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Review

Review of legal and voluntary instruments and methods for assessing sustainability of FennoScandinavian forests and their use

Diana Tuomasjukka [1,*], Staffan Berg [2], Marja Kolström [3], Marcus Lindner [1]

[1] European Forest Institute / Torikatu 34, 80100 Joensuu, Finland
[2] Skogforsk / Uppsala Science Park, 751 83 Uppsala, Sweden
[3] University of Eastern Finland / Joensuu Mekrijärven tutkimusasema, P.O. Box 111, 80101 Joensuu

E-Mails: diana.tuomasjukka@efi.int (*); staffan.berg@skogforsk.se; marja.kolstrom@uef.fi; marcus.lindner@efi.int

* Diana Tuomasjukka; Tel.: +358-10-773-4320; Fax: +358-10-773-4377 (European Forest Institute / Torikatu 34, 80100 Joensuu, Finland)

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Abstract:

This paper demonstrates selected impact assessment methods for legal and voluntary instruments with an analysis of strengths and weaknesses for assessing different aspects of sustainability. Each of them is compared against the other in an overview about which sustainability dimensions they cover (workplace, human rights, community, market place, environment, economy). Results highlight covered, overlapping and missing aspects for each method and how they can support or reinforce each other. Special attention is given to current methods of impact assessment, particularly on their areas of application (companies, regional development, products, production practices, etc), if it is a voluntary or legally binding instrument and recommendations for supplementing it with sustainability impact assessment for regional development in FennoScandinavian forests and their use.

Keywords: sustainability; CSR; legal instruments, voluntary global instruments; voluntary cooperative instruments; certification; SIA; ISO; FSC; Carbon footprint; LCA.

1. Introduction to sustainability, instruments and methods

The definition of "sustainability" was founded in forestry and was strictly resource-based and stayed so for centuries [1]. Change came with the WCED conference onwards [2], when sustainability became a common demand and concept to development in various fields of life. With that different interpretations and foci of sustainability evolved over time in different fields: in science, in industry and in policy. With that also different methods for assessing the state of sustainability or un-/sustainable operations or the impact on sustainability have been developed.

The political process concerning sustainability goals has evolved from Earth Summit in Rio (1992) to present-day policies. With this evolvement of the political discussions and framework, also the requirements from policy to science have evolved, while also scientific methods have evolved in interplay with industry, practice and policy. Different methods for impact assessment have developed in policy such as various Impact assessment (IA) [3] and Sustainability Impact Assessment Tools (SIAT)[4-7], social sustainability impact assessment (sIA) [8] and in industry such as certification (FSC), CSR [9], LCA, Carbon footprint, Water footprint and other ISO standards [10].

Therefore a wide assortment of legally binding and voluntary instruments exists (compare examples in Table 1).

Table 1. Categorisation of legal and voluntary instruments and methods

Legal Instruments	**Voluntary Instruments**	
Acts / Norms (national and international)	*Selfregulation (national and international)*	*Responding to markets (company specific)*
EU level	Certification (PEFC, FSC)	CSR reporting
National level	Standards (ISO)	IAs, SIA
Regional level		Carbon foot print, LCA, ...

The problem comes with this multitude of instruments, which brings confusion. All instruments started out having a different focus and some have evolved in parallel developments with similar aspects. Certification and standards exist but may have different rules in each Nordic country, and some instruments (LCA, CSR, etc) have started out as instruments in their own right but now are part of standards which may or may not be used for certification.

Aim of this paper

The following paper shall shed light on which aspects the different instruments cover and which level (international, national, regional, company) they address with which consequences. We will also discuss how the youngest instrument, Sustainability Impact Assessment (SIA), fits into the general picture and in which fields it needs to further evolve to answer the demands from the political process.

The focus of this review is on FennoScandinavia (Finland, Sweden, Norway, plus international) and the connection between regional development and the forest sector. Northern regional development in accordance to different policy strategies (Climate and Energy, Natura 2000, EU TR, etc) has led to some confusion to citizens and to SMEs, and this review shall give an overview and a strength-weakness-analysis over most common and discussed instruments.

This paper reviews impact assessment methods which correspond to the different types of regulatory instruments. These instruments are categorised into legal instruments, voluntary global and voluntary cooperative instruments . Methods for these overarching regulatory instruments will be discussed per instrument category (legal, global voluntary, cooperative voluntary) by introducing the different methods and giving one implementation example of that method, as well as highlighting the strengths and weaknesses of this method.

2. Instruments of regulation and current methods to support impact assessment for regulatory instruments:Legal instruments: Regional development

Legislation is based on political bodies, as well as regional, national or international law and agreements. Its content is decided by the electorate or governing forces in order to satisfy the vested interests and needs. The legislation relevant for any natural resource aims to satisfy the interest and wishes of the citizens as expressed by the political system. This usually means that aspects that address economy or social needs are dominant, and while doing so environmental aspects are covered [11]. In recent years there has been a clear trend towards environmental legislation [12, 13].

Regional development policy is one of the major policy areas within the EU. The target is a more harmonised development of rural regions within the area of the Union. The EU has several programmes for funding regional development. These funds are focussed so far on economic interests. Environmental aspects or the interlinkages between economic, social, environmental and institutional aspects are often not represented in an appropriate way [14].

Legislative Acts link to the sustainable use of forests, and these acts are implemented in form of programmes. This way, regional development is the translation of EU policies into national and regional policies, and regional programmes. The methods used for assessing the impacts are SWOT and expert assessments, and more recently also sustainability impact assessments.

2.1 Assessing sustainability in legislation at EU level

The purpose of the Strategic Environmental Assessment Directive (SEA) is to ensure that environmental consequences of certain plans and programmes are identified and assessed during their preparation and before their adaption. These certain plans and programmes are those which are subject to preparation and/or adaption by an authority at national, regional or local level or which are prepared

by an authority for adaption, through a legislative procedure by Parliament or Government, and required by legislative, regulatory or administrative provisions. The public and environmental authorities can give their opinion and all results are integrated and taken into account in the course of the planning procedure. After the adaption of the plan or programme, the public is informed about the decision and the way in which it was made. SEA will contribute to more transparent planning by involving the public and by integrating environmental considerations. This will help to achieve the goal of sustainable development [12].

2.2 National policy regulations – example from Finland

Regional Development Act

The common targets of regional development in Finland are based on the Regional Development Act [15] and the Regional Development Strategy of Finland 2020 [16] Under the Act, one of the targets is to improve the potential for economic growth, the development of business and industry and the improvement of employment that are based on expertise and sustainable development and ensure the competitiveness and prosperity of regions. Another target is to reduce regional disparities in development, to improve the population's living conditions and to promote balanced economic regional development. Furthermore, the aim is to create a balanced regional structure which keeps all the regions viable, including the sustainable use of natural resources. The responsibility for regional development rests with the state, municipalities and Regional Councils acting as regional development authorities [17].

According to the legislation, the activities are divided into three main programmes [18]:

- Regional Development Programmes
- The EU Structural Funds Programmes
- 'Special programmes'

Forest Act

The purpose of the Forest Act [19] is to promote economically, environmentally and socially sustainable management and utilisation of forests. The goal is healthy forests that produce a high yield in a sustainable way, while their biological diversity is being maintained. Each Forestry Centre develops a target programme for forestry for its territory and monitors its implementation. In drafting the programme, the Forestry Centre shall cooperate with the forestry related interest groups. The programme shall be revised as necessary. The programme includes the general objectives to be set for promoting sustainable management and use of forests.

Implementation of Acts

Regional Councils (total of 19 regions in Finland) are statutory joint municipal authorities operating according to the principles of local self-government. The Councils operate as regional development

and regional planning authorities and are thus the units in charge of regional planning and looking after regional interests. Planning for a region covers a strategic regional plan, a regional plan and a regional development programme and its implementation plan. These three documents form the basis for drafting other plans, programme and action schemes for the region, including the EU Structural Fund Programmes.

The strategic regional plan is the fundamental document in regional planning and it indicates the regional development goals and outlines the strategic choices and visions. The regional development programme includes regional development strategies and planned activities, and its timeframe is 3 to 5 years, with an annual implementation plan. The regional plan sets out the principles of land use and community structure, and designates areas as necessary for regional development. The strategic regional plan and the land use plan reconcile the interests of the central government with the interests of regional and local government. They also try to harmonise the land use objectives with the aims of economic life, environmental control and sustainable development [20].

National and Regional Forestry Programmes

The National Forestry Programme (NFP) is an important tool for directing and promoting economic, environmentally and socially sustainable development in the forest sector in Finland [21]. The Regional Forest Programmes (RFPs) implement the NFP. In accordance with normal programme processes, programmed regional or thematic development policy is formulated at international and national level, and measures are introduced at regional and local level. The RFPs are therefore of crucial importance in the implementation process of the NFPs.

The interpretation of the regional viewpoint must take account of the NFP's two orientations. The NFP acts on the one hand as a tool for promoting a policy of sustainable development which is co-ordinated internationally. It also has the role of development tool for Finnish forestry and, partly, the Finnish forest industry.

Integration of the NFP with overall regional development is seen as a palpable challenge. Regional players would like development of key aspects of the economy and business to be a part of regional development at the same time. This objective is of course given support by the fact that the NFP has a 'shortage of resources', which makes forest sector players more interested in regional development programmes.

The RFPs' role in overall regional development is also fairly prominent. The key organizations in the region are involved in the drafting of the RFP and are represented on the Regional Forest Council (RFC). The role the RFCs play and the weight they carry in regional development generally, including the drafting of regional development programmes, are important. The RFPs have a very clear role to play in regional development. This position needs to be made stronger still by integrating the RFPs

closely with overall regional development, in order to reinforce their role as programmes that steer project work.

2.3 Methods used in legislative regulation

2.3.1 SWOT

Definition and application example

SWOT analysis is a strategic planning method used to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in a project or in a programme. It involves specifying the objective of the programme or project and identifying the internal and external factors that are favourable and unfavourable to achieving that objective.

In Finland SWOT analysis has been used in Regional Forestry Programmes because of the guidance of the Ministry of Agricultural and Forestry. In some Regional Development Programmes SWOT analysis has also been used.

Strengths

SWOT is a rather simple and easy method to structure the analysis of a project or programme's performance. The aim is to benefit from the recognised strengths, improve the identified weaknesses, utilise the opportunities and mitigate the threats.

Weaknesses

In most of the Regional Forest Programmes strengths, weaknesses, opportunities and threats are recognized and identified, but concrete measures are missing. This is at the same time a weakness of the SWOT method, as it only describes by stating that something has to be strengthened and developed, but not how this should happen. There is a need to plan practical measures and especially it needs to be specified responsible [22].

2.3.2 Expert assessment

Definition and implementation, example from Forest Centre of North Karelia

The processes of regional development and regional forestry programmes involves working groups. These working groups discuss ecological, economical and social issues which are included in the programming process [23].

In few regional development and regional forestry programmes, the assessment of the impacts of the programme on sustainability has been done with a five steps scale (e.g. Forest Centre of North Karelia, 2005):

++ significant positive impact

+ slight positive impact

0 no positive or negative impact

- slight negative impact

-- significant negative impact

Strengths

The expert assessment gives fairly good review on impacts of measures under the programmes. It depends how well all aspects are presented within the working groups.

Weaknesses

Although, in some programmes the assessment has been done very carefully, there are no suggestion about measures, how to utilize positive impacts or to decrease negative impacts. Further, this 5-point scale include a middle value (=zero), which tends to gather votes but does not "force" the expert to decide if an impact if more on the positive or negative side. This may make results difficult to interpret, if no definite standpoints are taken.

3. Instruments of regulation and current methods to support impact assessment for regulatory instruments: Voluntary global instruments Certification and ISO standards

Standards are commercial instruments to make trade and markets function efficiently. Early and common standards regulate how to measure weight or content [24, 25]. They create norms and specifications regarding the handling of goods and services, in order to control performance quality and risks. The advent of environmental concerns, as expressed earlier, put the emphasis more on the environmental, social and economic sustainability in a holistic way [26], rather than only on the economical or social serving of a group of people. In fact, concerning the use and trade of (renewable or non-renewable) raw materials, the standards express the needs and concerns of (export) markets and consumers, and function at an international non-legislative basis [27]. It thus may well have in many cases higher requirements and differing interests than the legislation of the exporting nation [28-30]. The opinions and priorities are bound to differentiate. Problem solving and negotiating are part of the process of standard development, which usually brings forward balanced solutions for further development.

3.1 Standards replace legislation

Thus the process around environmental certification is an example of global development that was carried out by governments, other political bodies and loosely organised groups of concerned citizens, Non-Governmental Organizations (NGOs). Today environmental issues concern so many different interest groups, that these issues are represented as hard facts on eco-sensitive markets. The process behind UNCED encouraged the International Organisation for Standardization (ISO), [31, 32] to establish environmental standards. Following the success of the ISO 9000 standards for quality

management, ISO thus introduced the 14000 series for environmental management for use by an organisation [33]. Five areas are addressed in this family of standards that encompass the building of Environmental Management Systems, Performance Evaluations, Auditing, Life Cycle Assessment and Environmental Labelling. And in recent development also the ISO 26000 family on Social responsibility was published, to cover not only environmental aspects but also social, corporate, municipal and human rights related aspects of sustainability [34].

By means of standardisation and voluntary adherence to it, it was possible to avoid complicated international legislation in the area of environmental management. The ISO 14000 family of standards for Environmental Management Systems (EMS) are standards of procedures, some of which are applicable for certification. The level to be attained is set by the organisation itself. A third independent party, that has no vested interest in the organisation, must do the audit for the certification process. The ISO 26000 family is not subject to certification, but to provide guidance. Reference to standards, even though it is a voluntary procedure that companies can decide to engage in, is effective because of market demands. While customers are more aware and concerned about not only price and quality, but also environmental and social aspects, the pressure on companies' production, products and reporting grows [35].

The enforcement of forest legislation in many countries, which export forest industry products, did not satisfy consumers on some export markets [36, 37]. Hence, exporting countries and environmental NGOs took the initiative to create standards for forest management. Forest management standards such as e.g. Forest Stewardship Council (FSC), International Tropical Timber Organisation (ITTO), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Programme for the Endorsement of Forest Certification schemes (ex. Pan European Forest Certification Scheme (PEFC)), prescribe a certain performance or level of the management that the company must reach. The Forest certification standards are strongly committed to the three pillars of sustainability. By adding them to the ISO 14000 and ISO 26000 family of standards, in fact a standard was established for the certification of social and economic aspects of sustainability (ISO 14000 address environmental aspects only, ISO 26000 addresses social, corporate, community and human aspects). So with the advent of FSC and PEFC, the process towards Corporate Social reporting standards started. Public concern in the developed world raised the issue whether exporting markets in the developing world respected social rights. In fact the importing markets did not trust that the national legislation in exporting countries respected for social rights. This is why ISO 26000 has as main focus on social responsibility, transparency and accountability, and on adherence to national and international laws, rights and norms of ethical behaviour. The process behind the development of an ISO supported development of CSR was similar to the development environmental standards. The markets and concerned consumers exercise a pressure.

3.2 Scope

The scope of such a ISO certification on corporate and social responsibility includes several elements and preconditions. Therefore to commence to certification, an organization and its body of governance (=management) is required to live interdependent with the local community and its law, the labour forces, suppliers, consumers, organizations of human and labour rights, and the companies' stakeholders. The functionality of the system is dependent on an approach which vitally includes strive for transparency, accountability, a system for communication and continuous improvement. The actual design and implementation of these concepts is the matter of the organisation. However, the ISO Reporting is subject to covering aspects of the categories "Marketplace", "Environment", "Workplace", "Community" and "Human Rights" (see Table 2).

Table 2: Example of categories and aspects covered by ISO Standard [34]

ISO Reporting: Marketplace	***ISO Reporting: Environment***	***ISO Reporting: Workplace***
Customer complaints about products and services	Overall energy consumption	Workforce profile: gender, race, disability, age
Advertising complaints upheld	Water usage	Workforce profile compared to the community profile for travel to work area: gender, race, disability, age
Complaints about late payment of bills	Quantity of waste produced by weight	Staff absenteeism
Upheld cases of anti-competitive behaviour	Upheld cases of prosecution for environmental offences	Number of legal non-compliances on health, safety, equal opportunities legislation
Customer satisfaction levels	CO2/greenhouse gas emissions	Number of staff grievances
Customer retention	Other emissions (eg Ozone, Radiation, SOx, NOx etc)	Upheld cases of corrupt or unprofessional behaviour
Provision for customers with special needs	Use of recycled material	Number of recordable incidents (fatal and non-fatal) including sub-contractors
Average time to pay bills to suppliers	Percentage of waste recycled	Staff turnover
Customer loyalty measures	Net CO2 contribution made	Value of training and development provided to staff

Recognising and catering for diversity in advertising and product labelling	Environmental impact over the supply chain	Pay and conditions compared against local equivalent averages
Social impact, cost or benefits, of the company's core products and services	Environmental impact, benefits or costs, of companies core products and services	Impact evaluations of the effects of downsizing, restructuring etc
		Perception measures of the company by its employees
ISO Reporting: Community	***ISO Reporting: Human rights***	
Cash value of company support as % of pre-tax profit	Any upheld non-compliances with domestic human rights legislation	
Estimated combined value of staff company time, gifts in kind and management costs	Existence of confidential grievance procedures for workers	
Individual value of staff time, gifts in kind and management costs	Wage rates	
Project progress and achievement measures	Progress measures against adherence to stated business principles on human rights as stated by law and international human rights standards	
Leverage of other resources	Proportion of suppliers and partners screened for human rights compliance	
Impact evaluations carried out on community programmes	Proportion of suppliers and partners meeting the company’s expected standards on human rights	
Perception measures of the company as a good neighbour	Proportion of company's managers meeting the company's standards on human rights within their area of	

	operation
	Perception of the company's performance on human rights by employees, the local community and other stakeholders

3.3 Methods used in voluntary global regulation: ISO Standards and Certification (FSC)

Definition and implementation, and example from FSC

Standard has a generally applicable definition according to Webster´s dictionary [38] "Something set up and established by authority, as a rule for the measure of quantity, weight, extent, value or quality". Standards are one of the oldest market instruments (e.g. in the Middle Ages the standard size of a loaf of bread was engraved or attached outside to the churchwall, around which regular markets took place, for public reference as can be seen for instance at the Freiburg Minster in Germany) and developed for a certain use by due organisations e.g. internationally by the International Organization for Standardization (ISO). Standardization [38] is a global tool for achieving efficient and just trade and production, it enables cooperation and technology transfers. And this serves as a prerequisite for certification.

Certification refers to the confirmation of certain characteristics of an object, product service object, person, or organization in order to facilitate better services production, trade and use. This confirmation can be provided by professional organizations (e.g. lawyers) or some form of external review most commonly executed by third party. This party may be accredited in order to undertake relevant control [39]. Cashore et al [40] list as further features of certification voluntary nature, stakeholder perspective, social aspects, authority granted by stakeholders from the public domain and from the market value chain, and verification by an independent party (usually the certification initiative). The most important feature is the lack of
state sovereignty used to enforce compliance, thus it is a voluntary mechanism. In its place, a private organisation develops rules designed to achieving pre-established objectives (e.g. sustainable forestry, in the case of forest certification) [40]

There are different forms of certification. ISO certification is a global instrument, and the conditions are the same for all companies who apply it. In terms of FSC certification the procedure is slightly different. Even though FSC's principles and criteria for FSC certification [41] are applicable worldwide and relevant to all forest areas and ecosystems, as well as cultural, political and legal

systems, they are they are not specific to any particular country or region. In order to make them locally applicable, FSC's certification body develops in stakeholder involvement a set of International Generic Indicators. The reason for this are the diversity of local conditions, resources, forest management and operational systems, as well as the fragility of the assessed ecosystems. In many countries, FSC working groups have developed FSC National Standards. These are based on the principles and criteria [41], but nationally adopted based on case-to-case evaluations. This national specification, however, makes certification difficult to compare at an international context.
Regular check-ups and re-certification are part of the concept of certification.

Strengths

Certification is a non-governmental market mechanism, and thus voluntary. Validation and trust in the certified processes are given by the strict structures that and company that submits itself to certification has to adhere to: verification by outside instances, unlike CSR, where there is only an internal verification system) [40]. ISO Standards, as well as e.g. FSC certificates are globally recognized and trusted by users and customers. This sort of public relations is an important piece of communicating responsible production and adherence to higher morals and ethics in production and product safety.
Its strength is paramount, modern industry and trade would be impossible without certification of bodies, products or services.

Weaknesses

Certification, as well as standardisation imply an extra cost on production, products and services, alongside with additional procedures e.g. in book-keeping, management procedures and verification routines which come unexpectedly and thus may interrupt the production process.

4. Instruments of regulation and current methods to support impact assessment for regulatory instruments:Voluntary cooperative instruments CSR and other reporting practices in the industry

As one step before ISO certification, Corporate Social Responsibility (CSR) has no common agreed concept or standards and is entirely voluntary by the applying companies and institutions. In addition to SIA, CSR aims at measuring and documenting services/well-being of the employees and to the larger good of society in that region as such. The concept of CSR has evolved ever since the 1950ies [42].

Over the last two decades in OECD countries increasingly more firms are reporting on their CSR endeavours. The basic idea is a concept which is assigned by private companies to guarantee that a certain firm's behaviour is environmentally and sociologically correct. First studies show that CSR firms are more virtuous and have better long run performance. This balances the initial CSR costs by

higher sales and profits due to the reputation effect, reduction of long run costs and increased socially responsible demand (Vergalli and Poddi, 2009).

Until recently (Nov 2010), when ISO 26000 on Social Responsibility was published, there has been no designated standard for CSR. However, ISO 26000:2010 is not a management system standard; this means it is not possible to be certified according to it or to be used for regulatory or contractual purposes.[1] Its purpose is "to assist organizations in contributing to sustainable development. It is intended to encourage them to go beyond legal compliance, recognizing that compliance with law is a fundamental duty of any organization and an essential part of their social responsibility. It is intended to promote common understanding in the field of social responsibility, and to complement other instruments and initiatives for social responsibility, not to replace them." [34].

So even with ISO 26000, the concept of (C)SR as such takes on different meanings depending on the organization or group and is encouraged to do so. The emphasis usually is on individual aspects, e.g. ethics, environment, safety, education or human rights. According to the World Business Council for Sustainable Development (WBCSD, 2011) "CSR is the task of a business to contribute to sustainable economic development, working together with workers, their families, the local community and society in general to improve quality of life". The Lisbon European Council (2000) included it as a fixed strategy. Further it includes strategic corporate aims and respect for all players involved in a company. Stakeholder theory seems to be useful to measure the social responsibility of a firm by means of social accountability. However the recentness of the phenomena and the absence of a well defined and universally accepted certification method lead to certain limitations: There is no certification, which is an objective benchmark rather than a mere marketing tool for the public, and the principal motivation and elements which push firms into ethical behaviour and suitable certification (Vergalli and Poddi, 2009)

This lack of an agreed standard lead to a variety of competing global standards for CSR reporting, which should not be forgotten to mention, such as the Global Reporting Initiative, formed by the Coalition for Environmentally Responsible Economies (CERES) and UNEP in 1997. Another is the UN Global Compact, which was first announced by then UN Secretary-General Kofi Annan in 1999, as an initiative to encourage businesses worldwide to adopt sustainable and socially responsible policies, and to report on them [43].

4.1 Introduction to CSR principles

In the following the Global Reporting Initiative (1997) and the UN Global Compact (1999) are presented in more detail as an example of CSR principles [9, 44].

[1] ISO 2010: ISO 26000:2010 on http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=42546 date: 01.12.2011

The Global Reporting Initiative (1997) focuses on key non-financial issues for company reports [9]. These include:

Environmental indicators, such as materials used (including percentage of recycled material), consumed and saved energy, used and reused water, as well as land which is owned, leased, managed in or adjacent to protected areas and areas of high biodiversity value and impacts on biodiversity. Further included are Greenhouse gas emissions by weight and initiatives to reduce greenhouse gas, ozone- depleting and other harmful emissions, as well as waste by type and disposal method.

Social performance concentrates on four different aspect groups: labour practices and decent work, human rights, society and product responsibility.

Labour practices and decent work is measured by employee turnover by age group, gender, and region, as well as employee benefits, occupational health and safety, training and education, diversity and equal opportunity.

Human rights cover investment and procurement practices, including percentage and total number of significant investment agreements that include human rights clauses or that have undergone human rights screening, as well as the percentage of significant suppliers and contractors that have undergone. This requires also a careful screening of human rights and actions taken to combat child labour, forced and compulsory labour, as well as indigenous rights.

Society as an aspect of social CSR performance concentrates on nature, scope and effectiveness of any programs and practices that assess and manage the impacts of operations on communities, as well as on corruption, public policy development, and anti-competitive behaviour.

Product responsibility addresses customer health and safety issues, adherence to laws, standards, and voluntary codes related to marketing communications, including advertising, promotion and sponsorship, as well as customer privacy.

The UN Global Compact (1999) includes ten principles which in general relate to human rights, labour rights, environmental protection and transparency [44].

In detail those are:

Human rights

- Principle 1: Support and respect the protection of internationally proclaimed human rights.
- Principle 2: Make sure that they are not complicit in human rights abuses.

Labor Standards

- Principle 3: The freedom of association and the effective recognition of the right to collective bargaining.
- Principle 4: the elimination of all forms of forced and compulsory labour.
- Principle 5: the effective abolition of child labour.

- Principle 6: the elimination of discrimination in employment and occupation.

Environment

- Principle 7: Support a precautionary approach to environmental challenges.
- Principle 8: Undertake initiatives to promote environmental responsibility.
- Principle 9: Encourage the development and diffusion of environmentally friendly technologies.

Transparency / Anti-corruption

- Principle 10: Businesses should work against corruption in all its forms, including extortion and bribery.

4.2 Methods used in voluntary cooperative regulation

4.2.1 CSR

Definition and implementation, an example from IKEA

As CSR is entirely voluntary and lacks a clear and practical standard procedure as well as only few recommendations exist, also CSR reporting varies a lot [42]. However, it is also widely used by different companies [37, 45]. In the following, an example from Scandinavia shall be given:

IKEA, a Swedish furniture producer and retailer, created the "The IKEA Way on Purchasing Home Furnishing Products (IWAY)" as IKEA's code of conduct [46], which is "based on international conventions and declarations. It includes provisions based on the United Nations Universal Declaration of Human Rights [47], the International Labour Organisation Declaration on Fundamental Principles and Rights at Work [48], and the Rio Declaration on Environment and Development [49]. It covers working conditions, the prevention of child labour, the environment, responsible forestry management and more.

Suppliers are responsible for communicating the content of the IKEA code of conduct to co-workers and sub-contractors and ensuring that all required measures are implemented at their own operations."[46]. This code of conduct incorporates many aspects of both the Global Reporting Initiative [9] and the UN Global Compact [44], and puts special focus on combating child labour (compare paragraph on "The IKEA Way on Preventing Child Labour", IWAY 2000). In practice this means that Europe is not the border of CSR aspects, but any country in which the company is affected, and this includes its contractors and sub-contractors [27, 50]. Countries, in which IKEA produces, do have child labour, but IKEA does not accept it at any of its contractors or their sub-contractors. This includes an (unannounced) random checking regime. If such cases are found, the offensive (sub)contractor is required to change this situation, plus to take a pronounced role in that child(ren)'s further education (e.g. taking over a part of the school arrangements). Only if these measures fail, the

contract with the (sub)contractor is ended [46]. These measures described under the Code of Conduct are an example of how one company has translated the theoretical aspects of CSR into practice, with clear goals and procedures.

Strengths

The strength of CSR is that it is not depending on national interests and it offers a structural method to address complicated issues. As being of a procedural nature, its content is voluntary. This gives it a lot of freedom to customize the scope and the requirements to the organization in question, and with that the reporting can be tailored by an organization and its employees in order to suit their scope and requirements. Large organizations many times have advantages when maintaining monitoring systems, but in this case the voluntary approach also provide for SMEs or globally acting large companies, operating in many regions or nations. The ability to perform CSR reporting is considered to be an argument on social sensitive markets in order to support organizations and its products with a transparent argumentation.

Weaknesses

At the same time, this freedom in reporting makes it difficult to compare the level of CSR between different companies, as there is no certifiable standard or firm regulation. No levels of performance are identified. Some organizations have addressed this by defining the criteria, and their evaluation in order to monitor compliance to the most commonly selected indicators and criteria, and outward acceptance. There is however also a fear that CSR schemes function as barriers, discriminating competing organizations from certain markets.

In contrast to certification, CSR verification is done according to routines that the company decides, not an independent auditing procedure. This can be both beneficial, as the verification can be adjusted to the companies special needs and situation, or a disadvantage, as it can potentially undermine the credibility of the verification procedure and results.

4.2.2 Life Cycle Analysis (LCA)

Definition and implementation, and an example from ISO14040

LCA [33] is a different form of approaching cooperate reporting on a company's socially or environmentally responsible production. LCA [33] assesses environmental impacts of all stages of a product from the "cradle to the grave" (e.g. from the extraction of all raw materials used in the system, including for the production of the used equipments, until the end of all used equipment and emission at waste). There is also an option of adjusting the depth and scope of the analysis, depending on the purpose of the analysis.

The purpose of this methodology is to create an overview of how different processes or services from raw material extraction, production and use influence the environment. Economic or social aspects are not typically covered. Consequently the evaluation is to be meant wider than e.g. point assessment of a certain industrial unit.

The purpose of a LCA is to assess and compare the environmental performance of processes or services. The comparisons are stand-alone comparisons which could lead to an EPD (environmental product declaration). LCA contains three general stages:

1. Goal and scope definition
2. Inventory analysis and
3. impact assessment, referring to certain impact categories as e.g. Global Warming Potential and Acidification.

The fourth Step "Life cycle interpretation" is needed in order to present the results as recommendations and conclusions.

The method of LCA has been included in the ISO14000 family as ISO standard "ISO 14040 (2006): Environmental management – Life cycle assessment – Principles and framework, International Organisation for Standardisation (ISO), Geneva." [33].

Strengths

Its strength lies in the systematic approach that covers a whole chain of processes, and includes also impacts, which the production of material/tools/machinery has, that is needed for the value chain processes.

Weaknesses

Its weakness is that its need of relevant data for the assessment causes a considerable workload. This requires an extensive, specialized database with information on all processes prior to production and makes the methodology difficult for small organizations.

Further, the wide scope makes assessments of subsystems or selected processes less clear, as the effects of scenarios or changes are diluted with a wider scope. The system boundaries cannot be adjusted according to the needs of a smaller assessment.

4.2.3 Carbon footprint

Definition and implementation, an example from Apple

Carbon footprint methods assess only environmental aspects, and there it concentrates mainly on generation of CO2 equivalents during the products life cycle (production, consumption, use, end-of-life). Also this is a voluntary concept.

Currently, an ISO standard is for ISO/DIS 14067.2 “Carbon footprint of products: Requirements and guidelines for quantification and communication” is under development. This ISO standard will specify calculation guidelines, and belong to the group of ISO 14067 family of Greenhouse gas Emissions.

For example the PC manufacturer Apple uses the Carbon footprint method to visualize the development efforts of the companies’ products (computer hardware), processes (e.g. packaging), production (e.g. facilities and employees) and product recycling (see Figure 1). With this it also promotes new products by showing where the improvement in terms of environmental impact (reduced GHG) can be found in comparison to older versions.

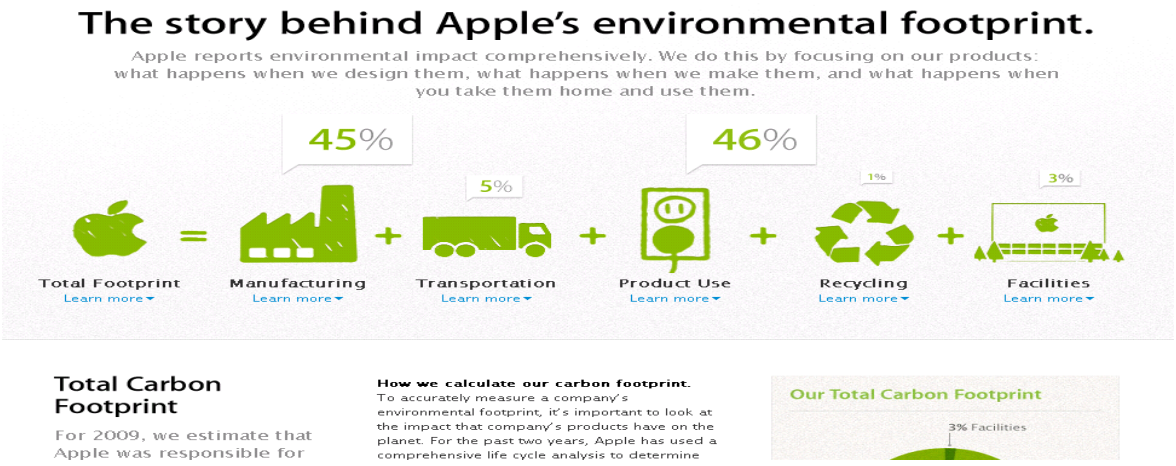

Figure 1: Example on Apple’s graphical reporting on Carbon Footprint.

Strengths

On the positive side, Carbon footprint includes a fairly complete picture of the Carbon footprint of production, including generation, distribution, use and related exhaustions – as far as feasible.

Weaknesses

A drawback is the sole concentration on Carbon, which makes it unsuitable for a complete environmental survey, as it neglects other important aspects like generation of waste, hazardous impacts, water use, energy generation and use and many more. It also does not cover any other dimensions of sustainability.

4.2.4 SIA approach

Definition and implementation, example of ToSIA

Sustainability is a highly subjective and difficult to assess concept. Absolute sustainability is not measurable. Relative changes of sustainability aspects however can be assessed. Therefore the SIA approach, Sustainability Impact Assessment, was developed to do baseline-scenario comparisons and to cover a wide range of sustainability aspects, such as economic, environmental and social. It

integrate previous and parallel approaches such as various indicator approaches, product approaches, value chain approaches, Multi-Criteria Assessments, Environmental Impact Assessment (EIA), Strategic Environmental Assessments (SEA), Social Impact Assessment (sIA) and others [3-6, 8, 51]

As an example for a tool for SIA the Tool for Sustainability Impact Assessment (ToSIA), was developed to assess sustainability impacts of changes in FWCs [52]. In ToSIA, FWCs are defined as chains of processes (e.g. transport), which provide products and services (e.g. round wood). Sustainability impacts are determined by quantifying relative environmental, economic, and social sustainability indicators for every process along the FWC, multiplied with the material flow passing through these processes. Changes in sustainability impacts are then calculated for alternative chains, which differ from the baseline. Changes can be changed material flow amounts, changed relative indicator values and/or changes in FWC process chain topology [53]. These changes are "what if"-scenarios of interest to the respective user, and can be hypothetical, ex-ante or ex-post scenarios.

Strengths

Indicators can be freely selected and defined as needed for the purpose, according to a formalised quantitative approach. The same is true for the focus and detail of the assessment's study. Data sources and assumptions can be stated and checked at each stage. This flexibility makes the SIA approach a highly applicable tool and possible to be used for different purposes. Unlike LCA, which is developing in stressing other aspects such as LCC (Life Cycle Costing), SLCA (Social Life Cycle Assessment) and LCSA (Life-Cycle-Sustainability-Assessment), or Carbon footprint, SIA is non-exclusive in the aspects, which it is assessing; social, economic and environmental are just groups which were introduced for users' convenience. Further groups can be added, which enlarge the set of indicators, restrict it or focus on an entirely different area like Human rights, Labour standards, Transparency/anti-corruption, (all categories see ISO 26000) and Market place, Workplace, Community (all additional groups see ISO 14000 family) and other indicators. This makes it a very flexible, transparent and objective method. All material flows are referred products to tons of elemental Carbon.

Weaknesses

The method is data-driven, and the tool fairly young and as such needs time and technical improvements. Quick assessments are difficult. Further the concept is still requiring expert knowledge of handling the tool and includes lots of detail. Improved functionalities to cater to this and other needs are under constant development and implementation. Because of its only recent development and hand-made usage, also one further important limiting factor is the human user and his or her capability to keep an overview over processes and products. Biggest application so far was a European FWC assessment, covering 80% of EU25 plus Norway and Switzerland's forest-based sector for products

until the 6-digit NACE classification level. Tracking of individual wood flows is in the current concept not possible at batch level.

4.3 Summary and overview of introduced methods

This section will shed more light on the youngest method, SIA which aims at covering the main aspects and filling in the gaps the individual methods left.

As it becomes obvious by the explanation of the different concepts and methods, there is some partial overlap between those. This is founded in the historical development of the requirements for these methods and the development of these methods themselves. LCA and certification, like FSC, PEFC and Rainforest Alliance (here represented only by FSC) are among the oldest, while CSR is younger. However, these methods are responding to the developments in other methods and thus grow organically to cover additional aspects. The ISO 14000 and 26000 standards are youngest and partially still under development, searching for a comprehensive and unambiguous way of describing how the different methods shall be carried out. And overview of coverage of different aspects can be found in the following Table 3:

Table 3: overview of sustainability dimensions which are covered by the individual methods and concepts

CSR	**CSR**	**ISO 26000:2010**	**Forest Management Standard**	**ISO 14000-family**	**SIA**
Global Reporting Initiative (1997)	***UN Global Compact (1999)***	***ISO 26000 on Social Responsibility***	***FSC***	***14000 on Environmental Management***	***Sustainability Impact Assessment***
Sustainability dimension: Work place					
GRI: Labour practices and decent work	UN GC: Labour Standards	Labour practices 6.4	Principle 4, Principle 8	ISO Reporting: Workplace	Social indicators
Sustainability dimension: Human rights					
GRI: Human rights	UN GC: Human Rights	Human rights 6.3	Principle 1, Principle 3	ISO Reporting: Human rights	(potential)
Sustainability dimension: Community					

GRI: Society	UN GC: Transparency / Anti-corruption	Fair operating practices 6.6, Community involvement and development 6.8	Principle 2, Principle 4, Principle 5, Principle 8	ISO Reporting: Community	(potential)
Sustainability dimension: Market place					
GRI: Product responsibility		Consumer issues 6.7	Principle 9	ISO Reporting: Marketplace	(potential)
Sustainability dimension: Environment					
	UN GC: Environment	The environment 6.5	Principle 6, Principle 8	ISO Reporting: Environment	Environmental indicators
Sustainability dimension: Economy					
					Economic indicators

It is a schematized overview which does not list the individual features, but rather indicates coverage of a certain aspect or none (see color-filled fields).

In general, most sustainability dimensions are covered by the introduced methods, except the economic aspects. CSR and ISO 26000 cover the work place, human rights, and community aspects very well; while ISO 26000 covers additionally also market place and environment, which are not simultaneously covered by the older CSR initiatives GRI and UN Global Impact. On the down side there are no practical instructions for comparable assessment of these sustainability impacts in terms of indicators or other comparable means. The same is true for FSC, due to the variation of country-specific definitions.

ISO 14000 covers all areas, but the economic dimension, through the different standards. These individual standards (as for Carbon Footprint, LCA, or others) are however very precise and implementable for international comparison.

SIA has so far mainly been applied for the sustainability dimensions work space, environment and economy, with only tentative approaches to cover community, human rights and market place. However, the concept is very implementable and flexible and supports the inclusion of these dimensions, if suitable indicators are developed.

There are two ways how it can be done: as a) process-specific indicators and b) as general chain or sector-level indicators.

Process-specific indicators:

Process-specific indicators already exist. They are indicators which logically only relate to specific processes (bundled in stages or modules). E.g. “Biodiversity” or “Forest resources” only make sense in

the module of forest resources, while “Energy and Heat generation” happens at the industry. Some indicators change their definition and meaning despite their name, e.g. “Water use” in the forest differs considerable from “Water Use” in the industry.

A closer look at the CSR and ISO 26000 criteria showed that many aspects are directly applicable as indicators and partially even already part of the ToSIA indicator set, such as “Equal opportunities” translates to ToSIA indicators “10. Employment: male and female, urban and rural”, “11. Wages and Salaries: male, female, related to country average and PPP (purchasing power parity) as well as “13. Education and training”. The same is applicable for other binary or quantitative process-based indicators like “child labour”, “conformity to national laws and regulations”.

general chain or sector-level indicators

The development of the tool towards connected factors and impacts of process chains is possible with the same SIA approach. This would include not only indicators which are strictly related to specific physical processes like harvesting, pulping, trading, but also connected aspects like local value added (where does the money from a certain resource go?) or HR (human resource) related indictors like quality of work, customer perception, development potentials, etc.

In terms of categorisation, so far the groups: economic indicators, environmental indicators, social indicators and user-defined indicators are implemented in ToSIA. For above mentioned assessments, the groups: CSR or social responsibility indicators and good governance could be added. Or to stay in the ISO nomenclature: Human rights, Labour standards, Transparency/anti-corruption, (all categories see ISO 26000) and Market place, Workplace, Community (all additional groups see ISO 14000 family) and other indicators.

5. Discussion: Possibilities and opportunities to use SIA to support sustainable development in regions and companies

5.1 How does SIA add value to above approaches?

There are many resource use questions which could be addressed with SIA, and the scope is not limited to forest-based carbon, but –so far – to value chains, land use and, in the case of ToSIA, elemental tons of Carbon. A forestry-nature conservation-reindeer husbandry case [54] proved that it is open to include also other sectors operating on the same resource, which is a forest. Thus, the method could be applied to other resource use cases world-wide and include forestry, reindeer husbandry, wind-energy, mining, tourism, agriculture, urban forestry and agriculture, other land uses, just to name a few.

While the complexity of land use decision making is increasing, also the value of other forest services is increasingly important. A monetary evaluation should consider also e.g. value of nature conservation

or supporting traditional livelihoods, including social, environmental and cultural aspects, which supports regional development. It was suggested to establish additional indicator calculation procedures to make (To)SIA more useful: e.g. LCA results, cultural aspects, conservation value. The benefit in these is that the use of those older, tested and approved approaches with additional SIA indicators will give even broader decision support and make it more useful: e.g. cultural aspects at local and national level.

Despite these great prospects, it is important to keep in mind that SIA is no magical fortune teller, and that a thorough analysis is needed to apply the method. The quality of the results is directly linked to the quality of the data which was used for using the method or feeding the tool.

Nevertheless, when it comes to understanding the process and the concept of SIA of value chains, already the work that is needed to do an assessment, is at least as valuable as the results themselves [55].

5.2 Why should we assess at all how SIA fits into the above approaches?

SIA was developed as a concept because the traditional methods had the limitation of a too narrow topical focus (e.g. only Carbon) or lack of practical applicability. SIA is a flexible and enlargeable concept, which does not require changes to the basic method or approach to be suitable for different contexts (e.g. landuse perspective). New indicators or assessment areas can be included as long as they can be quantified, even qualitative aspects added as long as they can be translated into quantitative values. It is an indicator and a process - product based approach in one, and thus covers many aspects of the older approaches. Still some results from LCA, Carbon footprint, CSR or FSC certification could be included as indicators and thus be comparable in terms of impacts.

There is still more work needed on developing reliable indicators for softer aspects such as CSR aspects (workplace, human rights, community, market place), so that they can be included in SIA. CSR as well as ISO 26000 is still missing a systematic and practical approach for implementation, and SIA could be such a method. Carbon footprint is naturally a part of SIA, as SIA is based on material flows of products through the production processes of a value chain.

6. Conclusions

The concept and definition of sustainability, particularly of sustainable forestry from where the concept of sustainability has started from, has evolved over time in different fields and created different methods for assessing sustainability: in science, in industry and in policy. With this co-evolution also different methods for assessing the state of sustainability or the impact different external drivers have on sustainability have been developed in parallel and in response to one another. In the forest-based sector, different methods have evolved. Starting from a restricted aspect, such as purely

resource-based sustainability focusing on the non-depletion over time of standing volume of trees, the methods have broadened in covering additional aspects later. There are very strictly defined concepts, e.g. the LCA standard ISO 14040: 2006 [33], while others are rather vague (e.g. Corporate Social Responsibility). This concept of sustainability is a base for initiatives in standard development and subsequent certification (ISO, FSC) or reporting (CSR, LCA) and for international agreements or conventions serving the legislation. This means that the initiatives asked for voluntary and legally binding instruments, and methods for impact assessment. These instruments and methods can be applied to/at different levels (regional, national, international agreements). Selected methods can even only be applied at company level.

And indeed, instruments and methods aiming at ensuring and assessing sustainability have come a long way since the establishment of the concept of sustainability in [1]. Legislative and voluntary instruments have co-evolved. With them also assessment methods have co-evolved, by borrowing, adapting and integrating useful aspects of other methods (e.g. ISOA 26000), specialising on selected aspects (e.g. Carbon footprint) or broadening in flexibility to include further dimensions and aspects in the assessment if needed (e.g. SIA). The further development of methods will need to focus more on aspects of social responsibility and provide practical means of implementing these methods. Therefore the expected work is not necessarily needed for methods but for indicators and calculation methods, which allow to assess changes in areas of social responsibility like work place, human rights, community and market place.

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Conflict of Interest

The authors declare no conflict of interest.

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