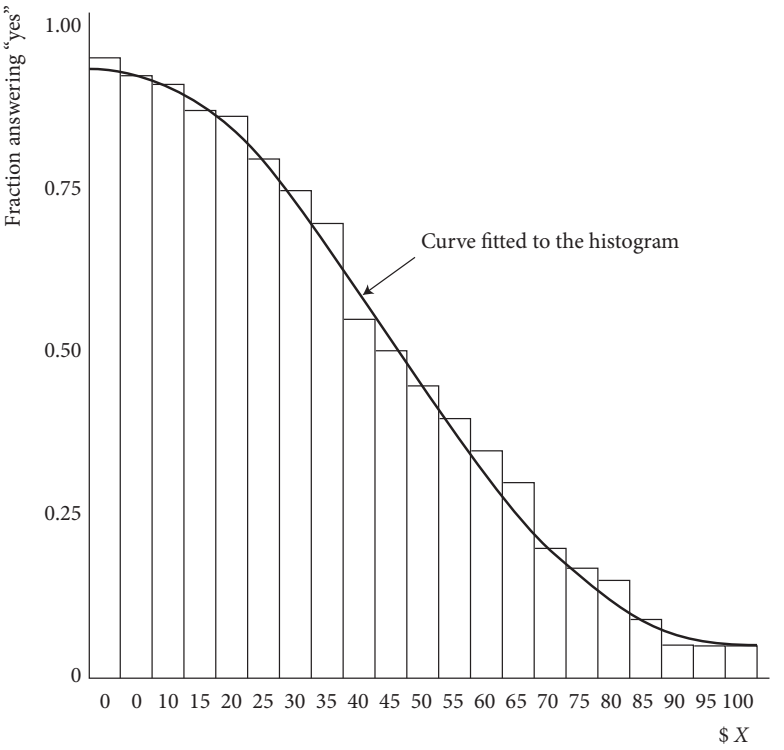

Figure 4. Histogram of Dichotomous-choice models
Source: [Boardman et al. 2001]

Nevertheless both methods are very useful to estimate the WTP and the corresponding consumer surplus. Very often they are the only alternative.

4. Cost-Benefit Analysis versus economic impact analyses

Economic impact analyses such as TSA (Tourism Satellite Account) method, National Accounts method, and I-O (input-output) method aim primarily at estimating the income and employment generation of an event, a project, additional tourism exports, etc. All these methods neglect the cost side, the positive and negative externalities and side effects. This is less the case with the CGE (computable general equilibrium) approach.

Dwyer, Forsyth and Spurr [2006] formulate the limitations of the I-O approach as follows (the same applies to other methods as well):

– Resource constraints do not exist; in other words additional resources are assumed to be unemployed with no constraints on their availability.
– Prices and costs remain fixed as economic activity expands. This means that I-O analysis excludes changes in factor and product prices which may affect employment and output of other sectors.
– There are constant ratios between inputs and output, between value added and output and there is the assumption of constant labour productivity
– Spending on new tourism products (e.g. an event) by the local population does not lead to a diversion of spending away from other goods and services.

An essential difference between CBA and CGE is the following [Vanhove 2013]. Cost-Benefit Analysis is primarily a partial equilibrium technique. It focuses on the direct impacts of a project. CGE techniques are general equilibrium. Furthermore CBA is very detailed. Unpaid and underpaid costs and benefits and side effects on complementary and competitive firms are taken into account. CGE techniques are general equilibrium but less detailed [Dwyer, Forsyth & Spurr 2006]. A CBA takes into account several costs and benefits which would not be considered in a CGE model. Dwyer and Forsyth refer to non-priced effects (e.g. noise of an event or traffic congestion) which do not get included in the markets which are modelled.

Another important difference is related to the time period covered. A tourism infrastructure project has an economic function for several decades. That is the reason why in most cases CBA takes a period of 30 years into consideration. Indeed benefits accrue during a very long period. Of course this is not the case for events. In the case of an event costs and benefits take place in the same year. This probably explains why the comparison between CBA and economic impact analyses (I-O, CGE) quite often relates to a big event.

CBA and CGE are complementary techniques. One technique picks up items that are not taken into account by the other. One of Dwyer and Forsyth's conclusions is very relevant. 'The two techniques focus on different aspects of the evaluation problem. CBA is the established technique for assessing the benefits and costs of a project, and as such, it is appropriate for an event. CGE models are the preferred technique for assessing the impact of an event on economic activity and its various dimensions such as GSP/GDP and employment'. Impact analysis and CBA become closer in case of unemployed or underused factors of production. The relative value of different methods is determined by the needs of the user and sophistication of the results required [Burgan & Mules 2001].

5. Special problems with respect to CBA

In the application of CBA we can be faced with a number of special problems. The first is risk and uncertainty. Here we take the two terms as synonymous although this is not

completely correct. Risk is inherent in all investment projects but for some projects the uncertainty might be bigger. In the tourism sector there are many projects with uncertain factors. How do we tackle risk and uncertainty? In literature, several procedures are proposed. Two have little value: risk premium to the discount rate and shortening of project life. These procedures have little value because nobody can tell us what risk premium should be taken or by how many years a project should be shortened.

We prefer to recognise that there are risks and thus recommend that two or three variants be taken for one or more cost or benefit items. The consequence of this approach is a multitude of NPVs or IRRs. However, it cannot be the intention to present 50, 100 or 200 results. Therefore, we propose to keep to three combinations:

- The most pessimistic approach. In this case the highest value is taken for each cost item and the lowest for each benefit item. If the NPV > 0 we obtain a positive sign in favour of the project.
- The most-optimistic approach. This uses a combination of all the lowest cost and highest benefit alternatives. An NPV < 0 is a negative indication against the project.
- The most likely result. Here NPV or IRR is based on a combination of all the most likely estimates of cost and benefit items.

This brings us to the sensitivity analysis [Boardman et al. 2001], with worst-and-best case analysis, the most plausible estimates and partial sensitivity. The latter is most appropriately applied to what the analyst believes to be the most important and uncertain assumptions. It can be used to find the values of numerical assumptions at which net benefits equal zero. The partial sensitivity analysis can also be applied with respect to the right choice of the discount rate.

Another approach of risk analysis is 'component analysis', based on the composition of the cost components as well as the composition of the benefit components of the NPV. Here it must be reassuring for an investor if one cost component represents 60 per cent of the NPV of the costs and there is not much uncertainty about the estimation of that item; similarly if a benefit component has a high share in the NPV of benefits and shows little risks.

Another problem are the limitations in space and time. Any project is influenced by the definition of space and time. The NPV or IRR of a project can be calculated for a resort, destination, region, county or country. The result will most probably be different with respect to the space (or area) level. Two examples make this clear. A major event, financed by the destination, can lead to important side effects which do not accrue to the inhabitants of the destination and as such cannot be considered as a benefit for the destination. However, from the national point of view these benefits should be taken into account. Another relevant example is the building of a congress centre in a city subsidized by the national government. For the city the grant means a reduction of the investment and/or operation costs but from the national point of view the subsidy should be disregarded.

Limitations in time are of a different nature. The question arises as to how long a period we should take into account in order to get a reasonable estimate of the total effect of the investment. The answer depends on many elements. The first factor is the level of the social discount rate. A high discount rate leads to a negligible NPV of a benefit accruing in 30 years or more. Other important elements include physical length of life, technological changes, emergence of competing products or projects and shifts in demand.

Final remarks

A special problem is the comparability of the profitability of a project with other projects. In most cases this is a theoretical problem; in practice there is not a similar project. A comparison of a project in one field with one in another field does not make much sense. A choice between a tourism project and an education project cannot be based on the difference in IRR; the choice is purely a political decision. It is very important to notice that a CBA can facilitate a political decision.

Sometimes it is alleged that CBA is perceived as technocratic with too much emphasis on economic efficiency. It is argued that CBA is unable to embody the socio-cultural, political factors of human existence and the complexities of ecological systems [Stabler, Papatheodorou & Sinclair 2010]. This is not completely true. Economists should focus on efficiency; public decision makers can add social considerations. Income distribution is such a social issue. Most economists cannot take income distribution into account. The latter belongs to the political level. Sustainability is not ignored in CBA. Table 1 proves this. When social and ecological factors cannot be quantified or expressed in monetary terms a qualitative table is a necessary complement.

We support the thesis of Stabler et al. [2010] "(…) the method is conceptually simple, wide ranging in its scope, well founded in economic theory, where the projected outcomes are expressed objectively in monetary terms (…)". Within the tourism field, CBA is more and more applied. We were already confronted with CBA in the beginning of the 1970s. I applied the CBA for a congress centre in Bruges [WES 1971] and I refer to the CBA application of the French SCETO group on the famous and successful Nusa Dua tourism project in Bali.

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