

Review

Managing Sustainability of Fennoscandian Forests and Their Use by Law and/or Agreement: For Whom and Which Purpose?

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Abstract: Sustainability and sustainable behaviour is of crucial importance in the management of Fennoscandian forests and forest-related industries. This paper reviews a number of voluntary instruments, which aim at promoting or assessing sustainability impacts at different levels. The multitude of available instruments brings confusion in practice, where companies, consumers and investors meet legal and different voluntary regulatory and non-regulatory instruments. The practical suitability and covered sustainability dimension for each instrument is reviewed with an analysis of strengths, weaknesses, actors and purposes 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 approach and how they can support or reinforce each other. Special attention is given to current approaches in impact assessment, particularly on their areas of application (companies, NGOs, products, operations, production practices, *etc.*), and recommendations for supplementing it with sustainability impact assessment.

Keywords: sustainability; CSR; legal instruments; voluntary instruments; certification; SIA; ISO; FSC; LCA

Abbreviations

CBD: Convention on Biological Diversity; CERES: Coalition for Environmentally Responsible Economies; CSR: Cooperate Social Responsibility; EIA: Environmental Impact Assessment; EMS: Environmental Management Systems; EUTR: European Timber Regulation; FLEGT: Forest Law Enforcement, Governance and Trade; FSC: Forest Stewardship Council; GFEP: Global Panel of Forest Experts; GRI: Global Reporting Initiative; IA: Impact Assessment; ISO: International Standard Organisation; ITTO: International Tropical Timber Organisation; NFP: National Forestry Programme; NGO: Non-Governmental Organisation; PEFC: Programme for the Endorsement of Forest Certification; RFP: Regional Forest Programme; SEA: Strategic Environmental Assessment; SIA: Sustainability Impact Assessment; SME: small- to medium-sized enterprise; STG: Standard Trading Group; ToSIA: Tool for Sustainability Impact Assessment; UNCED: United Nations Conference on Environment and Development; UNEP: United Nations Environment Programme; UNFCCC: United Nations Framework Convention on Climate Change; VPA: Voluntary Partnership Agreement; WCED: World Commission on Environmental and Development.

1. Introduction

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 in development in various aspects of life. Different interpretations and foci of sustainability evolved over time in different fields: in science, in industry and in policy. With that different approaches for assessing the state of sustainability or un-/sustainable operations or the impact on sustainability have also developed. In academic circles some discussion centres around the follow-up and assessment of “weak sustainability” *versus* “strong sustainability” concepts [3–5]. According to Rennings and Wiggering [5], the concept of weak sustainability is based on neo-classical economic theory and assumes that manufactured and natural capital are close substitutes. This means that costs of environmental deterioration (e.g., forest damage) can be compensated by benefits from manufactured capital (e.g., income). Thus, environmental damages are valued in monetary units. The concept of strong sustainability denies the degree of substitution that weak sustainability assumes, at least for some critical elements of natural capital. Rennings and Wiggering [5] and Cabeza-Gutés [4] plead for strong sustainability indicators, since the costs and benefits of avoiding critical impacts need to be taken in considerations. In some cases, these critical impacts cannot be substituted through monetary or social benefits, or reversed to the original state. With this the original idea of sustainability (see [1,6]) is not fulfilled anymore, and the development becomes unsustainable. In terms of assessment approaches, it is critical for the interpretation of the results to be aware which assumption of sustainability lies behind the approach and thus, if the assessment method suits the assessment question and purpose.

The political process concerning sustainability goals has evolved from the Earth Summit in Rio (1992) to present-day policies [7,8]. With this emergence of political discussions the sustainability requirements in policy and science have evolved, while scientific methods and approaches have evolved in conjunction with industry, practice and policy. Different approaches for impact

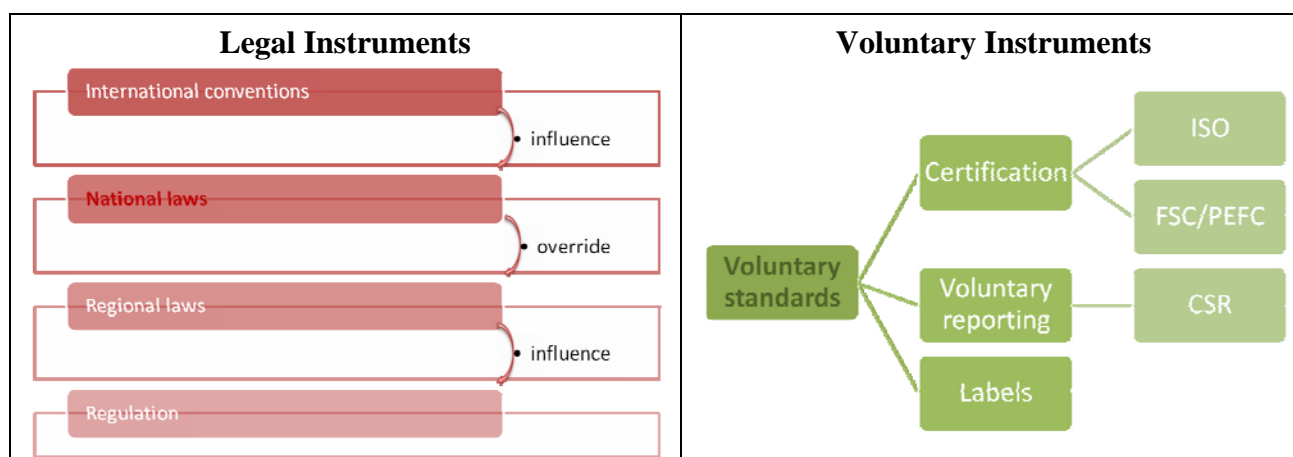
assessment have developed in the policy and business arena, including impact assessments [9–12], social sustainability impact assessment (SIA) [13], certification [14], Cooperate Social Responsibility (CSR) [15], and Life Cycle Assessment (LCA) [16]. Ness *et al.* [17] and Singh [18] give an overview of different sustainability tools, methods and approaches in use from a scientific, method-driven perspective.

In recent years, there has been a clear trend towards environmental legislation [19–23]. Ex-ante Impact Assessment (IA) was officially introduced into European Commission (EC) policy making in 2002 [7,8]. It is a formal procedure to analyse potential effects of new policies before their adoption. In parallel, Environmental Impact Assessments (EIA) and Strategic Environmental Assessments (SEA) exist [9]. The purpose of the Strategic Environmental Assessment Directive (SEA) is to ensure that environmental consequences of plans and programmes are identified and assessed during their preparation and before their implementation. A plan, project or programme's impacts on the environment and society are assessed by EIA or the wider SIA.

In addition to abovementioned instruments and approaches of impact assessment, both legal and voluntary instruments exist which aim at assessing or promoting sustainability. In many cases, there is an overlap in instruments between scientific approaches (like LCA) and voluntary instruments (like the ISO 14040 standard on LCA). The main difference between those are in content, meaning that while ISO standards are regulated and fixed, the scientific approach is freer to develop and explore the possibility to expand its boundaries. As both voluntary and legal instruments can be regulatory, in recent literature these regulatory instruments are handled as the “new legal” [24]. Voluntary instruments are particularly prominent in the field of natural resource use such as forestry and the forest-based sector, as it is under a lot of public interest and scrutiny. Humphreys [24,25] argues that the international forest regime was founded upon three broad sources:

- (a) Hard international legal instruments with a forest-related mandate and sanctions (such as the Convention on Biological Diversity (CBD) and United Nations Framework Convention on Climate Change (UNFCCC));
- (b) Growing body of soft international law focused on forests, which are not legally binding or not followed by sanctions for non-fulfilment, such as the Non-Legally Binding Instrument (NLBI) [26] and other decisions of the United Forum on Forests (UNFF), IPF/IFF (Intergovernmental Panel on Forests (IPF) and the Intergovernmental Forum on Forests (IFF)) proposals for action, the Forest Principles and Chapter 11 of Agenda 21 [24,27];
- (c) Voluntary private sector regulation, such as the FSC (Forest Stewardship Council) principles for forest management [28].

A wide assortment of legal and voluntary instruments exists (Figure 1). For the purpose of the analysis in this paper, the authors grouped those approaches into instrument categories of legal and voluntary instruments. Legal instruments relate to the geographic boundaries of a territory (national or international) and are legally binding in that territory. Some voluntary instruments are based on “certification”, which is a means of self-regulation in the industry and follows agreed national and international standards and these are binding once a company has agreed to follow them. Other “voluntary reporting” instruments are reporting and communication instruments which aim at giving a response to market demands on additional information.

Figure 1. Categorisation of legal and voluntary instruments and approaches.

In Fennoscandian countries, the voluntary instruments have a wide and strong acceptance and supplement legal instruments, since they are based on the markets [29,30]. Legal systems define the requirements that the legislator in a given country (or an international body) agree upon. Through the judicial system they have the possibility for legal penalties. The voluntary instruments may have higher and broader requirements. The consequences in failing these requirements are far more dire in economic terms (instrument-related penalties, plus consumer reaction) [31,32]. Shortly expressed, responsibility for the legal system lies with the national states; voluntary certification with the markets.

The multitude of available legal and voluntary instruments can result in confusion in practice, because market players such as company representatives, investors, NGOs, and consumers do not always understand the purpose and content of different instruments. To which extent do they address environment impact, economic or social issues? What is the reference scope and suitability to assess products, operations or a company's code of conduct? Who is behind each instrument and to what extent does it agree with legislation? This proliferation is partially due to an interest by many sectors of society in different aspects of sustainability. This is particularly the case in forestry whereby different interest groups meet. Organizations are free to choose an instrument which covers the issues that are important for its business practice. However they may need guidance in finding out which one is the most suitable for their purposes. All instruments started out having a different focus and target (group), and some instruments have evolved in parallel developments with focus on similar aspects of sustainability. Certification and voluntary standards exist but may have different rules in each 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.

In a Nordic project with focus on stakeholder concerns related to sustainable management in Fennoscandian forests [33] the authors detected an interest from practice for a comparison of this multitude of instruments and an evaluation of the purpose-defined usability of each instrument. While markets are looking for instruments that they can use and understand, the point where legal requirements and voluntary instruments meet in practice proved to be a hotspot. Exploring the borders and overlaps of these instruments in practice is a potential new area of research. A lot of research has been done on the theoretical side, and on the scientific instrument development side; in addition there are strong demands from policy and from NGOs, and initiatives from industry. What is missing is a map that says what is included or excluded in these instruments, what they refer to, in very simple terms.

Companies that deal with natural capital management and products resulting from a natural resource, such as the forest-based sector, are under a lot of public scrutiny. Many regulations are concerned with the management of this natural capital and its products. This paper focuses on the perspective of companies in the arena of legal requirements, voluntary requirements, sustainability concepts, and on how demands from important players can be met by choosing suitable instruments and complying with them.

Aim of this Paper

The objective of this paper is to show the necessity of voluntary and legal instruments, and the differences between them. In particular, difference between legality and sustainability in the forest-based sector is discussed. This is done by a detailed, practice-oriented description and comparison of different voluntary instruments, including aspects which different instruments cover, how they are comparable (if at all) and for which purpose which instrument or approach is suitable. The paper addresses interests of practitioners in the forest-based industry, such as NGOs, consumers, companies and authorities, who look at practical solutions, and who deal with international contracts (between states and companies). The aim of this paper is to shed light on which aspects of sustainability the different instruments cover; at which level (international, national, regional, company), and for what purpose. The suitability, area of application, strengths and weaknesses of the different voluntary instruments is examined. We will also discuss how the youngest instrument, Sustainability Impact Assessment (SIA), fits into the general picture and in which fields developments are expected for all instruments to answer the demands from the political process.

2. Material and Methods

The geographic focus is on Fennoscandia (Finland, Sweden, Norway, plus international outreach), and the forest sector including its products. The review was carried out by first providing an overview of each instrument and then employing a strength-weakness-suitability and actor-analysis. This was done following these steps:

- (1). Voluntary instruments are classified into two *instrument categories*: instruments with regulatory power, like certification and voluntary standards, and voluntary, non-regulatory instruments like CSR and SIA (see Table 1). Instrument categories are understood as a grouping of instruments following similar concepts. Instruments are means of implementing defined measures, concepts or ideas.

Table 1. Overview of instruments and approaches presented in this paper by the authors.

Instrument category	Instrument	Approach to represent instrument
Voluntary and regulatory instruments	Voluntary standards (ISO)	ISO14040: LCA
	Certification	FSC Certification
Voluntary and non-regulatory instruments	CSR reporting	CSR (IKEA)
	Reporting on Sustainability impacts (SIA)	SIA (ToSIA)

- (2). To give more tangible examples, for each instrument a representative approach is described in the following steps:
- Background of the instrument
 - Approaches used within this instrument with a discourse of
 - Definition and implementation: Details about the approach and its historic background are given. The aspects of sustainability it targets are described with details about the scope of the assessment (system boundary).
 - Strengths: Strengths are presented based on empirical observations, experiences from practice and literature.
 - Weaknesses: Weaknesses are presented based on empirical observations, experiences from practice and literature.
 - Suitability and actors: The suitability to assess or prove the sustainability assessment of a product, processes, or code of conduct) are clarified and potential actors for whom this approach or instrument is suitable are described.
- (3). The focus is on approaches as a way of dealing with certain concepts, rather than on specifically defined methods or tools. The reason behind is that for some instruments only recommended approaches exist. The detailed method or tools to implement them can be developed by the companies applying it. After the individual and detailed descriptions for each instrument and approach, they are assessed comparatively with respect to the sustainability dimensions each one covers (Section 3.3.). The traditional separation into economic, environmental and social aspects of sustainability turned out to be too simplistic and instead we used: work place, human rights, community, market place, environment and economy. These categories were chosen based on ISO26000 categories for social responsibility, supplemented with the dimension of economy. Each category is divided in sub-aspects which it covers. These sub-aspects are described and calculated by a set of indicators which each approach uses. For better analysis these indicators were condensed to a limited number of representative main indicators per sustainability dimension, as described in detail in Table 2.

Table 2. Categorization of sustainability dimensions and indicator for assessing which sustainability dimensions the different approaches cover.

Sustainability dimension	Indicators
Workplace	Workforce profile Safety and health Equal opportunity Work satisfaction/perception. Attractive employer Staff development
Human rights	Human rights Anti-force and child labour Indigenous rights National/international rights conformance Stakeholder perception

Table 2. Cont.

Sustainability dimension	Indicators
Community	Local community impacts Anti-corruption /transparency Public perception of company (Company brand)
Marketplace	Customer perception Product safety Advertising and product recognition (Product brand)
Environment	Resource and Environment Consumption Emission Waste/recycling Low environmental Impact Landuse and protection of biodiversity
Economy	Costs Gross value added Investment

Each approach was examined in order to identify which sustainability dimensions are covered by respective indicators. This was done in detail to get a thorough understanding of the covered content of each approach, by comparing indicators per approach side by side. These detailed data files are not shown in this paper. Results for this analysis are presented at a more condensed level as it helps the overview: instead of listing all indicators which fall into a sustainability dimension, the criteria or impact areas under which they are organised in each approach were allocated to the dimensions above. This overview is presented and discussed in detail in Section 3.4.

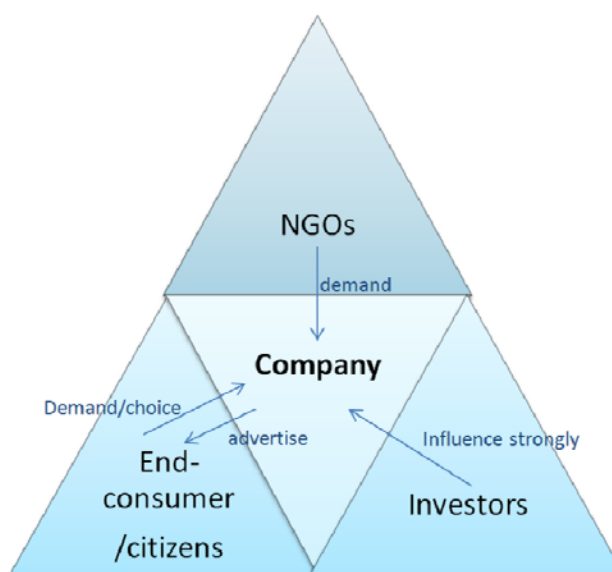
Roles and Interaction of Actors:

From a company perspective, there are three important groups of actors (see Figure 2):

- *Investors* have an interest in high and stable returns on investments, while minimizing risks. Risks for a company can take different forms such as the volatility of global and local markets, prices of raw materials, but most important are reputational risks and operational risks with regards to the fulfilment of environmental obligations [34,35]. Adherence to more strict regulations and initiative in good governance and production are usually investor driven. Investors are influential, as companies are dependent on their investments, and often major investors are represented in the decision making body of a company.
- *NGOs (non-governmental organisations)* are one of the external drivers demanding high standards and responsible treatment of the natural environment in the name of public interest. Thus, their demands and activities link directly to publicity, and in consequence, to financial risks related to the production environment of companies. NGOs are important actors influencing the use and development of both legal and voluntary instruments [24,36].
- *Business customers, end-users and citizens*, are important driving forces for company practices and markets. Companies anticipating a market premium may offer end customers products with

an eco-friendly reputation. The end users *i.e.*, the public, are usually in a national setting which relates to certain regional or national legislation and standards. The purchasing of public contracts may have a significant environmental or social impact. Therefore, purchases with public money are regulated by the EU directive 2004/18 [37]. In recent years, customers have also become more aware and active in demanding product safety, and ethical production practices. Market competition drives companies to respond to customer demands in a forward acting and informative matter [37].

Figure 2. Triangle of actor relations influencing a company's code of conduct.



To shed more light on how common and available instruments function from a company perspective, instruments are selected based on their public acceptance and visibility, and categorised into legal instruments, and voluntary instruments (see Figure 1). Approaches will be discussed per instrument category by introducing the approach and giving one implementation example of that approach, as well as highlighting the strengths, weaknesses, suitability and actors of this approach.

3. Results: Sustainability Assessments in Voluntary Instruments

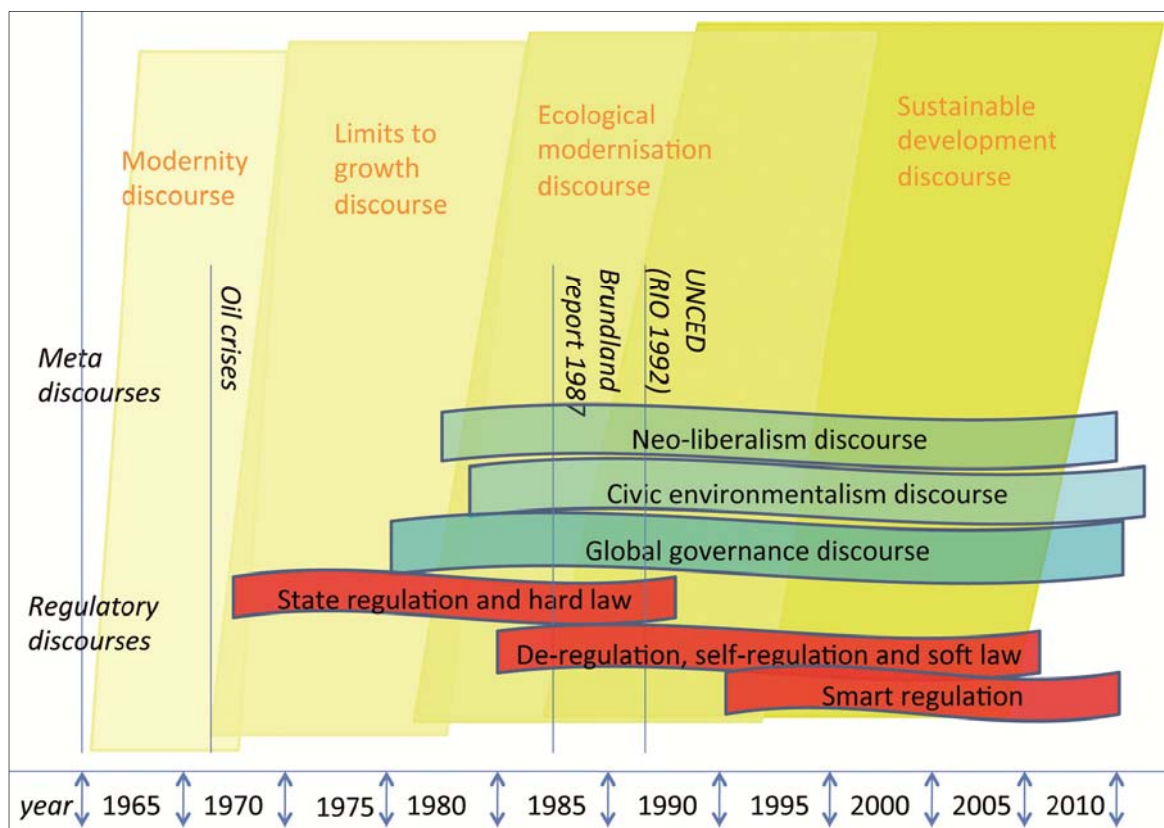
3.1. Standards Replace Legislation

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 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 [38].

In recent times, the boundaries between legal and voluntary instruments have shifted with the introduction of “hard *versus* soft laws”. This new instrument development is, according to Appelstrand, Kleinschmit, Pülzl and Visseren-Hamakers of the Global Forest Expert Panel [24], a response to social and political developments (see Figure 3). They argue that based on the topics for political discourse, the responsibility of the different actors and with that the type of instrument

development has changed. The trend goes from “hard law” and rigid state regulation to self-regulation and cooperate responsibility of involved actors.

Figure 3. Based on a literature search of the Global Panel of Forest Experts (GFEP) [24], we reconstructed the emergence, fall and existence-in-parallel of a number of meta discourses that relate to global forest policy. The environmental meta discourses are depicted in yellow. Overlapping those are the economic and governance meta discourses (in blue) and the regulatory discourses (in red). This time and discourse line describes the emergence of different instruments affecting companies, as presented in this paper.



With this shift from hard laws to more self-regulation and corporate responsibility, more weight is given to formalized and publically recognized, voluntary instruments. The authors classified these voluntary instruments into instruments with regulatory power, like certification and voluntary standards (Section 3.2), and into voluntary, non-regulatory instruments like CSR and SIA (Section 3.3). Section 3.4 compares all instruments in an overview and discusses covered dimensions of sustainability.

3.2. Voluntary Instruments with Regulatory Power: Certification and Voluntary Standards

Standards are commercial instruments to make trade and markets function efficiently. Early and common standards regulate how to measure weight or content [39,40]. 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 [41], 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 [42]. As a result, they may well have in many cases higher requirements and differing interests than the legislation of the exporting nation [43–45]. The opinions and priorities are bound to be different. Problem solving and negotiating are part of the process of standard development, which usually brings forward balanced solutions for further development. Standardization [46] is a global tool for achieving efficient and just trade and production; it enables cooperation and technology transfers. This serves as a prerequisite for certification. In this paper, the authors focus on voluntary standards (like ISO Standards).

There is a structural difference between the standards agreed upon in the ISO sphere, and those of FSC and PEFC. The former are standards of procedures, which the international business community can agree upon. Legal requirements are always basic, non-negotiable requirements, on top of which companies can add standards [47]. The organization itself may add levels of performance but the latter need not to be open to the public and are not subject to official auditing. In order to comply with the demands from markets, an organization may voluntarily add a standard, defining levels of performance as FSC or PEFC. FSC and PEFC contain the regulation of procedures but also as a significant contribution, the definition of levels of performance as e.g., remaining old growth trees at a final cut site (=clearcut with retention trees). These performance levels are set by the standard organization and their fulfilment is reviewed and verified by an independent body (=third party control).

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, such as 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 (United Nations Conference on Environment and Development) encouraged the International Organisation for Standardization (ISO) [32,48] to establish environmental standards [25]. Following the success of the ISO 9000 standards for quality management, ISO thus introduced the ISO 14000 series for environmental management for use by an organisation [16]. 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. More recently, the ISO 26000 family on Social responsibility was developed, to cover not only environmental aspects but also social, corporate, municipal and human rights related aspects of sustainability [49].

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 [50].

The enforcement of forest legislation in many countries, which export forest industry products, did not satisfy consumers on some export markets in the past [51,52]. 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) and the Programme for the Endorsement of Forest Certification schemes (ex. Pan European Forest Certification Scheme (PEFC)), prescribe a certain performance or level of management that a company must reach [31]. The forest certification standards are strongly committed to the three pillars of sustainability. In fact, by adding them to the ISO 14000 and ISO 26000 family of standards, 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 of whether exporting markets in the developing world respected social and human rights. In fact, the importing markets did not trust that the national legislation in exporting countries respected social rights. This is why ISO 26000 has its 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 the pressure.

3.2.1. Approaches Used in Voluntary, Regulatory Instruments: FSC Certification

3.2.1.1. Definition and Implementation of Standards and Certification, and Example from FSC

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 a third party. This party may be accredited in order to undertake relevant control [53]. Cashore *et al.* [54] 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) [54].

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 [14] 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 using stakeholder involvement a set of International Generic Indicators. The reason for this is 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 [14], but when nationally adopted, are 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.

3.2.1.2. 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 company which submits itself to certification has to adhere to: verification by outside bodies (=third party control and certification). This is unlike CSR, where there is only an internal verification system [54]. ISO Standards, as well as e.g., FSC certificates are globally recognized and trusted by users and customers, particularly in developed countries [31]. This sort of public relations is an important part 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.

3.2.1.3. Weaknesses

Certification, as well as standardisation, implies an extra cost on production, products and services, alongside additional procedures e.g., in book-keeping, management procedures and verification routines which come unexpectedly and thus may interrupt the production process. Comparability across different countries or certification schemes is not easily possible. In fact, cross-country comparability is not even desired, since FSC requirements are country-specific. This harmonisation to local conditions implies that the standard specifications will be different from country to country. A FSC certificate in southern Africa might aim at social issues (as it is a narrow sector), while a FSC certificate in Fennoscandia aims at biodiverse sustainability (as it is a narrow sector). Due to strict audit schemes and supervision, consumers tend to trust in the certificate and its labelling. However, forgery and misconduct can happen, and may lead to the loss of the certificate [55]. In the meantime, such ill-gotten certificates on the market will likely decrease the trust in the brand and confuse customers.

3.2.1.4. Suitability and Actors

Certificates and standards are useful for both nationally and internationally operating companies, particularly those that deliver to the European or US market. The checking procedures require seamless due diligence systems along the supply chain. With this, companies are able to prove good business conduct along the lines of the certificate. This third party evaluation makes certificates and standards also useful references for NGOs and consumers. At the same time, these companies are well prepared for emerging legal requirements such as the EU Timber Regulation [19,56] or FLEGT Voluntary Partnership Agreements [57]. While EUTR and FLEGT VPAs focus on legality issues, certification provides in addition to legal operations the seamless tracking and documentation of forest products. With the infrastructure that the certificate requires, it that can put participating companies with a head start on the international market. In the context of FLEGT VPAs, Legal Assurance

Systems (LAS) are being established in each country. However, this takes time, so currently there are some discussions around the possibility of accepting certified wood as legal.

Certification is a regulatory industry instrument, on which also consumers and investors, and increasingly also policy makers, rely.

3.2.2. Approaches Used in Voluntary, Regulatory Instrument: ISO Standard 14040 on Life Cycle Analysis (LCA)

The scope of ISO certification on corporate and social responsibility includes several elements and preconditions. Therefore, to commence certification, an organization and its 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 company's stakeholders. The functionality of the system is dependent on an approach which vitally includes striving for transparency, accountability, a system of communication and continuous improvement. The actual design and implementation of these concepts is the matter of the organisation. However, ISO Reporting is subject to covering aspects of the categories "Marketplace", "Environment", "Workplace", "Community" and "Human Rights" (see Appendix 1).

3.2.2.1. Definition and Implementation, and an Example from ISO14040

LCA [16] is a different form of approaching cooperative reporting on a company's socially or environmentally responsible production. LCA [16] 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 equipment, 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 approach is to create an overview of how different processes or services from raw material extraction, production and use influence the environment. These impacts are allocated to the end-product. Economic or social aspects are not typically covered. Consequently, the evaluation is 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.

LCA has been included in the ISO 14000 family as ISO standard "ISO 14040 (2006): Environmental management—Life cycle assessment—Principles and framework, International Organisation for Standardisation (ISO), Geneva." [16].

3.2.2.2. Strengths

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

3.2.2.3. Weaknesses

Its weakness is that its need for relevant data for the assessment creates a considerable workload. This requires an extensive, specialized database with information on all processes prior to production and makes the approach 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. Adding economic and governance-related or other soft aspects to it is even more contentious [33].

3.2.2.4. Suitability and Actors

LCA as a tool is used for product or process development within a company or as a base for environmental product declaration (EPD). Increasingly, authorities are using LCA for the evaluation and prescription of policies, e.g., the Renewable Energy Directive (Directive2009/28/EC) [58].

3.3. *Voluntary, Non-Regulatory 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 since the 1950s [59].

Over the last two decades in OECD countries more and 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 company's behaviour is environmentally and sociologically correct. First studies show that CSR firms are more virtuous and have better long run performance. The initial CSR costs are balanced by higher sales and profits due to the reputation effect, reduction of long run costs and increased socially responsible demand [60].

Until November 2010, when ISO 26000 on Social Responsibility was published, there had 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, nor can it be used for regulatory or contractual purposes [49]. 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.” [49].

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 [61] “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 company by means of social accountability. However, the currency 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 [60].

This lack of an agreed standard leads to a variety of competing global standards for CSR reporting, which must be mentioned, such as the Global Reporting Initiative (GRI) [15], formed by the Coalition for Environmentally Responsible Economies (CERES) and UNEP in 1997. Another is the UN Global Compact [62], 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 [63].

The Global Reporting Initiative (1997) focuses on key non-financial issues for company reports [15]. 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. Also 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 10 principles which in general relate to human rights, labour rights, environmental protection and transparency [62].

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.

3.3.1. Approaches Used in Voluntary Reporting: Cooperate Social Responsibility (CSR)

3.3.1.1. Definition and Implementation, an Example from IKEA

As CSR is entirely voluntary and lacks a clear and practical standard procedure, only few recommendations exist, and CSR reporting varies a lot [59]. However, it is also widely used by different companies [52,64]. In the following, an example from Sweden 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 [65], which is “based on international conventions and declarations. It includes provisions based on the United Nations Universal Declaration of Human Rights [66], the International Labour Organisation Declaration on Fundamental Principles and Rights at Work [67], and the Rio Declaration on Environment and Development [68]. 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”. [65]. This code of conduct incorporates many aspects of both the Global Reporting Initiative [15] and the UN Global Compact [62], 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 [42,69]. 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 [65]. 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.

3.3.1.2. Strengths

The strength of CSR is that it is not depending on national interests and it offers a structural approach 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 often have advantages when maintaining monitoring systems, but in this case, the voluntary approach also provides 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 in socially sensitive markets in order to support organizations and its products with a transparent argumentation.

3.3.1.3. Weaknesses

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 evaluation methods in order to monitor compliance to the most commonly selected indicators and criteria, and to assess their wider acceptance. There is however also a fear that CSR schemes function as barriers, discriminating against 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.

3.3.1.4. Suitability and Actors

As discussed before, CSR is mainly applicable at the company level for assessing its way of producing. Unlike LCA, it is not product-focused, but focuses on the organisation and its code of conduct. With this, CSR may be applied by small and large, local and global enterprises with sub-contractors. The scope for data collection and policies around a company's way of operation can be followed with an intensity that corresponds to the individual company's size, scope and means. The results and follow-up actions thereof can be used as an integral part of annual reporting for investors and customers, for PR purposes on the company webpage and news. CSR reporting also provides valuable additional information to investors and customers. For NGOs, it can be a discussion point on invested efforts in sustainable behaviour.

In recent discussions, the content and principles of (C)SR are also discussed at a political level to assess governments, governmental agencies and programmes, and development programmes which potentially influence local livelihoods such as REDD+ or FLEGT [70].

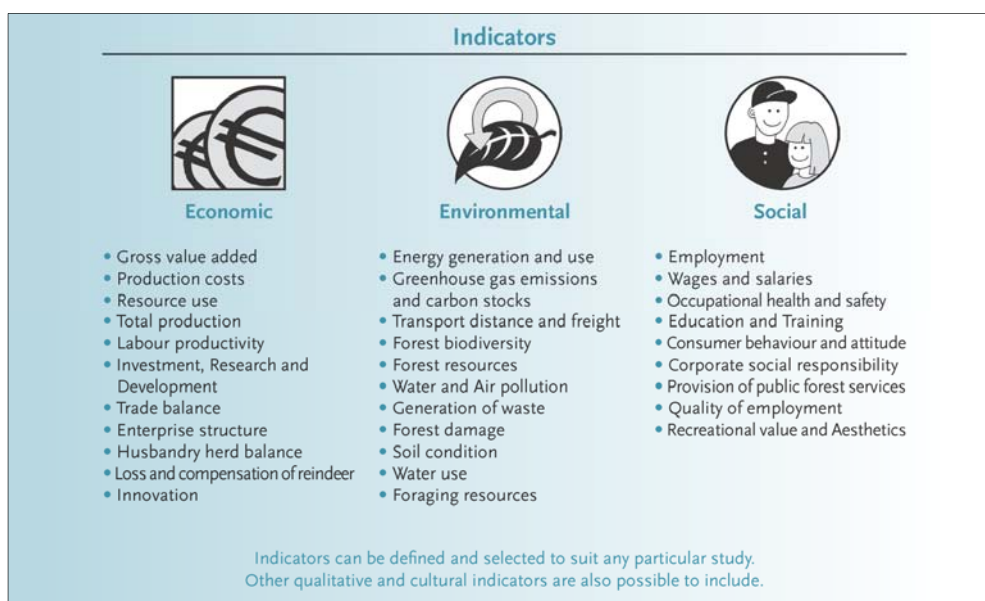
3.3.2. Approaches Used in Voluntary Reporting: SIA Approach

3.3.2.1. Definition and Implementation, Example of ToSIA

Sustainability is a concept that is highly subjective and difficult to assess. Absolute sustainability is not measurable. Relative changes of sustainability aspects however can be assessed. Therefore, the SIA approach was developed to do baseline-scenario comparisons and to cover a wide range of sustainability aspects, such as economic, environmental and social [7,8]. It integrates elements of previous and parallel approaches such as various indicator approaches, product approaches, value chain approaches, and can optionally be used in combination with Multi-Criteria Assessments. As an example of a tool for SIA, the Tool for Sustainability Impact Assessment (ToSIA) was developed to assess sustainability impacts of changes in FWCs [71]. In ToSIA, FWCs are defined as chains of processes (e.g., transport), which provide products (e.g., round wood) [72]. Sustainability impacts are determined by quantifying relative environmental, economic, social, and cultural 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 [12,71]. Changes can result from changed material flow amounts, changed relative indicator values and/or changes in FWC process chain topology [73]. These changes are “what if” scenarios of interest to the respective user, and can be hypothetical, ex-ante or ex-post scenarios [71,74].

Indicators are process-specific, and cover economic, environmental and socio-cultural aspects, with the option of including further indicators. The current selection is shown in Figure 4; details about indicator definitions and calculation are described in the form of an indicator collection protocol by Berg [75].

Figure 4. ToSIA indicators covering economic, environmental and social dimensions.
Picture source: EFI.



Process-specific indicators are indicators which logically only relate to specific processes (bundled in stages or modules). For instance, “Biodiversity” or “Forest resources” only make sense in the module of forest resources, while “Energy and Heat generation” happens across the industry. Some indicators change their definition and meaning despite their name, e.g., “Water use” in the forest differs considerably from “Water Use” in industry.

3.3.2.2. 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 (=metadata). This flexibility makes the SIA approach a highly applicable tool and possible to be used for different purposes. Unlike LCA, which is developed 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 aspect 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 cultural aspects. This makes it very flexible, transparent and objective. All material flows are referred products to tons of elemental carbon.

3.3.2.3. Weaknesses

The approach covers wide concepts reflecting sustainability, the method is data-driven, and the tool fairly young, and as such, it needs time to develop 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.

3.3.2.4. Suitability and Actors

SIA is a process-based approach and thus assesses sustainability impacts of processes and the connected material through them for alternative options. With that it is more of a scenario tool describing the impacts different options have (“How would a structural, technical, policy- or market-driven change affect the economic, environmental, social impacts of operations?”). The assessments provide quantified results for companies dealing with natural products, for natural resource management, policy makers, decision makers and industry based on individually tailor made assessments and for strategic questions. SIA results can be combined with a Multi-Criteria-Analysis (MCA) [76] or Cost-Benefit-Analysis (CBA) [77], and are also suitable for stakeholder interaction processes as a quantified basis for discussion around different choices [78]. This makes it a good tool for policy makers and NGOs, as a basis for quantified discussions.

3.4. Comparison of Voluntary Instruments on the Covered Sustainability Dimensions

This section will shed more light on the development of the different instruments, how they influenced each other, and on the youngest approach, SIA, which aims at covering the main aspects and filling in the gaps the individual approaches left.

As it becomes obvious by the explanation of the different approaches, there is some partial overlap between them. This is founded in the historical development of political discourse (compare Figure 3 and Rayner [24]) and the requirements for these approaches, as well as in the development of these approaches 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 approaches are responding to the developments in other approaches 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 approaches shall be carried out. An overview of coverage of different aspects can be found in the following.

It is a schematic overview which does not list the individual features, but rather indicates coverage of a certain aspect or none (see colour-filled fields in Table 3).

Table 3. Overview of sustainability dimensions which are covered by the individual approaches and concepts.

CSR	CSR	ISO 26000:2010	Forest Management Standard	ISO 14000-family	SIA
<i>Global Reporting Initiative (1997)</i>	<i>UN Global Compact (1999)</i>	<i>ISO 26000 on Social Responsibility</i>	<i>FSC</i>	<i>ISO 14000 on Environmental Management</i>	<i>Sustainability Impact Assessment</i>
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

In general, most sustainability dimensions are covered by the introduced approaches, except the economic aspects. CSR and ISO 26000 cover the work place, human rights, and community aspects very well; ISO 26000 covers additionally 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 (e.g., LCA) are however very precise and implementable for international comparison. Current scientific research in LCA (outside the ISO standard) is exploring how social and cultural aspects can also be integrated into LCA [79]. LCC (Life Cycle Costing) and already includes economic aspects for assessment.

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 [75,80–84].

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. A closer look at the CSR and ISO 26000 criteria showed that many aspects are directly applicable as indicators and are partially already part of the ToSIA indicator set, for instance, “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”.

4. Discussion and Conclusion: Summary of Suitability and Trends of Introduced Approaches

The concept and definition of sustainability has evolved over time. Instruments and approaches aimed at ensuring and assessing sustainability have come a long way since the establishment of the concept of sustainability in 1713 [1]. In different fields, different approaches for assessing sustainability were created in science, industry and policy implementation. With the evolution of instruments it becomes obvious that different instruments influenced each other in their development particularly in terms of sustainability dimensions.

This pushes some tools and approaches to their limits, and requires new instruments and approaches. In the forest-based sector, different approaches 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 approaches have broadened in covering additional aspects later by borrowing, adapting and integrating useful aspects of other approaches, specialising on selected

aspects (e.g., LCA) or increasing in flexibility to include further dimensions and aspects in the assessment if needed (e.g., SIA).

There are very strictly defined concepts, e.g., the LCA standard ISO 14040: 2006 [16], 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 approaches for impact assessment. These instruments and approaches can be applied to/at different levels (regional, national, international agreements). Selected approaches can even only be applied at the company level, like CSR, or at a strategic level.

This co-evolution of different approaches for assessing impacts on sustainability is on-going as they develop in parallel and in response to one another, and can be used to support one another. A clear separation of the tools is important, as they do not have the same scope, calculations or system boundaries, even if they describe the same dimensions of sustainability. The results are bound to differ in value.

4.1. In Short—Which Approach is Suitable for Which Purpose?

The suitability and the adherence to these instruments can support the different goals in a company's operations, and support the general goals of sustainability [31].

Important for the choice of assessment approach is the purpose of the assessment and the focus.

- For comparative, operations- and management-related questions (=processes) with a clear system boundary, SIA is suitable.
- While for stand-alone, product related assessments which need to cover a wide range of the lifecycle of the product itself and the raw materials and facilities to produce this product, LCA is suitable (=Environmental Product Declaration).
- A company's code of conduct in terms of sustainable behaviour can so far only be assessed through CSR, and the contents thereof have to be defined by the company itself. ISO 26000 gives merely guidelines for assessment.

The separation of instruments with specialisation in selected fields of suitability is important to stress. It is expected that the different focus on products, operation procedures or code of conduct remain the main difference between instruments. They may only expand in adding further aspects of sustainability (compared to the sustainability dimensions community, workplace, *etc.*). LCA will continue to be the instrument of choice for product related sustainability assessments but may add in more economic and social aspects, while SIA focuses on the sustainability of operations (=process-based) and expand to workplace and community related aspects. CSR will be the main instrument to assess the code of conduct, but may expand into including economic aspects and be used not only for companies, but whole programmes, policies, plans for regional development. However, this does not mean that these instruments cannot or should not be used together, as long as the data for both do not get mixed up. For instance, it can be very interesting for a company to calculate and show the LCA calculated impacts of their products and to use this instrument to show the improvement in product

development (e.g., reduced greenhouse gas emissions). If such a company runs CSR reporting in parallel, it could show that not only the product is safe and sound, but also that the production of it is based on ethical behavior. Interesting for further analysis would be actual studies that compare how changes in production which are triggered as a result of a CSR strategy (e.g., safer work conditions through reduced pesticides in workshops, safeguarding adherence to human rights and local livelihoods) or SIA study (e.g., reduction of transport, emissions, *etc.*) impact the quality and environmental of a manufactured product as measured according to ISO 14040.

4.2. Why Are Voluntary Instruments Gaining More Ground and Getting More Important for Sustainable Management?

Legal and voluntary instruments satisfy different needs. While legal instruments address minimum requirements of legality of e.g., timber trade between different nations or operators, voluntary instruments go one step further in efforts to promote sustainable operations. There is a clear trend to include more environmental, social and community and human-rights related aspects. This trend is mainly due to a change in public and political discourse [24,27] and to market demands. In a globalised world traded products and information cross borders. Consumers have a large choice of which brand to choose for the same product (e.g., a kitchen cupboard). At the same time consumers have become more aware of miss-conditions in production operations, and have the means to access and share this information. The reputation and news items of a brand or a company are reflected in its value at the stock market and in sales, which again is of interest for investors in this company.

Voluntary instruments close a gap in the chain of evidence on sustainable responsible production practices that exceeds legal limitations. All products on a national market have to adhere to the legal requirements. Standards and certificates are easy to recognise and can give a market advantage over products that are not following these. This simplifies also trade between companies or states, as certificates or voluntary instruments regulate the specifications.

Non-regulatory voluntary instruments around reporting (like CSR or SIA) fill an important role in communication and PR (public relations) where a company's profile and code of conduct can be presented. It is not enough to produce a good product; consumers also have an interest in the way it was produced. Voluntary reporting can highlight a company's endeavour to respect sustainable practices.

4.3. How Does SIA Add Value to above Approaches, and What Are Development Trends for Voluntary Instruments?

SIA was developed as a concept because the traditional approaches had the limitation of a too narrow topical focus (e.g., only on GHG emissions) or lack of practical applicability. SIA is a flexible and enlargeable concept, which does not require changes to the basic approach or approach to be suitable for different contexts (e.g., land use perspective). New indicators or assessment areas can be included as long as they can be quantified. Even qualitative aspects can be added as long as they can be translated into quantitative values. It is an indicator- and a process-based approach, and thus covers many aspects of the older approaches. Still some results from LCA, Carbon Footprint could be included as indicators and thus be comparable in terms of impacts, while indicators and tools (such as ToSIA) could be used for CSR reporting and certification. Further aspects that need to be included in

any of the instruments are appreciations of ecosystem services and intangible community-related aspects which are so far difficult to quantify or even qualify. Impacts on these areas do exist and are influenced by a company's production, operations or way of conduct, however hitherto they are very difficult to catch. Therefore, there is still more work needed on developing reliable indicators for softer aspects such as workplace, human rights, community, and market place. Such methods for quantifying reliable and practical indicators is an area for further development. CSR as well as ISO 26000 is still missing a systematic and practical approach for implementation.

This trend of integrating further dimensions of sustainability into an instrument is expected to continue, and to develop from voluntary, non-regulatory reporting schemes into voluntary instruments with regulatory power. Stronger focus on aspects of social responsibility and development of practical means of implementing these approaches is expected. Therefore, the expected work is not necessarily needed for new approaches, but for developing indicators and calculation approaches, which allow assessing changes in areas of social responsibility like work place, human rights, community and market place.

What will be needed in future are commonly agreed assessment approaches for calculating the impacts of operations in the areas that describe livelihoods, human rights, work place, and cultural identification.

For any instrument or approach it is important to keep in mind that none can guarantee sustainability, and that a thorough analysis of operations is needed to apply each approach. The quality of the results is directly linked to the quality of the data which was used for using the approach. Nevertheless, when it comes to understanding the impact of products, production processes or operations, voluntary instruments and approaches used for them can play an important role to supplement legislation and give a company a cutting edge on the market in a society that values sustainably responsible behaviour.

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Conflicts of Interest

The authors declare no conflict of interest.

Appendix 1. Example of categories and aspects covered by ISO Standard [49].

Categories	Aspects
ISO Reporting: Marketplace	Customer complaints about products and services Advertising complaints upheld Complaints about late payment of bills Upheld cases of anti-competitive behaviour Customer satisfaction levels Customer retention Provision for customers with special needs Average time to pay bills to suppliers Customer loyalty measures Recognising and catering for diversity in advertising and product labelling Social impact, cost or benefits, of the company's core products and services Cash value of company support as % of pre-tax profit Estimated combined value of staff company time, gifts in kind and management costs Individual value of staff time, gifts in kind and management costs
ISO Reporting: Environment	Overall energy consumption Water usage Quantity of waste produced by weight Upheld cases of prosecution for environmental offences CO ₂ /greenhouse gas emissions Other emissions (e.g., Ozone, Radiation, SO _x , NO _x etc.) Use of recycled material Percentage of waste recycled Net CO ₂ contribution made Environmental impact over the supply chain Environmental impact, benefits or costs, of companies core products and services Any upheld non-compliances with domestic human rights legislation Existence of confidential grievance procedures for workers Wage rates

Appendix 1. Cont.

Categories	Aspects
ISO Reporting: Workplace	<p>Workforce profile: gender, race, disability, age</p> <p>Workforce profile compared to the community profile for travel to work area: gender, race, disability, age</p> <p>Staff absenteeism</p> <p>Number of legal non-compliances on health, safety, equal opportunities legislation</p> <p>Number of staff grievances</p> <p>Upheld cases of corrupt or unprofessional behaviour</p> <p>Number of recordable incidents (fatal and non-fatal) including sub-contractors</p> <p>Staff turnover</p> <p>Value of training and development provided to staff</p> <p>Pay and conditions compared against local equivalent averages</p> <p>Impact evaluations of the effects of downsizing, restructuring <i>etc.</i></p> <p>Perception measures of the company by its employees</p>
ISO Reporting: Community	<p>Project progress and achievement measures</p> <p>Leverage of other resources</p> <p>Impact evaluations carried out on community programmes</p> <p>Perception measures of the company as a good neighbour</p>
ISO Reporting: Human rights	<p>Progress measures against adherence to stated business principles on human rights as stated by law and international human rights standards</p> <p>Proportion of suppliers and partners screened for human rights compliance</p> <p>Proportion of suppliers and partners meeting the company's expected standards on human rights</p> <p>Proportion of company's managers meeting the company's standards on human rights within their area of operation</p>

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