MusTT sustainability framework: SII and SIA methods and user guide

Final deliverable 4 for the DG-ENTR MusTT project

NHTV Centre for Sustainable Tourism and Transport

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Paul Peeters
Cees van Halen

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Management Summary

The MusTT project has developed an impact inventory and assessment methodology to analyse the sustainability profile of tourist transport systems. Why? There is a clear need to increase our understanding of the impacts that a tourist transport system has in all dimensions of sustainability. Transport is a crucial link in the tourism chain, and acts as enabler for the fulfilment of the personal needs of tourist, the creation of jobs, and the economic prosperity of tourist regions. By definition, tourism is impossible without transportation.
Even today, transport of tourists to/from/at the destination comprises the major part of the total impact of tourism on a variation of environmental effects. Specifically, effects like climate change, air quality and noise pollution are largely caused by transport of tourists. There is an urgent need to understand these impacts in a holistic way. This is specially the case, as strong future volume growth of the tourist sector is expected and the prevalence for tourist transportation modes is changing. If we fail to improve today's systems, negative impacts of tourism are likely to increase enormously as result of these trends.

Understanding the full impacts of transport in the perspective of tourist systems is an essential first step towards awareness and readiness for action (to improve the sustainability performance) by the stakeholders in the tourist industry. As a contribution to learning to understand sustainability of tourism transport, the MusTT project has developed a coherent sustainability framework consisting of:

- A coherent set of parameters for expressing the sustainability profile of a tourist transport system.
- A Sustainability Impact Inventory (MusTT-SII) method for systematic collection of expert judgement(s).
- A Sustainability Impact Assessment (MusTT-SIA) method for objective and (semi)-quantitative analysis of the performance of the tourist transport system.
- A visualisation tool (radar screen) for easy to understand communication of the SII and SIA analysis results.

We offer this framework to the stakeholders and we have demonstrated its applicability in the various parts of the MusTT study.

- The SII method has been applied by the MusTT team to analyse the set of collected Good Practices (GPs). A Sustainable Impact Inventory (SII) table and radar diagram is included in the description of most GPs. This profile shows the *perceived* performances for all sustainability parameters, describing the outcome of the independent expert judgement of the GP initiative by consultants of the MusTT consortium. The SII results have been sent for review to the GP coordinators – their views will
- In addition to the SII approach, the MusTT project has developed a more *objective and quantitative* method: the Sustainability Impact Assessment (SIA). This SIA methodology has been specifically developed for the analysis of tourist transport cases – including models, weighting factors and reference data. For testing the MusTT-SIA method, a SIA data capture sheet has been developed and sent to the coordinators of selected GPs for completion- as the execution of a SIA requires reliable and quantified data of the GP. The outcome of the SIA calculations is discussed and evaluated with the GP coordinator.

It must be stressed that both the SII and SIA methods are offered for making a direct comparison of a new transportation system that is introduced against a business as usual (BAU) reference situation only. The results should therefore not be used outside this context. Today's methods offered by MusTT are not designed to make cross-comparisons of SII or SIA profiles of BPs, as system boundaries, scale of introduction and reference systems differ.

It is suggested that sustainability workshops are organised for all stakeholder groups in the tourist transport industry in which good practices are presented and discussed. At these workshops, the use of the MusTT sustainability framework in specific cases can be demonstrated and stakeholders can be trained to make use of the sustainability tools offered by MusTT.

1 Background and scoping of the work, and general introduction of the MusTT sustainability framework

Background

The domain of tourism transportation systems and sustainability is still a rather unexplored area. Although there are many niche-player offering eco-tourism packages including efficient transportation solutions, the main stakeholders are still in a learning phase. Development and implementation of sustainability strategies is no common practice yet. The struggle for survival and the heavy price competition put a lot of pressure on the transportation companies. As result, a short-term horizon and dominance of the economic domain over the environmental and social domain results.

The MusTT study could offer the 'handles' to empower the stakeholders to improve this situation. Objectives of the MusTT study include:

- to increase general awareness of the importance of sustainability for the broad group of stakeholders involved;
- to create a sense of urgency that design of sustainable development strategies/roadmaps by the sectors involved is needed;
- to create a window of opportunity for new initiatives, e.g. by learning, exchange of ideas, expressing needs and sharing good practices.
- to bridge groups of stakeholders that – until today – act in relative isolation from each other.

To contribute to these objectives, it is important that a common language and methodology is available for communicating and analysing sustainability issues. For this, a dedicated sustainability framework for tourism transport as been developed by the MusTT team. This work has been preceded by making an inventory and an analysis of existing (more generic) leading sustainability frameworks and by discussions with Eurostat.

The MusTT sustainability framework includes an easy to understand visualisation tool (*sustainability radar*) that will be helpful for the stakeholders to understand the positive and negative impacts of their acting, and even more important to learn where improvements could be effective

Scope

MusTT a preparatory phase of a larger action envisaged by the European Commission. We stress the fact that the MusTT sustainability framework presented in this report should be seen as a contribution to this process and not as the final outcome. The framework is designed to assist in comparing the impacts of a new transportation solution that has been introduced against the impacts of a business as usual (BAU) reference situation.

Setting objectives and translation into a practical approach

In our work the MusTT team started by setting clear objectives for the sustainability framework, based on the likely role that this framework could play in terms of the multi-annual actions described in the prior paragraph.

The list below shows these objectives and the way the MusTT team has tackled them.

Objectives	***MusTT approach***
The methodology should be based on a benchmarking study of leading relevant sustainability impact assessment methods reported (available of under construction).	*A SIA benchmark study has been executed. The results of this benchmark study have been reported (see Annex).* *A meeting was organised with experts of Eurostat to discuss the outline of the MusTT SIA method, including design, definition and availability of data.*
The method should include complete set parameters for describing the performances in all three domains of sustainability: People, Planet and Profit.	*For each domain, a selection has been made of relevant parameters for tourist transportation systems.*
The methodology should be based on leading reference values and weight factors for the parameters. The MusTT consortium should complete this set where reliable values are unavailable in literature.	*For the environmental domain, most values could be extracted from literature, although some correction factors and estimates were included. For the social and economic domain, literature offered much less support – indicating the pioneering work of MusTT. In a number of situations, values were entered based on the findings in the other tasks of the MusTT study – or expert judgement. It was decided to include some parameters only semi-quantitative as result of a lack of reliable data.*
The methodology should be easy to use and easy to understand.	*Special, attention has be paid to realisation of a data-input mechanism and visualisation tool, including the development of SII and SIA radar screens and the development of a SIA data capture questionnaire that was sent to selected GPs.*
The method will offer a contribution to raising stakeholder awareness of the importance and complexity of the subject of sustainable development. A method is requested for describing and understanding the social, environmental and economic domains of new tourist travel systems, especially the Good Practice (GPs) cases collected in the MusTT study. The method can deal with the fact that the implementation of GPs is 'work in progress'.	*It was decided that the method should work from the perspective of a specific GP (business) case, making a direct comparison of a new transportation system that is introduced against a business as usual (BAU) reference situation. Cross-comparisons of SII or SIA profiles of BPs are not possible.* *Specific choices are needed to cover the factor 'time', as the process of implementation of a GP can be in an early or more advanced stage of development.*

1.1 Sustainability Framework Escalator Model

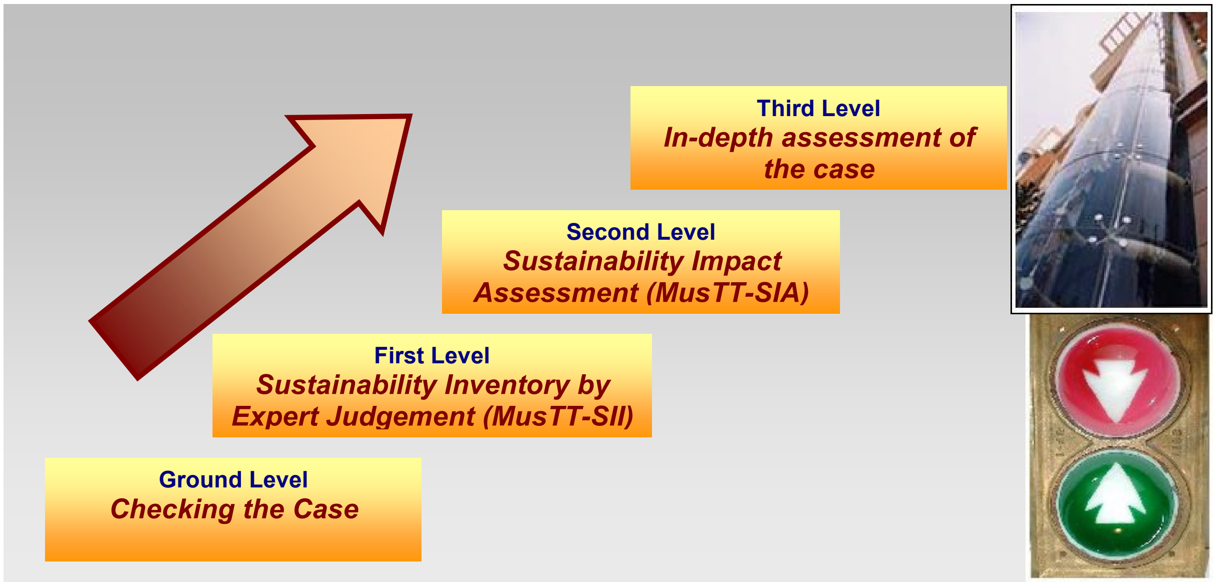
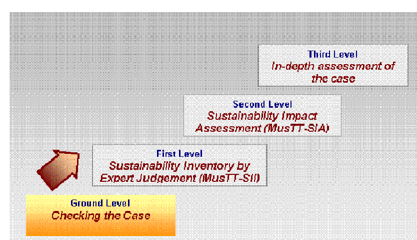


Figure 1-1: Sustainability Framework Elevator Model

The sustainability framework offered by the MusTT team can be described by means of an escalator-model.

1. *At Ground level*, checks will be made whether closer analysis of a case makes sense.
2. *At the first level (MusTT-SII),* expert judgement are made to create a better understanding of the case and its most likely impact in de environmental, social and economic domains
3. *At the 2nd level (MusTT-SIA),* an impact assessment is made based on the
4. *At the third level,* more advanced analyses of the case, its reference and alternatives can be made.

1.2 Ground level: checking the case



At Ground Level, a GP case is checked. The check should learn whether it is appropriate to execute a systemised analysis of the sustainability performance of the GP case by the methods offered at the higher levels of the elevator.

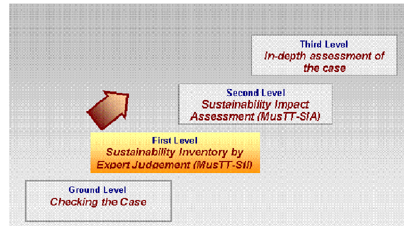
The execution of assessment is strongly advised against in the following situations:

- The case is older than 1 year, with no real activities in the last year
- The case is aimed at communication, lobby or policy development (e.g. aims at creating support for a shared policy statement or shared sector strategy on sustainability)
- The case is a network, cluster or umbrella project
- The case is still in an early (exploratory) phase, with high uncertainties on the actual concept design and/or implementation path
- The case has unclear geographical scoping
- Information about the case is of insufficient quality

If one of more of the above situations applies to a specific case, one should be extremely careful in making statements on the actual impacts of the case. The methods presented at the next levels of the elevator model are not valid for making any statement on these cases. A tailored approach is suggested. Whether these cases contribute(d) substantially to making progress towards sustainability should be checked in close consultation with the stakeholders involved (opinion finding process).

If none of these situations is the case, the elevator can go up to level 1.

1.3 LEVEL 1 – Expert judgement Sustainability Inventory Assessment (SII)



At this level, an expert judgement is being collected in a systematic six-step procedure, preferably by a group of experts with different backgrounds.

1. Determine the reference system
2. Check which parameters are relevant in this case
3. Describe the (positive or negative) impacts for the relevant parameters
4. Each expert makes his/her SII radar diagram.
5. The group of experts discusses the radar diagrams produces to reach consensus.
6. The final SII-radar is produced and discussed.

The SII can serve as a mirror to the GP-actors. They can learn how their GP is perceived by (independent) expects. Thus, SII plays an important role in creating awareness.

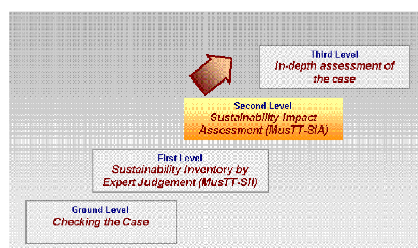
Unlike the SII method containing subjective elements, the SIA method on the next elevator level has the advantage that it has a solid scientific base. It will result in a more *objective measuring stick* (still it has to be marked that the scientific references for the environmental domain are better established and broadly accepted by the scientific community[1] than for the social and economic domains).

In situations where the case meets following set of criteria, the execution of a sustainability impact assessment is suggested:

- The case is well developed and the market situation is relatively stable.
- Reliable data can be provided for all indicators of the SIA.
- The GP and BAU cases have clear system boundaries.

After completion of the SII profile, the elevator can go up to the next level when the criteria of the above list are all met.

1.4 LEVEL 2 – Sustainable Impact Assessment (SIA)



The MusTT-SIA methodology offers a more objective and precise approach. Parameters are treated quantitative as far as possible and the method includes rebound effects due to volume changes.
A detailed manual for the execution of SIA calculations is described in the next chapter.
Main steps in the SIA method are:

1. Determine the reference system (BAU – business as usual) against with the GP will be assessed.
2. Quantify the changes for all parameters resulting from the introduction of the GP[2]. A SIA

[1] The reference data used in the SIAmethod are well-documented. In a number of cases scientifc debate is still ongoing, such as for the the 2.7 factor for CO2 emissions by airlines.
[2] Assuming the practice/project to be fully implemented and developed for today's system (equilibrirum situation).

data form has been developed to assist in this task.

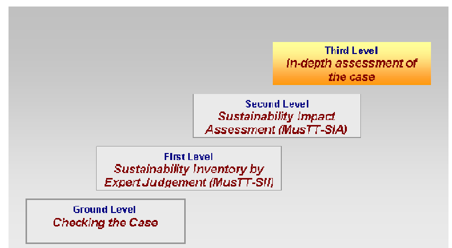
3. Enter all data of the data form in the SIA calculation sheet.
4. Produce SIA radar diagram.
5. Check this diagram – explaining all scores
6. Discuss and disseminate the findings

Alpha version:
Very early version of a tool that may not contain all of the features that are planned for the final version. Typically, software tools goes through two stages of testing before they are considered finished. The first stage, called alpha testing, is often performed only by users within the organization developing the software. The second stage, called beta testing , generally involves a limited number of external users.

The SIA method presented here can be considered as an operational, complete and stable (α-tested version of the) tool, including a simple user interface, programmed in Excel. In today's version, the MusTT experts have to execute the actual calculations.

The method has to be further discussed and tested by the stakeholder groups in the tourist and transportation sectors. Improvements will have to be made based on these discussions and tests.
After successful testing, it is recommended to make a user-friendly web-based version of the SIA tool and stimulate the use of the tool by the stakeholders themselves.

1.5 LEVEL 3 – More advanced analyses by commercial tools



At the 3rd level, more advanced analyses of the case and the alternatives need to be made. Normally, it is decided to zoom in for in-depth analysis of one or more pillars of the sustainability framework. E.g., this phase can include a comparison of alternative future business models of the case and sensitivity analysis.

Commercial tools are offered for specific exercises, such as tools for the execution of environmental life cycle assessment and life cycle costing assessment[3]. Execution of these calculations asks for specialists with good experience with the use of these tools. Moreover, the calculations are often costly and consuming a lot of time. Availability of reliable datasets (including data of all steps of the production chain) is essential (sine qua non).

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[3] For state-of-the-art commercial software – please check the sites of the LCA-software market leaders: GABI 4 offers the most complete tool.
GaBi 4 assists you with: Greenhouse Gas Accounting, Life Cycle Assessment, Life Cycle Engineering, Design for Environment, Energy Efficiency Studies, Substance Flow Analysis, Company Ecobalances, Environmental Reporting, Sustainability Reporting, Strategic Risk Management and Total Cost Accounting: www.gabi-software.com.
SIMAPRO is today's market leader in LCA software. SimaPro 5.1 provides you with a professional tool to collect, analyze and monitor the environmental performance of products and services. You can easily model and analyze complex life cycles in a systematic and transparent way, following the ISO 14040 series recommendations. Simapro's features include: easy modeling., full transparency:, hot-spot analysis and extensive filtering options. www.pre.nl/simapro.
Other useful software includes: D-LCC www.reliability-safety-software.com/products/product_dlcc.htm, RELEX-LCC www.relexsoftware.com/products/lcc.asp, TEAM www.ecobalance.com, ECOSCAN www.ind.tno.nl/en/product/ecoscan

1.6 Sustainability Framework Building blocks

Set of parameters

Based on the SIA benchmarking results reported in Annex 2 and the subject matter report of MusTT (MusTT Technical Report 1), the following set of parameters has been composed for the description of the sustainability profile of a project.[4]

Dimension	Aspect
Ecology	CO_2–e emissions
	Land use
	Habitat Fragmentation
	Material Intensity
	Fossil Energy Consumption
	Noise
	Air Quality
Social	Price
	Quality/Comfort
	Travel Time
	Jobs
	Safety
	Trip Experience/Fun
	Equity of Nuisance
	Cultural Heritage
	Accessibility Elderly/Disabled
Economy	Turnover
	Profitability
	Growth
	Economic Equity

The reference (business as usual – BAU)

The first step needed in execution of the SII or SIA tools is to set clear system boundaries. Based on the selected boundaries the business as usual (BAU) reference needs to be described as well. This reference situation would have existed in case this new system is not offered.

- As a first approximation, the system before the introduction of the new system can be taken.
- Next, this initial reference should be checked/corrected for autonomous trends in the market – that should be taken into account.

It is important to note that – as the SII and SIA methods provide answers on the relative changes of a GP compared to its specific reference situation – the methods *cannot be used for cross-comparisons of*

[4] The set of parameters has been selected by the MusTT team in such a way that the set is expected to describe the relevant impacts of (almost) all tourist transportation systems. Two remarks most be made:

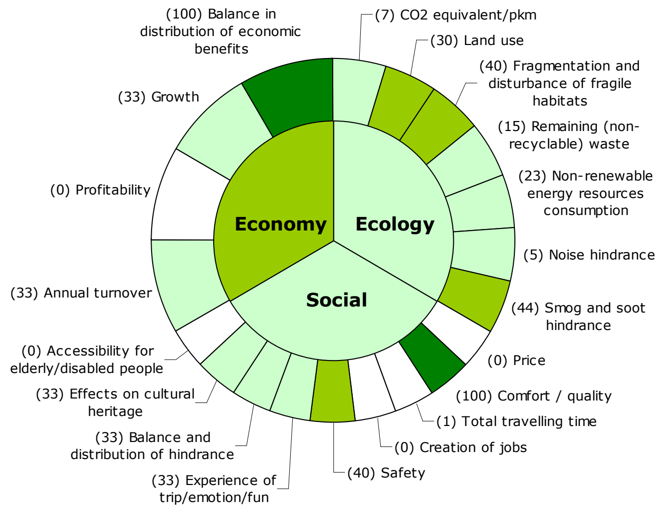
- Not all parameters have an equal weight. The relatve contribution of each parameter will be determined in completely different ways in the MusTT SII and SIA methods.
- Stakeholders have indicated that the nuclear energy impacts should have been included as well. This suggestion has not been followed up mainly as result of methodological difficulties. The risk of nuclear energy production (including terrorist attacks) and the problem of nuclear waste can not be modelled in the same way as the other parameters. In case train transportation plays an important role in the GP or BAU-reference transportation system, it should be understood that the MusTT methods presented in this document should be completed with a nuclear indicator. Still this is not felt as a major omission in the MusTT methods.

<u>the individual cases</u>, as both system boundaries and reference systems do not match.

The sustainability radar diagram

The radar diagram is developed as a means to understand the multi-dimensional character of sustainability: a tested graphical tool offering easy and complete transfer of information.

The figure on the right side shows an example of a radar diagram.



- The outer ring describes the impact scores of all parameters by colour (the colour scheme is described in the user guide chapter). The parameter names of all segments are included in the outer-circle legend.
- There are numbers positioned in front of the parameter names. In today's methodologies, following choices are made:
  - In the SII method, we include the relevance scores of the parameters.
  - In the SIA method, we include the impact scores of the parameters.
- The inner ring gives the cumulative impact scores for the three domains: people, planet and profit by colour.
  - In the SII method, the relevance factors are used as linear weight factors for this accumulation.
  - In SIA method, we the calculation of the cumulated scores for the three domains is more advanced. Weight factor tables applied are included in the SIA user guide chapter).

The calculated sustainability radars should be used with great care. We would strongly encourage restricting the use the MusTT sustainability framework for learning and understanding of a GP. Lobby activities based on these radars should be avoided, as there is a story behind each radar (that is easily forgotten in a policy context).

2 Technical Introduction to the SII and SIA methodology

As explained in the previous chapter, the aspects and dimensions used are the same for both SII (Sustainability Impact Inventory) and SIA. The way they are treated is quite different. For the SII the expert defines a reference situation and estimates by his own expertise in what direction and to what extend the good aspect will change the aspect and if this is certainly or probably (un-)sustainable or neutral. By definition this method is qualitative and the result may depend to a rather high extend on the expertise of the expert. The advantage is its ease of use and the short time to get results.

2.1 SII

In the SII, expert judgement is being collected in a systematic six-step procedure, preferably by a group of experts with different backgrounds.

1. Determine the reference system (BAU – business as usual) against with the GP will be assessed.
2. From the complete set of parameters of the MusTT sustainability framework, a decision is made which of the indicators is relevant for description of the impacts that the case might have.
3. Within this resulting subset, the experts are asked to give relevance factor scores and (relative) impact scores. Experts are asked to include a brief explanation when needed.
4. The individual scoring results of the experts are entered into SII radars diagram.
5. Differences in the radars are discussed and the group of experts is asked to come to a group decision – taking into account all arguments that are discussed.
6. The final SII-radar is produced and discussed.

The SII can serve as a mirror to the GP-actors. They can learn how their GP is perceived by (independent) expects. Thus SII plays an important role in creating awareness, as the execution of this expert judgement will learn more about the specific *perceived* strengths and weaknesses of a GP. Based on SII profile, further action could be planned. E.g. it 1could be decided to:

- To modify the offer to minimize the negative scores of the SII;
- to focus marketing efforts on the positive scores, or
- to start a dialogue or communication programme explaining the richness of the GP in (in case stakeholder feel that expert's views are based on fundamental misperception).

2.2 SIA

In the next phases of the Multi-stakeholder project (subsequent to the first phase covered by MusTT); more time may be invested into the calculation of SIA-profiles. The SIA methodology offered by MusTT is developed in a way to make it more objective and more precise. Therefore, half of the aspects are made quantitative and the remaining qualitative ones are treated quantitative in the method. the method includes not only direct impacts, but also rebound due to volume changes. In addition, a set of data is given for every aspect to help the expert to make objective judgements as far as feasible.

The SIA deliverable contains the description and a user guide for experts to the SIA (Sustainability Impact Analysis) for the MusTT project.

The method consists of:

- a SIA data form (for the stakeholder) and a summarizing SIA Word Input Table (for the expert)
- a SIA Spreadsheet (MS Excel), and
- this user guide including background information.

The general way to assess a tourism transport good practice is to fill in the SIA Word Input Table with figures and comments, to put the gathered data into the SIA Spreadsheet. The produced radar diagram can be included in the analysis description of the good practice.

3 The SIA method

The general basis for the SIA is the following equation:

$$I_n = \beta_n \cdot V$$

The impact I of aspect n is the multiplication of the specific impact per unit volume β_n of aspect n and the total volume V of the good practice under consideration. However, the method is in essence relative. this means we are looking for the changes of the good practice with respect to the situation without this good practice (the business as usual or BAU situation). Actually, the method requires not the final impact, but the change in percentage of BAU of the impact. This changes the form into:

$$I_n + \delta I_n = (\beta_n + \delta\beta_n) \cdot (V + \delta V)$$

In this equation δ means the absolute change of the variable. By dividing all parameters by their BAU values, we get the following:

$$1 + \frac{\delta I_n}{I_n} = \left(1 + \frac{\delta\beta_n}{\beta_n}\right) \cdot \left(1 + \frac{\delta V}{V}\right)$$

This form can be mathematically solved for the fraction of change of impact by replacing $\frac{\delta I_n}{I_n}$ by ΔI_n et cetera resulting into:

$$\Delta I_n = \Delta\beta_n + \Delta V_n + \Delta\beta_n \cdot \Delta V_n$$

For most aspects, a change in volume will result in a change in impact. This is not always true (for example the consumer price for transport is already a relative parameter (€/pkm) in itself and therefore is not directly impacted by volume changes.

Within the SIA method, the 20 aspects are divided over the three dimensions of sustainability (ecology, social and economy). Two kinds of aspects are available: quantitative and qualitative aspects. The quantitative aspects are treated fully with the above given forms as a base. They are further supplied with background general data; the qualitative have not such data added. In the quantitative aspect, it is possible to make a quantitative estimate of the change in the relative impact (delta beta). The betas of qualitative aspects are filled in at the judgement of the expert.

Most good practices will suffer to the rebound effect, normally caused by volume effects that inadvertently reverse part of the intended positive impacts on sustainability. This rebound effect is estimated for all aspects by calculating the direct volume change from price and travel speed changes. Reference is the business-as-usual (BAU) situation: the situation without or before the project has been implemented. Assessment is therefore based on delta beta and delta volume. Delta beta means how the performance per aspect changes per unit of product (as transport is the focus here this will normally be per passenger kilometre). Delta volume will be expressed in terms of the total volume of transport (in pkm-s) will be affected.

In the next chapter, we will give a user guide, in which the elements of the spreadsheet are explained.

4 User guide

4.1 Spreadsheet calculation

Per good practice, the expert has to fill three columns and one general figure on:

- general change in transport volume (to give an idea of the rebound effect)
- direction of the change (to green or red) per the aspect
- delta beta (% change per pkm or an expert judgement on a scale of 0-5) per aspect
- global impact factor GIF per aspect to assess the weigh the BAU sustainability (the less sustainable BAU is the higher this factor).

The following variable is used to standardise for every project between 0 and 100:
The maximum score per aspect for both green and red.
These are used to make up the dimension index, assuming the lowest scores for all aspects to be zero (there are always practices with zero change on one or more aspects). Of course these maximum red and maximum green can only be found after the whole set of good practises has been assessed, but it is possible to start with some default value. The maximum will be taken for project with the maximum score for (delta beta plus delta V) as a proxy for the max score

Scores and colour codes

The equation including the index to standardise to the maximum value of all practices will than be:

$$Score = 100 \cdot \sqrt{GIF} \cdot \left(\frac{\Delta\beta}{Sc_{\max}} + \frac{F_V \cdot \Delta V}{Sc_{\max}} + \frac{\Delta\beta \cdot F_V \cdot \Delta V}{100 \cdot Sc_{\max}} \right)$$

The $Sc_{\max}$ differs for quantitative and qualitative aspects as given in the following table:

	Quantitative	Qualitative
$Sc_{\max}$ for aspects where a reduction of the impact is advantageous	50	100
$Sc_{\max}$ for aspects where an increase of the impact is advantageous	100	100

the value of 50 has been chosen compared to 100 for the quantitative aspects because a reduction of 50% means halving, which has been scored the same as a doubling of the impact (plus 100%).

For some aspects, the volume will have no influence. In the spreadsheet this is realised by multiplying the ΔV with a 'volume factor' F_V of zero (no impact of volume changes) and 1 (full impact of volume changes). In some cases, the impact will be less than one-to-one. In those cases, a lower value than 1.0 has been chosen. The following table gives these factors:

Group	Aspect	Volume impact
Ecology	CO_2-e emissions	1
	Land use	0,1
	Habitat Fragmentation	0,3
	Material Intensity	1
	Fossil Energy Consumption	1
	Noise	1
	Air Quality	1
Social	Price	0
	Quality/Comfort	0
	Travel Time	0
	Jobs	-0,5
	Safety	1

	Trip Experience/Fun	0
	Equity of Nuisance	0
	Cultural Heritage	0
	Accessibility Elderly/Disabled	0
Economy	Turnover	-1
	Profitability	0
	Growth	0
	Economic Equity	0

The different signs for jobs and turnover are necessary because the impact of a volume decrease will be unfavourable (less jobs and less turnover), where all other volume impacts will be favourable, (fewer emissions, safer situations, et cetera). Further it is assumed that volume growth will lead to higher labour productivity, so not all volume increase will be translated to extra jobs (estimated is in case of a 10% output volume increase, the number of jobs will increase by 5%).
For land use a 10% volume effect will normally not result in 10% extra land use due to extensive scale effects. An elasticity of 0.1 is presumed. For fragmentation and disturbance, the impact is estimated at an elasticity of 0.3. Most adverse impacts of transport are related positively with volume (volume increase means increase of the impact and therefore a negative (red) score). However for creation of jobs and annual turnover, this relation is the other way round (more jobs is green, not red; therefore the volume effect has been reversed).
Last step within the spreadsheet is to standardise the above scores to colour codes. This is done linearly (values between 0 and 3 will have to be attained so 0-25 = 0, 25-50 = 1, 50-75 = 2 and >75 = 3) in the qualitative case (making a score of 0 to be 0, 33 to be light, 66 to be medium and 100 to be high).

As most quantitative aspects of projects will be at the small effect range, it has been done with more resolution at the lower end of the scale:

Colour intensity	Quantitative aspects	Qualitative aspects
white	0-0.5	0-20
light	0.5-5	20-50
medium	5-20	50-80
dark	>20	>80

Weighing

Finally, the aspects are weighted and summed to the three dimensions economy, ecology and social. This is done with a standardised weight set for all projects per dimension.

Ecology

The generalised weight factors have been based on the total external cost per mode for tourism OD-transport data as given in MusTT Deliverable 1 (based on IWW/INFRAS, 2000). These give values for all aspects except material intensity and fossil energy consumption (see Figure 4-1).

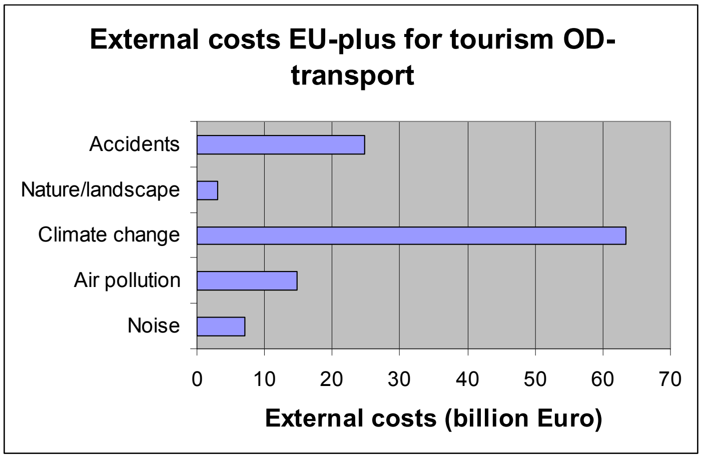


Figure 4-1: external costs for intra-EU-plus tourism transport (source: IWW/INFRAS, 2000 and MusTT model).

The last one has been estimated to be a small part (10%) of climate change. The material intensity has been set at 5 points, taking this proportionally from the other aspects. Further land use has been estimated at 5 points, taking this from climate change.

Aspect for ecology	Weight factor
CO_2-e emissions	56
Land use	5
Habitat Fragmentation	3
Material Intensity	5
Fossil Energy Consumption	7
Noise	8
Air Quality	16

Social

The weight factors of the social dimension have been based on the assumption that external impacts (with a difference between persons who get the benefit and the loss) have been weighted for half of the total of 100 points. The other impacts are internal - directly related to the traveller - and get the other 50 pints together. Of the external impacts, specifically safety is quantifiable and has almost half as the external cost for climate change minus land use and fossil energy use. Therefore, 25 points go to safety. creation of jobs is an important social impact of tourism and has been favoured 15 pints, while the remaining 10 for external social impacts are divided evenly over cultural heritage and equity of nuisance. Price, quality/comfort and travel time are all weighed equal with 10 points. Of the two remaining aspects, accessibility for elderly/disabled people has been rated high (with 15 pints) and trip experience/fun low with the remaining 5 points.

Aspect of dimension Social	Weight
Price	10
Quality/Comfort	10
Travel Time	10
Jobs	15
Safety	25
Trip Experience/Fun	5
Equity of Nuisance	5
Cultural Heritage	5
Accessibility Elderly/Disabled	15

Economy

For economy the weighing no special way to distribute the weighing has been envisaged and the weighing is equal (al aspects the same number of points).

Aspect of dimension Economy	Weight
Turnover	25
Profitability	25
Growth	25
Economic Equity	25

4.2 Expert assessment steps

The expert is required to do the following steps to find the values to be filled into the SIA Word Input Table. Per aspect variables, these are three steps:

1. direction with respect to BAU (+ = green of - = red)
2. delta (% per pkm or per holiday, whatever is appropriate, with respect to BAU OR score on a scale with the scores 0, 1, 2, 3, 4 or 5 for the largest impact)
3. global impact factor (factor on the current sustainability, deciding if the BAU is already very sustainable or not)

The general change in volume is a variable acting for the whole good practice and filling it is the final step:

4. volume/rebound: effect on net volume total in percentage BAU (variables are price en travel speed using elasticities from Table 4-1). This gives the overall effect on travel volume based on current BAU volume (so if all new volume of the project comes from another mode than the rebound/volume parameter is zero, if all volume growth is generated than the full growth will have to be filled in. The equation is $\Delta V = 100 \cdot \left(\frac{\Delta P}{100} \cdot \varepsilon_p + \frac{\Delta TT}{100} \cdot \varepsilon_{tt} \right)$ in percentage. In this equation ΔP is the change in average travel price per pkm (in % of the average BAU situation) and ΔTT is the change in travel time per trip (in %). Be aware that an increase in price or travel time is indicated by a positive value and a decrease by a negative one.

	Price ε_p	Reference	Travel time ε_{tt}	Reference
Road	-0,46[5]	BTE, 2004, Table 1B01	-0,9	BTE, 2004, Table 9B08
Rail	-0,9	BTE, 2004, Table 2C02	-0,7	BTE, 2004, Table 6C02
Coach	-0,5	BTE, 2004, Table 2D12	-0,5	BTE, 2004, Table 3B18
Air	-0,7	Pulles, Baarse et al., 2002, pg. 72	-0,85	Fitted to Pulles from BTE, 2004, Table 4D22

Table 4-1: elasticity values to be used for volume change calculation.

4.3 Impact signs columns

The signs of the impacts on the aspects are at the discretion of the expert. This column should be filled in together with the delta beta column with only the relative direct impact of the project in mind with respect to the BAU situation. Per aspect the sign and colour to be used at increase or decrease of the beta has been given in chapter 5.

4.4 Beta's and GIF: general

To find the betas and GIF factors a distinct approach will be followed to quantitative aspects with respect to qualitative ones.

[5] Based on TRACE project and fuel price of average €0.094/vehiclekm. So to find the impact of other cost increases use this average to find the equivalent fuel cost increase in % and than apply the elasticty.

Dimension	Aspect	Quantitative	Qualitative
Ecology	CO_2–e emissions	X	
	Land use	X	
	Habitat Fragmentation	X	
	Material Intensity	X	
	Fossil Energy Consumption	X	
	Noise	X	
	Air Quality	X	
Social	Price	X	
	Quality/Comfort		X
	Travel Time	X	
	Jobs		X
	Safety	X	
	Trip Experience/Fun		X
	Equity of Nuisance		X
	Cultural Heritage		X
	Accessibility Elderly/Disabled		X
Economy	Turnover		X
	Profitability		X
	Growth		X
	Economic Equity		X

Table 4-2: Quantitative and qualitative aspects overview.

Approach for estimating QUANTITATIVE beta and GIF for aspects (as indicated in Table 4-2) where general quantitative data is available in the data table that is given per aspect in chapter 4.4. generally start to copy the word table file SIA_model_input_0.doc into SIA_project code_input.doc and than fill in this table including comments on the sources for data according to the following steps (normally in the order as given below):

- Determine the characteristics (technological changes to the vehicles or infrastructure with impacts on the betas, main transport mode/modes-mix, kind of tourism, investments in infrastructure and their land-use and impacts on biodiversity or nature, et cetera) of the main market on which the project is directed at.
- From the current (BAU) main transport mode (mix), determine the GIF factor as given in the table per aspect. If the BAU transport mode (mix) is unknown, choose the appropriate default value (domestic if the project works on the domestic market only, etc).
- Determine the delta beta ($\Delta\beta_i$, change in % of the impact of an aspect per pkm) as it will work on the average tourist actually making use of the project[6] and fill in the sign with +1 for an advantageous (sustainable) or green impact and –1 for a disadvantageous (unsustainable) red impact.
- Estimate the share *MSh* (%) of the market on which the project will actually be effective[7].
- Is there a change of length of stay (ΔLOS) to be expected. please if so; express it in percentage of BAU *LOS*.

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[6] This means the delta beta for the case when one tourist actually is using the project, i.e. a new mode of transport offered, compared to his usual mode of transport, or the change in distance for the new destination chosen, compared to the usual one, etc. It also may mean the technical or operational efficiency gain in using the same mode but with new technology or operational procedures.

[7] Following example may help to determine this. If a bus company increases the energy efficiency on its total fleet with 10%, than the actual market the aspect energy consumption is acting on will be 100%. If the project only is intended to act on half of all busses than the share ois 50%. If a project aims at a mode shift from car to train using a communication program, than the estimate of the share of the market actually shifting modes is the number sought (for example 5% of tourists reacts to project giving 5% as the share). In general communication projects will show only a very small respons (some percenst of the total market at which the communication is aimed at); new supply may catch (much larger) shares; but never 100%; technical or operational changes will generally be acting on the full market (i.e. 100%).

Now the delta beta to insert in the table can be calculated as follows:

$$\Delta\beta = MSh * \frac{100 + \Delta\beta_i}{100 + \Delta LOS}$$

Approach for estimating QUALITATIVE beta and GIF for aspects (as indicated in Table 4-2) where general quantitative data is NOT given in a table:

- Determine the characteristics (main transport mode/modes, kind of tourism, investments in infrastructure and their land-use and impacts on biodiversity or nature, et cetera) of the main market that the project is targeting.
- Set all GIF-s at 1 for this aspect.
- Give an estimated guess for the delta beta ($\Delta\beta_i$, choose one from following values: 0%, 33%, 66% or 100% of the impact of an aspect per pkm) as it will work on the average tourist actually making use of the project[6] and fill in the sign with +1 for a advantageous (sustainable) or green impact and –1 for a disadvantageous (unsustainable) red impact.
- Estimate the share *MSh* (%) of the market on which the project will actually be effective[7].
- Is there a change of length of stay (ΔLOS) to be expected. If so, express it in % of *LOS* in the BAU situation without the project active.

Now the delta beta to insert in the table can be calculated as follows:

$$\Delta\beta = MSh * \frac{100 + \Delta\beta_i}{100 + \Delta LOS}$$

5 Beta's and GIF data

5.1 Ecology

CO_2-e emissions

Sign for CO_2–e emissions	Sign	Colour
Increase of aspect	-	red
Decrease of aspect	+	green

CO_2–e emissions are the greenhouse gas emissions expressed in carbon dioxide equivalents. Average emissions factors may be found in Table 5-1. If the actual CO_2 emissions of the current situation (BAU) are known, the CO_2–e emission factor may be found by multiplying the number with 1.05 for all modes, except aircraft, where this factor should be 2.7, indeed much higher according to the IPCC (Penner, Lister et al., 1999).

Mode	IC/EC	HST	Air (SH)	Air (LH)	Car	Coach	Slow Modes	Sea
CO2-e (g/pkm)	28,4	35	354	299	140	23,1	1	69,3
GIF	0,08	0,099	1	0,845	0,395	0,065	0,003	0,196

Defaults	International	Domestic	Overall
CO2-e (g/pkm)	224,6	130	184
GIF	0,634	0,367	0,52

Table 5-1: Global impact factors and beta for GHG-emissions (CO_2-e) (source: del_1).

Hints:

- If the emission of CO_2 or CO_2–e is unknown, the average fuel use may be taken as a proxy, if the kind of fuel is not changed.
- If a mode shift is part of the project, the delta beta is calculated as follows:

$$\Delta\beta = 100 * \left(\frac{\beta_{project}}{\beta_{bau}} - 1 \right)$$

Land use

Sign for land use	Sign	Colour
Increase of aspect	-	red
Decrease of aspect	+	green

The table gives the average land use for the transport modes as currently used. The land use is the actual direct land use for infrastructure (not only road, and rail, but also including slopes, stations, ports, airports, parking places, etc). Indirect land use – like for safety or noise zones - is not incorporated. The table may be used as a guide for the BAU situation.

Mode	IC/EC	HST	Air (SH)	Air (LH)	Car	Coach	Slow Modes	Sea
Landuse km2/bil pkm	2	3	3	1,5	3,5	1,5	0,2	0,5
GIF	0,571	0,857	0,857	0,429	1	0,429	0,057	0,143

Defaults	International	Domestic	Overall
Landuse km2/bil pkm	2,8	2,9	2,9
GIF	0,8	0,829	0,829

Table 5-2: Global impact factors and beta for land use (based on MusTT Deliverable 1).

Hints:

- If a mode shift is part of the project, the delta beta may be calculated as follows:

$$\Delta\beta = 100 * \left(\frac{\beta_{project}}{\beta_{bau}} - 1 \right)$$

- The projects impact may be found by first determining the current land use by multiplying the total volume of transport in the BAU situation with he appropriate land use factor from the table. Next. the land use of the investments required from the project is divided by the total and multiplied with 100 to end up with a percentage.

Habitat fragmentation

Sign for fragmentation	Sign	Colour
Increase of aspect	-	red
Decrease of aspect	+	green

Fragmentation is about the physical obstacle effect of infrastructure to both people and animals. The effect on people may be nuisance and even less mobility for specific groups; for animals the fragmentation may cause reduced genetic diversity and even extinction of species in the fragmented nature reserves. Also included in this aspect is the effect of nuisance (light, noise, vibrations) on biodiversity. Use the table and estimates for investments in infrastructure or strong changes (>doubling or halving) of traffic volumes on (parts of) existing infrastructure to determine the delta beta's here; all with respect to the total land use as determined in the 'land use' section.
Hint:

- If a mode shift is part of the project, the delta beta may be calculated as follows:

$$\Delta\beta = 100 * \left(\frac{\beta_{project}}{\beta_{bau}} - 1 \right)$$

Mode	IC/EC	HST	Air (SH)	Air (LH)	Car	Coach	Slow Modes	Sea
External cost fragmentation €/pkm	0,6	0,2	2,55	0,85	2,5	0,8	0,1	0,2
GIF	0,235	0,078	1	0,333	0,98	0,314	0,039	0,078

Defaults	International	Domestic	Overall
External cost fragmentation €/pkm	1,9	1,7	1,6
GIF	0,745	0,667	0,627

Table 5-3: Global impact factors and beta of land fragmentation and nature (based on IWW/INFRAS, 2000).

Material Intensity

Sign for material intensity	Sign	Colour
Increase of aspect	-	red
Decrease of aspect	+	green

With material intensity, we mean material use for the life cycle of vehicle used. Another aspect of waste may be the waste developing during the use of the vehicle, but this is not the issue here; as the vehicle effect seems to be much more dominant in most cases.

Hint:

- If a mode shift is part of the project, the delta beta may be calculated as follows:

$$\Delta\beta = 100 * \left(\frac{\beta_{project}}{\beta_{bau}} - 1 \right)$$

Mode	IC/EC	HST	Air (SH)	Air (LH)	Car	Coach	Slow Modes	Sea
Material intensity (gram/pkm)	0,007	0,003	0,0076	0,0021	0,196	0,00325	0,05	0,3
GIF	0,023	0,01	0,025	0,007	0,653	0,011	0,167	1

Defaults	International	Domestic	Overall
Material intensity (gram/pkm)	0,079	0,115	0,098
GIF	0,263	0,383	0,327

Table 5-4: Global impact factors and beta for waste (actual for vehicle material weight per pkm calculated as life cycle; based on Peeters, Peters et al., 1996).

Fossil energy consumption

Sign for energy consumption	Sign	Colour
Increase of aspect	-	red
Decrease of aspect	+	green

Carbon dioxide emissions have been taken as a proxy for fossil fuel use and its depletion. These two are interchangeable.

Mode	IC/EC	HST	Air (SH)	Air (LH)	Car	Coach	Slow Modes	Sea
Energy cons. (proxy gram CO2/pkm)	27	33	154	111	133	22	1	66
GIF	0,175	0,214	1	0,721	0,864	0,143	0,006	0,429

Defaults	International	Domestic	Overall
Energy cons. (proxy gram CO2/pkm)	115,5	115,3	115,7
GIF	0,75	0,749	0,751

Table 5-5: Global impact factors and beta for depletion of fossil energy sources (CO_2 as a proxy; source: MusTT Deliverable 1).

Hints:

- If a mode shift is part of the project, the delta beta is calculated as follows:

$$\Delta\beta = 100 * \left(\frac{\beta_{project}}{\beta_{bau}} - 1 \right)$$

Noise

Sign for noise	Sign	Colour
Increase of aspect	-	red
Decrease of aspect	+	green

With noise, we mean noise nuisance. The table gives the external cost per pkm for noise. Some hints for calculating betas:

Hints:

- Noise nuisance from a road will change logarithmically with volume changes on the infrastructure. Only when the volume is more than halved, there may be some reduction of noise nuisance, i.e. of the beta. Therefore, in most cases, volume changes will be too small to be perceptible and thus the delta beta will be zero.
- Using other modes, shifting from night to daytime operation and adding noise-abating measures to infrastructure are all more or less linearly reducing noise nuisance.
- Significant reduction of speeds on roads (for example from 120 to 90 or from 80 to 50 or from 50 to 30 km/hr) may have a relatively strong influence on noise nuisance (10-30% less nuisance).
- The impact on health of noise is correlated to the amount of people living around the source of the noise emissions (the road or rail-line, or the airport).
- If a mode shift is part of the project, the delta beta may be calculated as follows:

$$\Delta\beta = 100 * \left(\frac{\beta_{project}}{\beta_{bau}} - 1 \right)$$

Mode	IC/EC	HST	Air (SH)	Air (LH)	Car	Coach	Slow Modes	Sea
External cost noise €/pkm	4,68	3,12	7,2	1,8	5,7	0,325	0	0,1
GIF	0,65	0,433	1	0,25	0,792	0,045	0	0,014

Defaults	International	Domestic	Overall
External cost noise €/pkm	4,181	1,42	1,477
GIF	0,581	0,197	0,205

Table 5-6: Global impact factors and beta for noise (source: IWW/INFRAS, 2000).

Air Quality

Sign for air quality	Sign	Colour
Increase of aspect	-	red
Decrease of aspect	+	green

The external costs of air quality have been used as a proxy for the effects. Air quality is connected to a large set of different emissions to the air.
Hints:

- As soot is an important factor to air quality and is almost entirely connected to the use of diesel engines, a shift from diesel to petrol/gas/electric will probably result in delta betas of up to –80%.
- Modern soot filters may reduce average emissions with 90%.
- The impact on health is correlated to the amount of people living around the source of the emissions (the road or rail-line, the port or airport).
- If a mode shift is part of the project, the delta beta may be calculated as follows:

$$\Delta\beta = 100 * \left(\frac{\beta_{project}}{\beta_{bau}} - 1 \right)$$

Mode	IC/EC	HST	Air (SH)	Air (LH)	Car	Coach	Slow Modes	Sea
PM emissions (g/pkm)	0,013	0,018	0,00135	0,00103	0,0225	0,0103	0	0,001
GIF	0,578	0,8	0,06	0,046	1	0,458	0	0,044

Defaults	International	Domestic	Overall
PM emissions (g/pkm)	0,00997	0,01913	0,01398
GIF	0,443	0,85	0,621

Table 5-7: Global impact factors and beta for health where PM emissions have been used as a proxy (source: MusTT model).

5.2 Beta's and GIF: social

Price

Sign for Price		
	Sign	Colour
Increase of aspect	-	red
Decrease of aspect	+	green

The prices are based on out-of-pocket consumer prices for tickets or for petrol. The car includes also the costs depending on the distance travelled, like maintenance. The prices have been based on Peeters, Peters et al., 1996.

Price (€/pkm)	0,12	0,13	0,06	0,05	0,15	0,06	0,01	0,17
GIF	0,706	0,765	0,353	0,294	0,882	0,353	0,059	1
Price f/pkm	0,22	0,28	0,1	0,08	0,25	0,1	0,05	0,2

Defaults	International	Domestic	Overall
Price (€/pkm)	0,094	0,112	0,104
GIF	0,553	0,659	0,612

Table 5-8: Global impact factors and beta for price (based on Peeters, Peters et al., 1996).

Remark: original prices in 1996 guilders changed to € (*f*/2.2) and figures revised downward for air.
Hints:

- The effect of price must also be seen in relation to the quality.
- The delta price is very important to determine the volume and rebound effect (see section 4.2)
- If a mode shift is part of the project, the delta beta may be calculated as follows:

$$\Delta\beta = 100 * \left(\frac{\beta_{project}}{\beta_{bau}} - 1 \right)$$

Comfort/quality

Sign for Comfort/quality		
	Sign	Colour
Increase of aspect	+	green
Decrease of aspect	-	red

The GIF values here are 1 for all cases. The delta beta has to be determined in the qualitative way (0, 33, 66, and 100). Comfort and quality changes depend on transport mode and extras as defined by the project.

Travel time

Sign for travel time		
	Sign	Colour
Increase of aspect	-	red
Decrease of aspect	+	green

The travel times are based on in-vehicle time plus vehicle changing-time plus check-in and checkout times. Transfer times are not included. The travel times have been based on average cruising speeds as given by Peeters, Peters et al., 1996.

Mode	IC/EC	HST	Air (SH)	Air (LH)	Car	Coach	Slow Modes	Sea
Time (min/100 km)	66,67	31,58	16,67	9,38	75	92,31	500	153,85
GIF	0,433	0,205	0,108	0,061	0,487	0,6	1	1

Defaults	International	Domestic	Overall
Time (min/100 km)	43,135	56,685	50,191
GIF	0,28	0,368	0,326

Table 5-9: Global impact factors and beta for travel time price (based on Peeters, Peters et al., 1996*).*

Jobs

Sign for jobs	Sign	Colour
Increase of aspect	+	green
Decrease of aspect	-	red

The impact on number of jobs to produce the transport is treated qualitatively. As a guideline, the following order of number of jobs per billion pkm has been set up as a guide to assess the impacts of a mode shift. Volume changes are already automatically processed by the SIA spreadsheet. The ranking of labour per billion pkm is as follows (highest number of jobs first):

Sea	Highest number of jobs/pkm
IC/EC	
Coach	
HST	
Air EU	
Car	
Air ICA	Lowest number of jobs/pkm

The GIF values here are 1 for all cases. The delta beta has to be determined in the qualitative way (0, 33, 66, and 100). Comfort and quality changes depend on transport mode and extras as defined by the project.

Safety

Sign for safety cost/unsafety	Sign	Colour
Increase of aspect	-	red
Decrease of aspect	+	green

Safety can be assessed quantitatively using the table, which gives numbers based on external costs.

Mode	IC/EC	HST	Air (SH)	Air (LH)	Car	Coach	Slow Modes	Sea
External cost safety €/pkm	0,9	0,9	0,6	0,6	35,7	3,1	0	0,1
GIF	0,025	0,025	0,017	0,017	1	0,087	0	0,003

Defaults	International	Domestic	Overall
External cost safety €/pkm	9,967	14,331	12,24
GIF	0,279	0,401	0,343

Table 5-10: Global impact factors and beta for safety costs (CO_2-e) (source: IWW/INFRAS, 2000).

For slow modes, the assumption has been that almost no accidents with casualties or serious injuries are *caused* by these slow modes, contrary to motorised transport modes. For sea, an estimate has been made.

Hints:

- When considering safety the most important factor is first considering the safety of those who are not travelling. For example, how many accident casualties are not passengers or occupants of the crashing vehicle? Specifically this means slow modes have zero safety costs, while cars have higher costs than only caused by casualties among car drivers and passengers (about double outside the car).
- If a mode shift is part of the project, the delta beta may be calculated as follows:

$$\Delta\beta = 100 * \left(\frac{\beta_{project}}{\beta_{bau}} - 1 \right)$$

Experience/emotion/fun

Sign for experience/emotion/fun		
	Sign	Colour
Increase of aspect	+	green
Decrease of aspect	-	

The GIF values here are 1 for all cases. The delta beta has to be determined in the qualitative way (0, 33, 66, and 100). Experience, emotions and fun changes depend on transport mode and more even on extras as defined by the project.

Equity nuisance

Sign for equity of nuisance		
	Sign	Colour
Increase of aspect	+	green
Decrease of aspect	-	red

The GIF values here are 1 for all cases. The delta beta has to be determined in the qualitative way (0, 33, 66, and 100). The values may be determined by considering how much of the nuisance is cause to people who are not (directly or indirectly) benefiting from the travel (the travel itself, the revenues generated, jobs created, etc).

Impacts cultural heritage

Sign for disturbance of cultural heritage		
	Sign	Colour
Increase of aspect	-	red
Decrease of aspect	+	green

The GIF values here are 1 for all cases. The delta beta has to be determined in the qualitative way (0, 33, 66, and 100). The values may be determined by considering how much of the nuisance is caused in specific heritage areas.

Accessibility for elder/disabled people

Sign for accessibility		
	Sign	Colour
Increase of aspect	+	green
Decrease of aspect	-	red

The GIF values here are 1 for all cases. The delta beta has to be determined in the qualitative way (0, 33, 66, and 100). The values may be determined by considering how the accessibility of the transport for elderly and disabled people changes. in general, personal cars are not very accessible (driving is often impossible, so the people will be depending on others), small and specialised busses most accessible, public transport and rail only if attention has been paid to it, air transport ditto.

5.3 Beta's and GIF: economy

Turnover

Sign for turnover		
	Sign	Colour
Increase of aspect	+	green
Decrease of aspect	-	red

With turnover the turnover of the total tourism sector affected by the project is meant, not only the transport part of it. In this way, the direct transport and indirect tourism economical impacts are treated as these are important for the industry. The GIF values here are 1.0 for all cases. The delta beta has to be determined in the qualitative way (0, 33, 66, and 100). An increase is judged advantageously.

Profitability

Sign for profitability		
	Sign	Colour
Increase of aspect	+	green
Decrease of aspect	-	red

With profitability the profitability of the total tourism sector affected by the project is meant, not only the transport part of it. In this way, the direct transport and indirect tourism economical impacts are treated as these are important for the tourism industry. The GIF values here are 1.0 for all cases. The delta beta has to be determined in the qualitative way (0, 33, 66, and 100). An increase is judged advantageously.

Growth (potential)

Sign for growth (potential)		
	Sign	Colour
Increase of aspect	+	green
Decrease of aspect	-	red

With growth the growth of the total tourism sector affected by the project is meant, not only the transport part of it. In this way, the direct transport and indirect tourism economical impacts are treated as these are important for the tourism industry. The GIF values here are 1 for all cases. The delta beta has to be determined in the qualitative way (0, 33, 66, and 100). An increase is judged advantageously.

Equity for economic benefits

Sign for equity of economic benefits		
	Sign	Colour
Increase of aspect	+	green
Decrease of aspect	-	red

Considering equity of economic benefits the total tourism sector affected by the project has to be assessed, not only the transport part of it. In this way, the direct transport and indirect tourism economical impacts are treated as these are important for the tourism industry. Inequality exists when for example most economic benefits flow to the countries of origin of the tourists, leaving only small shares to the destinations. The GIF values here are 1 for all cases. The delta beta has to be determined in the qualitative way (0, 33, 66, and 100). A parameter here may be the amount of the total travel revenues go to the local communities involved at the destination and on the way to it.

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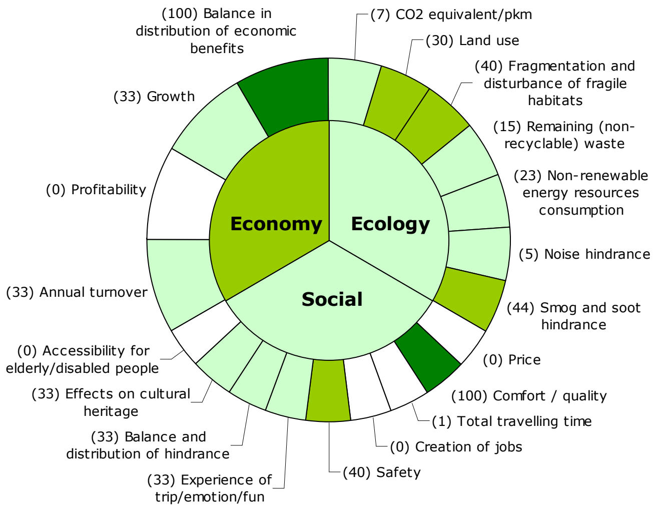
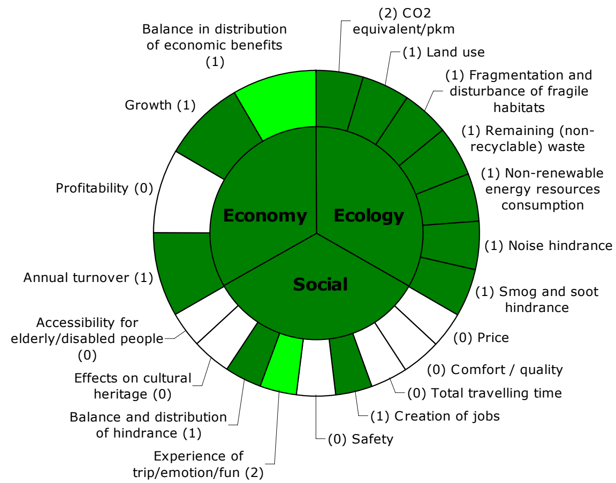
Appendix

Example valuation of Robinson Travel good practice

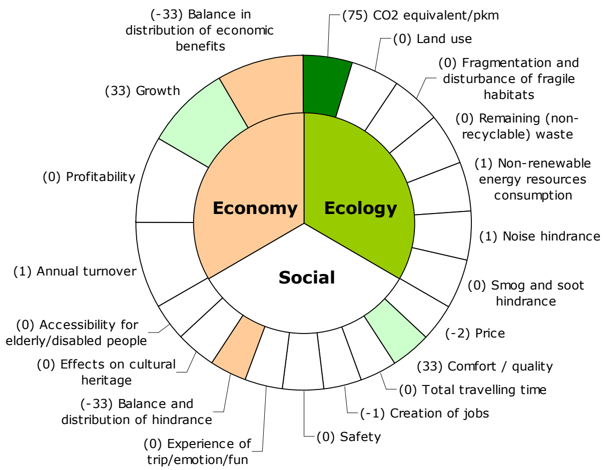
Three examples SII and SIA methods

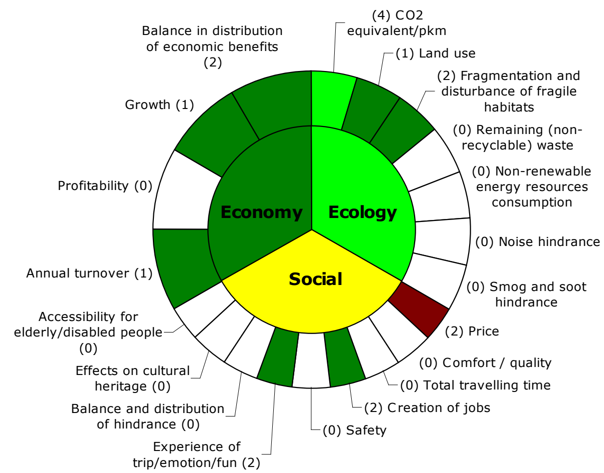
Werfenweng





Robinson





COOL Flying