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Susanne Padel

Catherine Gerrard

Laurence Smith

Christian Schader

Lukas Baumgart

Matthias Stolze

Bruce Pearce


# Further Development of Methodologies for Sustainability Assessment and Monitoring in Organic/Ecological Agriculture

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## Final project report

Susanne Padel[1], Catherine Gerrard[1], Laurence Smith[1], Christian Schader[2]
Lukas Baumgart[2], Matthias Stolze[2], Bruce Pearce[1]

**[1]Organic Research Centre ("ORC"),**
Elm Farm, Hamstead Marshall, Berkshire, RG20 0HR, UK

**[2]The Research Institute of Organic Agriculture ("FiBL")**
Ackerstrasse 113 / Postfach 219, CH-5070 Frick, Switzerland.

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**Contact persons: Dr Bruce Pearce (bruce.p@organicresarchcentre.com)**

**Dr Susanne Padel (Susanne.p@organicresaerchcentre.com)**

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# 1 Introduction

Sustainable development has been defined as “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, 1987). Sustainability is receiving increasing attention in the public debate. Consumers, retailers, policy-makers and farmers seek more transparency on the performance of farms and food production with regards to sustainability in general. The measurement of impacts is expected to become an integral part of Corporate Social Responsibility (CRS) tools with firms and public agencies making more use of Voluntary Sustainability Standards, like organic or Fairtrade (Giovanucci *et al*., 2014).

Organic farming aims to sustain the health of soils, ecosystems and people by relying on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with potential adverse effects (IFOAM, 2009). Organic/ecological farming standards are one of several voluntary sustainability standards of agriculture (VSS) and are, by some, considered to be the grandfather of voluntary standards for agriculture (Giovannucci and Koekoek 2003, cited in Giovanucci *et al*., 2014). Regarding sustainability, the global organic movement aims to lead, guide and inspire people to work cooperatively to reverse the destructive path modern agriculture has taken on our planet (SOAAN, 2013). Part of this aspiration is to empower individuals and organizations to lead by example and improve their own performance and practices. To make programme towards greater sustainability it is necessary to know about the impacts of certain practise and to be able to measure progress.

This report aims to contribute to the ongoing debate about sustainability assessment in the organic/ecological sector. The authors work at two leading independent organic research institutes (FIBL and ORC) that both engage in sustainability assessment in scientific and applied research. The overall aim of the project is to develop a set of societal level indicators or themes that can be used in a sustainability monitoring system of organic/ecological farms with reference to common Sustainability Assessment Framework for Food and Agriculture (SAFA) (FAO, 2013).

## 1.1 Background

### 1.1.1 Sustainability assessment approaches for agriculture

Various approaches, tools, initiatives, and standards aimed at measuring sustainability exist in the food sector, reflecting the variety of stakeholders from researchers, individual businesses, governments, control bodies to consumers. There has been much debate about the different approaches and indicators used to assess sustainability.

All types of food production, in particular the agricultural stages, have substantial impacts on different environmental aspects such as biodiversity, climate change, water, soil and air quality (Rockström *et al*., 2009; Steinfeld, 2006). Furthermore, the socio-economic impacts of food production play an important role as agriculture is often one of few economic activities in rural areas (European Commission, 2004).

During the last few years, a range of tools have been developed for assessing different aspects of sustainability in the food sector (for example Bockstaller *et al*., 2006; Grimm, 2009; Zapf *et al*., 2009;

Gerrard *et al.,* 2011). Tools consider different levels (such as field, farm, supply chain, sector or landscape). The purpose of tool development varies and can be summarised into four main purposes (Schader *et al*., 2014; Lampkin *et al*., 2011):

- scientific assessment in research (e.g. life cycle assessment (LCA) tools to study the impact of farming on the environment, Tuomisto *et al*., 2012; Knudsen *et al*., 2011),
- tools for product labelling and company reporting aimed at providing assurance to those that buy products (e.g. used in certification and/or CSR reporting such as COSA)
- tools and guidelines for policy advice and monitoring of policy implementation (e.g. FARMIS, OECD)
- tools for farmers and consultants aimed at improving performance and/or profitability, from the producer's perspective e.g. environmental benchmarking tools and triple bottom line tools such as RISE and the ORC PG tools (Meul *et al.,* 2008; Gerrard *et al.,* 2011).

Depending on the focus, tools vary in scope, assessment level, accuracy and precision (see Section 2.2.2.4). As a consequence, tools designed for different purposes and objectives assessing systems for the same issue (i.e. greenhouse gas emissions), might give different results. Furthermore, sustainability assessment tools in the food sector take diverging perspectives on the notion of "sustainability": what should be assessed, where the system boundaries are drawn and how it should be measured and what data are required to carry out assessments.

One of the main barriers for wide utilisation of these tools is cost. Generally a broad and shallow approach is commonly cheaper to carry out as it requires less time and/or data to complete whereas a deep approach is much more time and data hungry and therefore generally more expensive, especially if including multiple objectives (Schader *et al.,* 2012b).

Several tools assess only one specific aspect of the societal impacts of farming (e.g. carbon footprints, biodiversity), but there is a need to integrate all categories of sustainability (economic, social, environmental) in order to understand the complex interactions, synergies and trade-offs between different sustainability objectives. Tools and associated research have tended to focus on comparing overall trends over time, or on comparisons between alternative options. However, little research has so far has addressed the critical question about interactions between the different indicators: for example, how would improvements with respect to animal welfare objectives support or conflict with financial, environmental, social and other goals? While the ability of producers to monitor trends over time, and to compare their own performance against others, is important as an awareness raising tool, the ability to make real progress depends on being able to predict the impacts of particular actions on the range of sustainability objectives. Where relationships are not directly quantifiable, it might still be possible to specify the direction of impact (positive or negative) and strength (high or low) of the different interactions by using a cross-impacts matrix. This would permit the evaluation of specific management options with respect to their impact on the overall direction of progress towards sustainability.

Most sustainability assessment tools and approaches have been developed in relative isolation and with limited contact between the different developers. This implies that there has been limited exchange of ideas or discussion on the detail of sustainability outcomes and indicators as well as methods/approaches used for assessment and how they draw on relevant current scientific knowledge. So far there is no international consensus on what "sustainable food production" entails. As a response to this shortcoming, the FAO published in January 2012 a first draft of Guidelines for Sustainability Assessment of Food and Agriculture systems (SAFA) which specify the procedures, principles and minimum requirements for a sustainability impact assessment (FAO, 2015). These SAFA Guidelines provided for the first time one common language for the assessment of sustainability in agriculture.

### 1.1.2 Organic agriculture and sustainability

A key characteristic of certified organic farming in Europe is that it is governed by clear standards which are in many countries now legally binding. Producers and other operators are inspected to verify the adherence to the standards and are then certified. Only operators that follow the rules and who are inspected and certified can sell their products as organic.

There is a body of scientific literature documenting several positive sustainability impacts of the organic farming system (e.g. Stolze *et al.,* 2000; Mäder *et al.,* 2002; Bengtsson *et al.,* 2005; Nemecek *et al.,* 2005; Lampkin, 2007; Schader *et al.,* 2012a; Padel *et al*., 2013, Lampkin *et al.,* 2015).

However, there is concern that the process-oriented organic farming standards do not fully safeguard all the sustainability performance of an individual organic/ecological farm (Padel *et al*., 2009). The organic production rules focus on areas that are easy to codify and audit, such as what inputs are permitted or excluded and ignore aims and values that are more difficult to operationalise, such as the agro-ecological systems approach (related to bio-diversity and nutrient recycling) and social considerations (Lockie *et al*., 2006; van der Grijp, 2006). Several important outcomes covered in the principles of organic agriculture are currently not covered by most organic standards (Padel *et al*., 2009). There is concern that some organic farms may become more intensive and industrialised and would no longer function effectively as a more sustainable alternative to non-organic farms (Reed, 2005). This goes back to the so-called 'conventionalisation' hypothesis (e.g. Guthman, 2004; Buck *et al*., 1991) which stated that the growing importance of global trade and involvement of agri-business in organic agriculture have led to the creation of a lighter version of 'organic'. This discrepancy between stakeholders' expectations of what organic should be and what is expressed in the standards can be seen as a threat to the organic integrity but also an opportunity for further development of the sector (Padel and Gössinger, 2008). This implies that there is no commonly agreed standard for organic/ecological agriculture that covers all aspects of sustainability with current standards directly addressing only part of the three dimensions of sustainability (environmental, economic and social).

Some organic standard setters are developing new standards in response to the concerns of organic stakeholders (e.g. social or ethical standards, environmental standards), but often do this in isolation. Following a decision of the General Assembly in 2001, the Sustainable Organic Agriculture Action Network (SOAAN) as a world-wide project was initiated by IFOAM (International Federation of Organic Agriculture Movements) to develop a reference and programme that positions organic agriculture and its related supply chain as a holistic, sustainable approach (IFOAM, 2013).

Leaving aside policy monitoring in relation to pubic support, this illustrates that activities in relation to sustainability assessment of organic/ecological farms broadly serve two main purposes:

1. labelling of products (certification and retailer-consumer communication),
2. improving producer decision-making on the farm.

These two purposes can have different requirements and can potentially lead to different choices regarding the suitability of approaches, methods and indicators as well as different priority actions. If the aim is to improve awareness of the overall sustainability of production systems at the farm level leading to improved decision-making, the impacts of management practices need to be identified in order to assess progress over time on a specific holding as well as relative to others. The implications of any proposed changes to both financial and non-financial aspects of the system need to be understood, including the impact on both private and public goods. If the aim is to inform customers and aid decision-making in relation to supply chains, the comparability between farms becomes very important to ensure a level playing field, and minimum standards are needed to ensure consumer trust.

For any tool to fully assess sustainability it is also essential to consider the meaningfulness of the indicators chosen to monitor specific outcomes, the relevance to the stakeholders and the practicability of the methods in terms of data requirements.

## 1.2 Hypothesis

The hypothesis of the project is that sustainability impact assessments of organic/ecological farms, building on the FAO SAFA Guidelines (FAO, 2015) and other relevant approaches will lead to the most comprehensive and internationally recognised sustainability monitoring system of organic/ecological farms. Such a monitoring system will help

i. improve the sustainability performance of organic/ ecological farms and
ii. address many of the criticisms of organic/ecological agriculture by demonstrating directly the actual sustainability performance of such farms.

## 1.3 Aims

The overall aim of the project is to develop a set of societal level indicators or themes (i.e. water quality, soil health, biodiversity) which can be used in a sustainability monitoring system of organic/ecological farms, using the common framework of the FAO SAFA guidelines. It is intended that the indicator sets will guide labelling, policy-monitoring and farmer-decision making approaches. To achieve this aim, the project will pursue the following sub-objectives.

1.1. To analyse and evaluate existing sustainability assessment approaches and identify suitable indicators or sets of indicators to assess the sustainability performance of ecological/organic farms by evaluating their environmental integrity (including animal health and welfare), economic resilience, social wellbeing and good governance (work package 1).
1.2. To identify interdependencies and correlations between the identified performance outcomes and indicators on the basis of scientific literature (work package 2)
1.3. To synthesise the results into draft guidelines for applications of the indicator sets to assess and monitor the sustainability performance of organic/ecological farms for farmer decision-making, policy monitoring and labelling/communication with consumers (all work packages, disseminated in work package 3).

The development of sustainability tools and indicators is very fast moving and not yet standardised so it easy to be driven by methodological concerns. This report hence aims to make a contribution to two important questions: “What sustainability outcomes can be measured with current methods?” and “What topics and themes of sustainability matter most to the organic sector?”

## 1.4 Structure of the report

The following sections detail the results of the project. Taking each work package in turn they introduce the background and aims to that work package and then, where necessary, split it into several sub-tasks each with their own methods and results section. The discussion and conclusions section brings together the results from sub-tasks and across work packages, discusses how the results relate to each other and what they reveal about sustainability assessment for organic agriculture and then draws some conclusions both about what has been learned so far and about future research needs.

# 2 Evaluation of existing approaches to sustainability assessment (WP1)

The first part of work package 1 aimed to analyse and evaluate existing sustainability assessment approaches (essentially covering aim 1 above). The description of this work package is given below in italics.

*Work in this WP will review the sustainability outcomes and the corresponding indicators used in existing sustainability impact assessment methods and approaches to identify suitable candidate indicators or sets of indicators which allow for assessing the sustainability performance of organic/ecological farms along three sustainability dimensions and good governance: the environmental (including animal health and welfare), economic (including resilience) and social (including wellbeing) and good governance (which SAFA have subsequently called a fourth dimension). The indicators will be assessed against the following criteria: assessment level, relevance for sustainability monitoring of farms, sensitivity, methodological soundness, reproducibility, ease of access to data at farm level, cost-benefit ratio.*

The first part of work package 1 considered the sustainability approach by reviewing the scope of a selection of current sustainability assessment tools (Section 2.1). This was followed by a review and discussion of the methodological choices for sustainability assessments of organic farming including a list of criteria to assess indicators that was explored using a selection of indicators from two of the tools of the partners (Section 2.2). The third part of work package 1, endeavouring to identify sustainability themes for assessment of organic agriculture, is presented in Section 2.3.

## 2.1 Review of scopes of a selection of sustainability tools

### 2.1.1 Approach

Despite wide consensus on its relevance, a high degree of variability can be observed both in how agricultural sustainability is defined and how it is assessed (see Section 1.1). In this context of high variability, the main objective of this first phase of the project was to carry out a comparison between the themes and indicators covered in existing sustainability assessment tools and approaches. The main focus was on tools and guidelines that operate at the farm level. The sustainability themes covered and indicators used in the tools were cross-checked with the SAFA Guidelines (FAO, 2015 and previous draft versions) taking into consideration the four sustainability dimensions which they identify: environmental integrity, economic resilience, social well-being and good governance.

A literature review was carried out covering the following sustainability assessment tools/guidelines: SAFA (FAO, 2013), PG Tool (Gerrard *et al*., 2011), MOTIFS (Meul *et al*., 2008), RISE (Hani *et al.,* 2003), IRENA (EEA, 2005) and SOAAN (IFOAM, 2013). Initially, basic information on these tools was gathered, such as their nature and purpose, their design approach and characteristics, the research behind their development, the scale of the analysis they conduct, the system boundaries, the type of data they use, the stakeholders they involve and their level of involvement, the indicators they include, and their target end-users. More detail on the tools is provided in Appendix 1.

The SAFA (Sustainability Assessment for Food and Agriculture systems) Guidelines were developed by FAO to provide an international reference for sustainability management, monitoring and reporting in food and agriculture at all levels of the supply chain. They are the result of five years of participatory development, together with practitioners from civil society and private sector, building on cross-comparisons of codes of practice, corporate reporting, standards, indicators and other technical protocols currently used by private sector, governments, not-for-profits and multi-stakeholder organizations that reference or implement sustainability tools. The final guidelines were published in December 2013 (FAO, 2013). The guidelines include the usual dimensions of economic, social and environmental aspects but also include Good Governance as a fourth dimension of sustainability.

A comprehensive matrix comparing the tools and how their indicators relate back to the SAFA guidelines was developed. The format and design of the matrix was such that it allows additions (either of tools or of further dimensions/indicators) as the area of sustainability assessment continues to develop and the definition of sustainability continues to be evaluated and expanded.

Each SAFA sustainability dimension was taken into account separately, its themes and indicators listed and briefly described, and then cross-checked with the related indicators from the other tools, with a 'yes', a 'maybe' or a 'no' where the indicators were respectively present in the tool, were suspected to be represented in the tool, but perhaps not clearly and directly, or were not present at all.

### 2.1.2 Results

Each of the tools and guidelines considered has a different approach to sustainability and different strengths and weaknesses (see Appendix 1). Only three of them can be considered "real tools" to be used in a sustainability assessment at farm level (MOTIFS, PG Tool and RISE). The SOAAN guidelines, similarly to SAFA, have been developed to indicate "best practices" with regards to sustainability in organic agriculture, but are less developed and more aspirational than SAFA and so do not suggest specific indicators. The SOAAN guidelines, however, are based on extensive consultation among an advisory group and IFOAM membership and are therefore very relevant to the organic sector. IRENA was specifically conceived as a network of environmental indicators within an EU policy-making framework. The IRENA network was considered here because of its relevance to policy indicators. Neither SOAAN nor IRENA were specifically designed to perform a sustainability assessment at farm level.

The matrix was organised into four tabs, each one of them covering a different sustainability dimension: environmental, social, economic and governance. The matrix showed the extent to which each tool or approach satisfies the requirements of the SAFA guidelines. Table 1 below summarises the results from the matrix. Green highlighting indicates good coverage of a particular theme, yellow indicates reasonable coverage and red indicates limited or no coverage.

At the level of detail of the individual themes, it can be seen from Table 1 that all the tools and guidelines have reasonable coverage of the environmental dimension. RISE is the tool that has the best coverage across the themes outlined in the SAFA Guidelines.

**Table 1: Summary of the SAFA themes and how the tools and guidelines measure up against them**

| Themes | RISE | PG tool | MOTIFS | IRENA | SOAAN |
|---|---|---|---|---|---|
| **ENVIRONMENTAL INTEGRITY** | | | | | |
| Atmosphere | ** | * | ** | ** | *** |
| Water | ** | ** | ** | ** | *** |
| Land | *** | ** | ** | ** | ** |
| Biodiversity | ** | ** | ** | ** | *** |
| Materials &energy | ** | * | * | * | * |
| Animal welfare | *** | *** | * | * | *** |
| **ECONOMIC RESILIENCE** | | | | | |
| Investment | ** | *** | ** | * | *** |
| Vulnerability | * | * | * | * | ** |
| Product safety and quality | ** | * | * | * | *** |
| Local economy | *** | * | ** | * | ** |
| **SOCIAL WELL-BEING** | | | | | |
| Decent livelihood | ** | * | * | * | ** |
| Labour rights | * | * | * | * | ** |
| Equity | * | * | * | * | ** |
| Human health and safety | ** | *** | * | * | *** |
| Cultural diversity | * | * | * | * | ** |
| **GOOD GOVERNANCE** | | | | | |
| Governance structure | * | * | * | * | * |
| Accountability | * | * | * | * | * |
| Participation | * | * | * | * | ** |
| Rule of law | * | * | * | * | * |
| Holistic management | * | ** | * | * | ** |

The economic and social dimensions are both covered in varying degrees across the tools. This confirms the lack of consensus on what the concept of sustainability entails mentioned above: different tools cover different aspects. Additionally, economic and social outcomes are more difficult to quantify in the form of indicators. The area that shows the least coverage across the tools is good governance. This topic is a relatively new addition to what was previously known as "triple bottom line" (environmental, social, economic) reporting. Governance was included in the FAO's SAFA Guidelines because of the belief that good governance is needed to ensure the credibility of sustainability interventions. It may therefore be a matter of concern that this area has minimal coverage in current sustainability assessment tools.  However, as a result of the release of the SAFA guidelines a number of tools were updated or developed to reflect the new information and indicators suggested. In particular, the team at FiBL developed the SMART Tool which is referred to in subsequent sections of this report and in Appendix 3.

## 2.2 Methodological choices for sustainability assessments

### 2.2.1 Approach

The review of tools and sustainability assessment methods made it clear that various different types of indicators are used. A review was carried out, reported in detail in Schader *et al*. (2014) which resulted in some further concepts and ideas about methodological approaches to sustainability assessment. In the presentation in the following section the focus was on aspects of methodology and choices that appear particularly relevant to the assessment of sustainability of the organic sector.

A set of assessment criteria for indicators was developed to allow comparison of different types of indicator and identification of the nature of various indicators and its use explored using one of the partners' tools. Finally a matrix summarising four principal methodological approaches to analysing the sustainability performance of organic farming systems was developed and advantages and disadvantage of each discussed.

### 2.2.2 Results

**Primary purpose and perspective on sustainability**

The primary purpose of an assessment of farms can be summarised as mainly research, policy advice, certification, farm advice, self-assessment, consumer information and landscape planning. The categories relate to the main group of actors for whom the assessment is carried out, such as researchers, policy-makers and administrators, control bodies, farmers, processors and traders and consumers. Based on this two prevalent perspectives of the notion 'sustainability' can be identified: the **farmer** or **societal** perspectives.

If sustainability is interpreted from a farmer's perspective it mainly describes whether the farm is able to be sustained for a longer period of time. This interpretation focuses on whether the farm is able to a) use its resources (natural, social and economic resources) without depleting them and b) cope with possible upcoming changes in the societal, economic and environmental framework.

If sustainability is interpreted from a societal perspective, the main question is whether the farm contributes to a sustainable development of society (WCED, 1987). The assessment needs to focus on the impacts of farm management on the economic, social and environmental resources of society. These impacts can be either positive (services delivered) or negative (damages or costs induced). The latter perspective is often employed in the context of the concept of multifunctional agriculture (OECD, 2001).

The two perspectives, farm business and society oriented, can employ the same impact categories or indicators. For instance, protecting soil and water resources is beneficial to both the individual farm and to society. Tools reviewed by Schader *et al*. (2014) refer to both the societal and the farmer business perspectives of sustainability, often without consciously distinguishing between them. However, the farmer business perspective does not always correlate with the sustainability perspective of society. For example, to sustain the operation of a single farm is clearly of "private business interest" to that farm, but the operational sustainability of the single farm might not necessarily be of "societal interest", which might be better served if the farm ceased to be a business and the land became a nature reserve, for instance.

The perspective on sustainability that is to be adopted for further developing the monitoring of organic farms will, to some extent, depend on the purpose of the assessments. Farm advisory tools will need to be meaningful to the farmer (and hence pay attention to the sustainability of the farming businesses), and similarly, tools aimed at the monitoring of supply chains will need to be relevant to supply chain business. Tools to be used in the context of certification and/or policy monitoring should particularly reflect a societal perspective. In order to communicate a societal perspective on sustainability to all stakeholders all tools should aim for some alignment with societal perspectives. The specific choice of what indicators can be used will also need to consider the scope and assessment level.

**Scope, scale and functional unit of the assessment**

With regards to assessment level, the main choice is between farm based (e.g. assessing the impact of dairy farm of a given size) or product-related assessment (e.g. assessing the impact of the production of 1kg of milk or possibly even of 1 litre of fat-corrected milk to allow comparability between dairy breeds). Using the example of greenhouse gas emissions (see Box 1 and Figure 1), a quantitative assessment of the performance of a farm in relation to greenhouse gas emissions would require all emissions of the farm to be measured and aggregated. For a product based assessment this aggregated value is then divided by a functional unit (e.g. kg of product).

For specific assessments other area-based assessments that cover more or less than the unit of a farm itself can be relevant. For example, soil quality or biodiversity might be assessed on a field basis (smaller than the farm), or at the level of the catchment area (larger than the farm). Also, depending on the purpose of the assessment, other functional units (e.g. the turnover of the company) might be more appropriate than the mass of product ('kg Product'). The unit 'kg Product' might be problematic, where more than one main product is produced. This is very common on (mixed and) organic farms (e.g. cattle herds producing milk and meat), and problems of attribution of impacts to products can arise.

Other factors that might influence the choice of the assessment level and scope include whether or not the assessment can be carried out globally or is only applicable to a specific country or region (i.e. the geographical transferability), and whether specific indicators can be applied across different types of farms or agricultural / food products.

**Box 1 Example of Indicators of Greenhouse Gas Emissions**

Indicators related to greenhouse gas emissions can be used to more clearly illustrate the differences between indicators that essentially "measure" the same impact on the same area of sustainability. Rather than there being one, most appropriate, indicator there is a spectrum of different indicators, some very accurate but time-consuming to use, others much quicker and easier to use but sacrificing accuracy for user-friendliness. Take for example, emissions of methane from dairy cows. These could be assessed by a number of indicators:

- A methane collection device can be fitted to a number of the cows on the farms and their emission recorded directly. This is expensive and time-consuming (some time will be needed after fitting the device before readings can be considered to be representative of "normal" methane emissions for the cow as its behaviour, including feeding, may initially be changed by the presence of the device). However, it should give a figure that closely represents the bespoke management regime on the farm(s) being assessed.
- The number of dairy cows can be multiplied by a standard emission factor for dairy cows. This is the approach usually taken by LCA tools and greenhouse gas inventories for national reporting of emissions. Since it produces a quantitative value it is seen as highly accurate but it should be remembered that it is only as accurate as the emission factor that is used and so awareness of underlying assumptions may be required.
- A number of questions could be asked about the management of the dairy herd – feeding, housing, breeds - and a score given based on whether the management is likely to reduce emissions or increase emissions based on scientific reports that have tried to associate these sorts of management approaches with emissions. This approach is semi-quantitative and the least robust of the three presented here, but also the quickest to carry out on farm and directly links the emissions to factors that the farmer could change.

**Precision of the indicator**

According to FAO (2013) an indicator[1] provides evidence that a condition exists, or certain results have or have not been achieved, and can be either quantitative or qualitative. This is contrasted with a 'metric' that refers to a unit of measurement that is always quantitative. The widely held belief is that metric or quantitative indicators are more accurate than qualitative assessments, but the number of areas for which a full and reliable set of quantitative data exists is very limited.

A number of other factors in addition to the choice between 'quantitative' and 'qualitative' indicators also have impact on the precision of the indicator, illustrated with the example of greenhouse gas emissions (See Figure 1). A fully accurate quantitative assessment of the

[1] Another way to classify indicators is the DPSIR framework referring to: **D**riving force (input and land use, management trends), the environmental **P**ressure (pollution, resource depletion), the **S**tate of the environment (e.g. soil organic matter), the **I**mpact on the health of people, animals (e.g. proportion of cows in the herd with mastitis) and ecosystems or a **R**esponse in the form of policies and targets (EEA, 2005).

performance of a farm with relation to greenhouse gas emissions would require all emissions of the farm to be measured directly. This would be very time consuming and hence very costly. Many sustainability assessment tools (including the PG tool and SMART) therefore use more indirect approaches, where combinations of quantitative and semi-quantitative data (e.g. based on scoring using specific criteria) are used. For example, tools may collect quantitative data about the levels of a certain activity (e.g. the number of cows) and multiply them with standardised emission factors (in this case the emissions per cow). This example illustrates one problem that can arise, in particular but not only, when assessing organic farms. An emission factor for cows may depend on what and how much cows eat and how cows are kept and is not available for all practises and activities that are typically used on organic farms (IPCC, 2006). In this case, the accuracy of the assessment would be influenced by the underlying assumptions of the emission factor data. Other impacts are assessed indirectly, based on the question whether certain farm management practices that are known to have a positive impact are implemented on the farm or by asking for the farmers' own view. For example, soil erosion might not be quantified as such, but tools may ask the about observation of soil erosion on certain fields as well as evaluating the implementation of erosion prevention measures. Precision is hence influenced by how closely the indicator relates to the problem i.e. whether the desired output is measured directly or whether a proxy is used.

Quantitative data also exist for some environmental outcomes and both PG tool and SMART use a mixture of quantitative and semi-quantitative calculations (see box above). Quantitative data are less widely available in relation to social sub-themes, and here tools use relatively simple algorithms. Social topics that could be assessed quantitatively include labour use, e.g., number of working days, wage levels which might be combined with semi-quantitative or qualitative judgements (see Box 2).

The question of the precision of the assessment is also closely related to data requirements, data availability and the robustness of the data itself, as well as any calculation algorithms that the tools employ. Primary data are those that are collected immediately during the farm assessment, whereas secondary data include those data recorded prior to the assessment (e.g. on-going wildlife monitoring records, farm accounts, etc.) or existing from other sources (e.g. national statistics, emission factors). Primary data are more likely to be accurate in relation to the specific issue that is assessed, but their collection makes the process of evaluation time consuming and costly so tools should try to make use of data that are collected already. On farms, the availability of quantitative data is good regarding the economic data if the farm keeps accounts, but the profit of one private business on its own might not be a societal concern.

If the assessments are to be used across a number of different operators the repeatability of the assessments is also important, i.e. would a different auditor/assessor get the same result or reach the same conclusion.

**Assessment of indicators**

A list of indicator assessment criteria (see Table 2) was developed based on Schader *et al.* (2012), the critical success factors identified by de Mey *et al*. (2010) and EEA (2005). A final selection was agreed in a meeting of the project partners. The final SAFA guidelines published in 2013 also contain some guidance on the evaluation of indicators (FAO, 2013).

**Table 2: Assessment criteria for sustainability indicators, giving guidance questions and choice options**

| Assessment Criteria | Guidance questions | Options |
|---|---|---|
| **Perspective** | Who is this indicator coming from or benefiting? Is it aimed at the farmer to benefit management? Is it required by the industry? Is it driven by researchers? | Farmer, Processor, Trader, Retailer, Consumer, Environmental NGO, Researcher, Policy-makers/administrators, Control bodies, n/a. |
| **Supply chain** | To which level of the supply chain is this indicator relevant? | Input supplier, farm, processor, trader, retailer, catering, home consumption, All, n/a. |
| **Response inducing** | Does the indicator lead to recommendations for change and/or provide guidance as to what is considered best practice? | Direct, indirect, no. |
| **Robustness** | How robust is the data needed to answer the indicator? | Robust using hard data meeting scientific/statistical quality criteria; Medium using audited self-assessment data, certification and other administrative/third party data; Weak using self-assessment, personal opinion |
| **Data requirements** | Is Primary or Secondary data needed? | Primary data includes any data collected immediately during the farm assessment.<br>Secondary data includes data recorded previous to the assessment (e.g. on-going wildlife monitoring records, farm accounts, etc.). |
| **Proximity** | How close is the indicator to problem i.e. whether the desired output is measured directly or whether a proxy is used. | Use scoring system for assessment. A score of 3 indicates direct/exact applicability. A score of 1 indicates a proxy indicator. |
| **Type of Indicators** | What approach is used? | qualitative (descriptive), semi-quantitative (scoring data) or quantitative (measured) data? |
| **Reproducibility of scoring results** | Would a different auditor/assessor reach the same conclusions/results?<br>Is sufficient guidance given to ensure consistent scoring? | |
| **Area of assessment** | On what geographical level does the indicator focus? | Field, Farm, Neighbourhood (incl. river catchments and surrounding farms), Regional, National, International, n/a. |
| **Geographical transferability** | Can the indicator be applied to other contexts?<br>If so which? | Same level in another location, different level in same location, not transferable. |

| Assessment Criteria | Guidance questions | Options |
|---|---|---|
| **Operation type** | Is the indicator applicable across farm types?<br>To which European farm type does the indicator relate? | Field crops, Horticulture, Wine, Other permanent crops, Milk, Other grazing livestock, Pig/poultry, Mixed, All crops, All livestock, All, n/a. |
| **Farm size** | Is the indicator applicable across farm sizes?<br>If not, to what farm size is the indicator applicable? | Small-holders, Family farms, Estates, All, n/a. |
| **Methodological soundness** | Are there any peer-reviewed papers or other evidence/theoretical justification supporting and/or validating the indicator? | |
| **Time** | How long does providing the answer take a) for subject, b) for assessor? | Time in minutes |
| **Skill** | What level of expertise of the assessor is needed to answer the indicator? | Basic (general farming knowledge), Skilled (Trained for a particular tool and/or indicator),<br>Highly skilled (Extensive background knowledge). |

Table 3 below shows an assessment of a small number of social indicators from the PG tool using these criteria, as an illustrative example. It was found that, while the criteria can be used to get a clearer idea of the nature of some indicators, there is still a degree of subjectivity in some responses and so it may still be difficult to compare indicators that were assessed by different people. Further work will be needed to develop and test criteria to objectively compare indicators are used in the assessment of sustainability of farming systems.

**Table 3: Assessment of a number of social indicators from PG tool and SMART against some of the criteria outlined in Table 2**

| Social capital | Indicator | Perspective | Response inducing | Robustness | Data requirement | Proximity | Type of Indicators | Reproducibility | Area of assessment | Geo transfer ability | Method soundness | Time (for subjects) | Time (for assessors) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Employment* | How many staff do you employ? (Casual; long term; family labour) | Farmer | Direct | 3 - robust | Primary | 3 | Quantitative | Yes | Farm | Different level in same location | 2 | Less than 1 minute | Less than 1 minute |
| *Wage level* | How does the minimum wage that the operation pays to its employees compare with the statutory minimum wage that is generally paid in this region and sector? | Farmer, processor, trader, retailer, consumer, policy-makers | Indirect | 2 – interim | Primary | 3 | Semi-quantitative | Yes | Regional | Same level in another location | n/a | 1 minute | 15 minutes |
| *Wage level* | Can it be ruled out that auxiliary inputs were sourced from countries where there are problematic social conditions? If no, can information regarding the social compatibility of their production be furnished? (This relates to where the auxiliary inputs originally came from.) | Farmer, processor, trader, retailer, researcher | Indirect | 2 - interim | Both | 1 | Qualitative | Maybe | n/a | Same level in another location | n/a | 15 minutes | 10 minutes |
| *Skills and knowledge* | How many training days have staff had per year in total? (Casual, long term - including family) | Policy-makers | Direct | 3 - robust | Primary | 3 | Quantitative | Yes | Farm | Different level in same location | 2 | 5 | Less than 1 minute |
| *Community Engagement* | How many visitor events do you have per year? | Control bodies | Direct | 3 - robust | Primary | 1 | Quantitative | Yes | Neighbourhood | Different level in same location | 2 | 5 | Less than 1 minute |
| *CSR initiatives and accreditation* | Do you hold the "Investors in People" award or any other similar corporate social responsibility accreditations? | Control bodies | Direct | 3 - robust | Primary | 2 | Qualitative | Yes | Farm | Different level in same location | 3 - fully supported | Less than 1 minute | Less than 1 minute |
| *Support to vulnerable people* | Is the operations manager committed to preventing discrimination against women, minorities, minors and other vulnerable | Farmer, processor, trader, retailer, researcher | Indirect | 3 – robust | Both | 1 | Qualitative | Maybe | Farm | Same level in another location | n/a | 1 minute | 5 minutes |

| Social capital | Indicator | Perspective | Response inducing | Robustness | Data requirement | Proximity | Type of Indicators | Reproducibility | Area of assessment | Geo transfer ability | Method soundness | Time (for subjects) | Time (for assessors) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | groups? (For large operations: written commitment is required; for family operations and smallholders: written commitment is not required) | | | | | | | | | | | | |
| *Support to vulnerable people* | Does the operation take measures to prevent discrimination against women, minorities, minors and other vulnerable groups? | Farmer, processor, trader, retailer, researcher | Indirect | 2 – interim | Primary | 3 | Qualitative | Maybe | Farm | Same level in another location | n/a | 1 minute | 5 minutes |
| *Support to vulnerable people* | Are there disabled people who work and/or live at this operation? | Farmer, processor, trader, retailer, researcher | Indirect | 1 – weak | Primary | 3 | Quantitative | Maybe | Farm | Same level in another location | n/a | 1 minute | 1 minute |
| *Support to vulnerable people* | Does this operation provide extra support to disadvantaged groups (women, minorities, disabled people, etc.)? | Farmer, processor, trader, retailer, researcher | Indirect | 1 –weak | Primary | 3 | Quantitative | Maybe | Farm | Same level in another location | n/a | 1 minute | 1 minute |
| *Support to vulnerable people* | What proportion of the workforce is permanently employed, has social protection (including injury, illness and maternity benefits) and is protected against dismissal? | Farmer, processor, trader, retailer, consumer, policy-makers/ administrators | Indirect | 1 – weak | Primary | 3 | Quantitative | Maybe | Farm | Same level in another location | n/a | 5 minutes | 1 minute |
| *Public access* | How much access do you provide? | Control bodies | Indirect | 1 - weak | Primary | 3 | Qualitative | Yes | Neighbourhood | Same level in another location | 2 | Less than 1 minute | Less than 1 minute |
| *Human health issues* | How exposed are you or your workers to hazardous chemicals? | Policy-makers/ administrators | Indirect | 1 - weak | Primary | 3 | Semi-quantitative | Yes | Farm | Different level in same location | 2 | Less than 1 minute | Less than 1 minute |
| *Human health issues* | Have you carried out a COSHH assessment? | Policy-makers/ administrators | Direct | 2 -interim | Primary | 1 | Qualitative | Yes | Farm | Different level in same location | 3 - fully supported | Less than 1 minute | Less than 1 minute |

**Matrix of methodological choices**

A matrix was designed, which explains the methodological choices and the implications for the results of the assessments. The matrix has two main axes that determine the choice: the **assessment level** and **nature of the indicators** (quantitative or semi-qualitative).

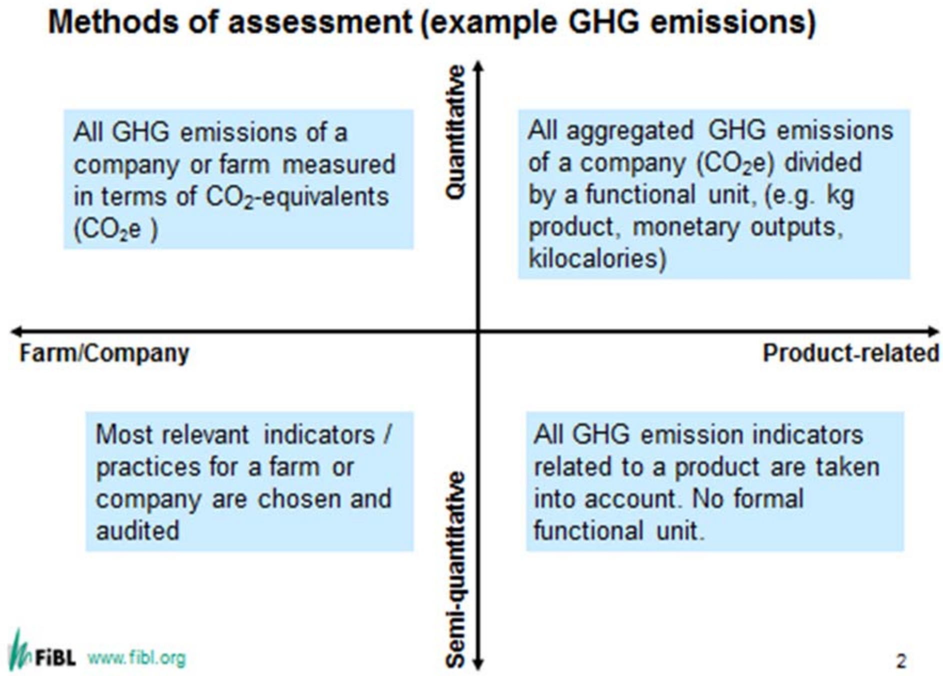



**Figure 1: Methodological choices in relation to GHG emissions**

This gives four principal methodological approaches to analysing the sustainability performance of organic farming systems each with their own advantages and disadvantages (see Figure 2 below).

Farm assessments with a fully quantitative approach (top left) allow the comparison of the performance of individual companies or farms, in particular if all measurements of the category can be integrated into one single indicator (e.g. total GHG farm emissions). However, for many areas data are difficult to obtain and calculations are based on models which work with specific assumptions that do not always hold true, especially if farms/companies of different size, in different natural conditions (soil, climate, etc) or with different business structures are compared. The assessment is one-dimensional and only themes that can be measured in a quantitative way can be covered (Haas *et al.*, 2001; Whittaker *et al*., 2013; Schader *et al*., 2014).

Product based assessments with a fully quantitative approach (top right) allow the comparison of products in relation to their contribution to a certain impact. The approach is widely used in LCA assessments. In addition to the problems that can arise for the quantitative assessment at the farm level, a particular issue arises when multiple outputs are produced together as it is difficult to apportion impacts to each product.

The alternative to a fully quantitative approach is a semi-quantitative/qualitative approach that combines a range of indicators to assess farm /company or product performance (bottom left in Figure 2). The main advantage is that data are easy to acquire and farms/companies can be benchmarked against each other. The results are practical as reasons for a good or bad performance can be identified easily and the assessment can be multidimensional. However, if several dimensions are considered and weighting procedures to combine values are used this can cause subjectivity of the assessment. In many cases there is a clear trade-off between transparency and accuracy of the assessment. A prerequisite of using such an approach should be sound scientific evidence of impacts of practices. This does not exist in all cases and impacts of certain inputs are often not taken into account. For instance, the environmental and social impacts of feedstuffs that a dairy farm imports are not considered in many farm-level sustainability evaluation tools e.g. RISE (Grenz *et al.*, 2009) and PG tool which is a farm-level tool. Therefore, a sound benchmarking of specialized dairy farms with mixed farms with such tools is impossible.

The multidimensional semi-quantitative approach can also be extended to product or functional unit based assessments (bottom right) and similar advantages and disadvantages as for company based assessments apply. Additional problems can arise because the relationship of certain practises to the functional unit cannot always be clearly established.

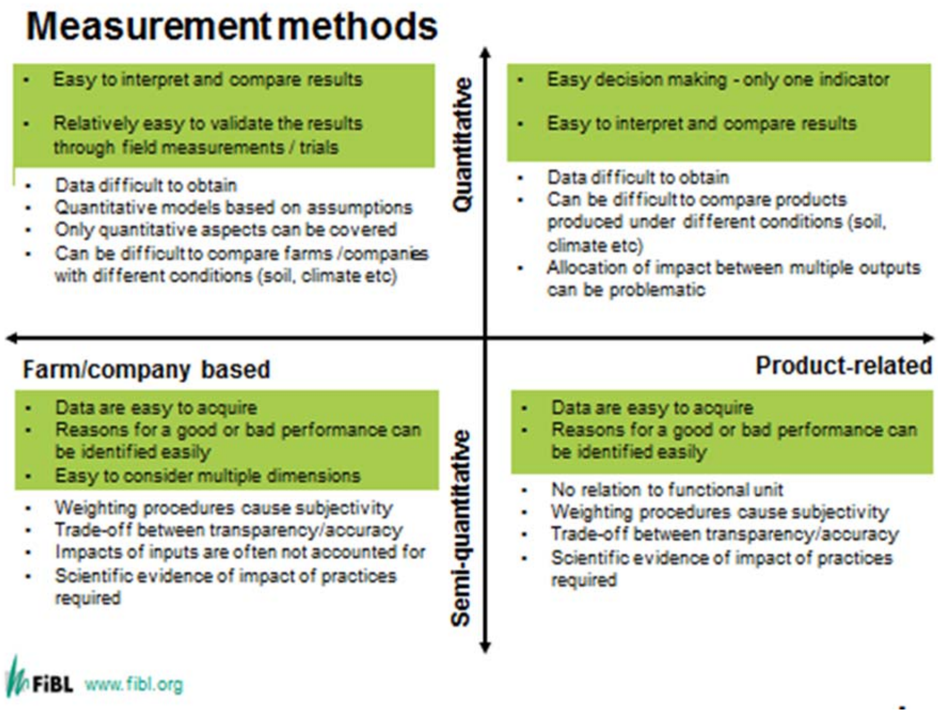



**Figure 2: Overview of advantages and disadvantages of the methodological choices**

An important conclusion of this framework is that the choice of method crucially depends on the purpose of the sustainability assessment. To select the most favourable method at the beginning of a project analysing the sustainability performance of organic farming systems, the goal(s)/purpose and scope of the assessment have to be defined precisely. All approaches have advantages and disadvantages in different contexts. it was concluded that tools for sustainability assessment should be focussed on a specific purpose, e.g. farm extension or comparative monitoring of farms or research.

## 2.3 Sustainability themes for organic agriculture

### 2.3.1 Approach

The third stage of work package 1 involved identifying a set of sustainability outcomes for the organic sector and obtaining feedback from stakeholders. Brainstorming to decide how to select the list of sustainability outcomes to take forward for the rest of the project was carried out an internal project meeting. The partners decided to use the SAFA framework and to focus on claims that delineate/differentiate organic from conventional but that are not well substantiated. To identify such disputed claims Google Scholar and Web of Science were searched, using the terms "organic conventional agriculture, SAFA sub-theme". A larger number of hits suggested a greater degree of scientific debate and therefore a greater amount of controversy/dispute and was used as a proxy for identifying the sub-themes where further substantiation was required.

The project team applied for and obtained a workshop at the IFOAM/ISOFAR conference held in Turkey in October 2014 (see Appendix 2). The workshop "Monitoring the sustainability of organic farming systems within the SAFA framework" aimed to provide a forum for discussion of this list considering both relevance and methodological choices and to assist the prioritisation of sub-themes.

Two short presentations by representatives of ORC and FIBL (maximum length 5 minutes) were given to set the baseline for discussion. This was followed by followed by open discussion, structured and facilitated by project staff. The presentations included a full list of SAFA sub-themes and the results of the internet search and the attendees were invited to vote on those sub-themes that they thought should be prioritised. Each individual in attendance at the workshop was allowed three votes. Due to a parallel session on animal welfare no experts on animal science/behaviour/welfare were present.

To access the opinions of a wider range of organic stakeholders an on-line survey on the sustainability themes was constructed. The survey introduced each sub-theme (as detailed in Table 3 below) with a short paragraph describing what it means. Respondents were then asked to select for each sub-theme, via drop-down menus, whether they thought it was a "strength", "weakness" or "neither strength or weakness" of the organic sector, whether they thought it was an area where further development was needed in the organic sector (yes or no), and whether they worked in that area (yes or no). The answers to the latter question could be used to identify whether people with particular expertise in an area would have a different perception of that area compared with those who were not specialists. Respondents were also offered an open text box in which they could explain their choices if they so wished and were asked what was their role within the sector (farmer, researcher, sector organisation e.g. control body, business, other).

The survey was advertised via the following routes and was kept open for 2 months:

- ORC website and e-bulletin
- ORC facebook page
- ORC twitter
- FiBL newsletter
- FiBL's sustainability groups in Switzerland, Austria and Germany
- ECOL-AGRIC@JISCMAIL.AC.UK mailing list

- IFOAM EU (farmers' interest group, policy experts group, Facebook page, newsletter and TP Organics)
- SOAAN mailing list
- Organic market.info newsletter
- The Biodynamic Association (UK)
- The Soil Association (UK)

Despite widespread promotion, only 21 responses were received. These were from 4 farmers, 2 researchers, 2 businesses, 3 sector organisations (e.g. control bodies), and 10 who selected "other". The 10 "other" respondents included two farmers who were also consultants/researchers, an NGO, an auditor, a trade organisation, and an international organisation. Due to the small number of respondents it was decided not to separate responses into categories, thus all responses were considered together.

Finally, the results from the different approaches and questions were brought together by calculating third quartile and then all sub-themes that received a number of hits/votes greater than quartile 3 were summarised.

### 2.3.2 Results

Below we present the results from the stakeholder workshop and the online survey:

**Priorities identified during the stakeholder workshop**

The numbers of hits for each sub-theme and the results from the workshop in Turkey are shown in Table 4 below. The sub-themes with the highest Google/WoS (web of science) hits were as follows:

- Social well-being: *quality of life* and *public health*;
- Environmental integrity: *greenhouse gases*, *water quality*, *biodiversity*, *energy use* and *animal health* and *welfare*;
- Economic resilience: *profitability*, *risk management*, *food safety* and *quality*;
- Good governance: *responsibility*.

The sub-themes with the most votes at the workshop in Turkey were as follows:

- Social well-being: *capacity development, support to vulnerable people, public health*
- Environmental integrity: *soil quality, ecosystem diversity, greenhouse gases, water quality*
- Economic resilience: *stability of production, food quality*
- Good governance: *transparency, full-cost accounting.*

Even though the priorities stressed by the stakeholders during the workshop match to a large extent with the web search hits in scientific databases indicating the number of papers published in this area (*public health, soil quality, greenhouse gases, water quality, food quality, transparency)*, the stakeholder workshop highlighted priorities of the organic sector which so far have not been as highly researched:

- Social well-being: *capacity development, support of vulnerable people*
- Environmental integrity: *ecosystem diversity,*
- Economic resilience: *stability of production*

– Good governance: *full-cost accounting.*

**Table 4: Results of ISOFAR workshop and web search, showing the number of votes/hits for each sub-theme from the SAFA guidelines.**

| SAFA theme | Sub-theme | Web-search hits | | Stakeholder preferences |
|---|---|---|---|---|
| **Social well-being** | | **Google scholar** | **Web of Science** | **Workshop** |
| **Decent livelihood** | Quality of Life | 53600 | 46 | 6 |
| | Capacity Development | 2920 | 0 | 7 |
| | Fair Access to Means of Production | 0 | 0 | 0 |
| **Fair trading practises** | Responsible buyers | 9 | 0 | 2 |
| | Rights of suppliers | 3 | 0 | 1 |
| | Employment relationships | 607 | 0 | 3 |
| **Labour rights** | Forced labour | 2060 | 0 | 1 |
| | Child labour | 3690 | 0 | 1 |
| | Right for associations & bargaining | 0 | 0 | 1 |
| **Equity** | Non Discrimination | 2880 | 0 | 2 |
| | Gender Equality | 7480 | 1 | 0 |
| | Support to Vulnerable People | 8 | 0 | 8 |
| **Human health & safety** | Workplace Safety and Health Provisions | 0 | 1 | 0 |
| | Public Health | 160000 | 211 | 8 |
| | Indigenous Knowledge | 8050 | 2 | 1 |
| **Cultural diversity** | Food Sovereignty | 26 | 1 | 6 |
| **Environmental integrity** | | **Google scholar** | **Web of Science** | **Workshop** |
| **Atmosphere** | Greenhouse Gases | 50900 | 56 | 7 |
| | Air Quality | 38900 | 6 | 0 |
| **Water** | Water Withdrawal | 2480 | 0 | 1 |
| | Water use (additional term) | 35200 | 59 | 1 |
| | Water Quality | 98300 | 74 | 7 |
| **Land** | Soil Quality | 30000 | 334 | 10 |
| | Land Degradation | 13200 | 14 | 1 |
| **Biodiversity** | Biodiversity (theme name) | 73400 | 356 | 0 |
| | Ecosystem Diversity | 1260 | 1 | 9 |
| | Species Diversity | 21300 | 88 | 3 |
| | Genetic Diversity | 25700 | 10 | 3 |
| **Materials & energy** | Material Use | 6020 | 0 | 1 |
| | Energy Use | 31400 | 74 | 6 |
| | Waste Reduction & Disposal | 30 | 1 | 1 |
| **Animal welfare** | Animal welfare (theme name) | 15400 | 61 | 3 |
| | Animal Health | 22000 | 197 | 1 |
| | Freedom from Stress | 108 | 1 | 1 |

| **Economic resilience** | | **Google scholar** | **Web of Science** | **Workshop** |
|---|---|---|---|---|
| **Investment** | Internal Investment | 198 | 1 | 0 |
| | Community Investment | 727 | 3 | 1 |
| | Long-Ranging Investment | 2 | 0 | 3 |
| | Profitability | 42800 | 73 | 1 |
| **Vulnerability** | Stability of Production | 363 | 62 | 7 |
| | Stability of Supply | 216 | 3 | 0 |
| | Stability of Market | 70 | 7 | 0 |
| | Liquidity | 10200 | 3 | 2 |
| | Risk Management | 25900 | 129 | 2 |
| **Product quality & information** | Food Safety | 35000 | 86 | 2 |
| | Food Quality | 22800 | 289 | 5 |
| | Product Information | 14500 | 125 | 0 |
| **Local economy** | Value Creation | 5830 | 1 | 3 |
| | Local Procurement | 533 | 0 | 0 |
| **Good governance** | | **Google scholar** | **Web of Science** | **Workshop** |
| **Governance** | Mission Statement | 9800 | 0 | 0 |
| | Due Diligence | 4790 | 0 | 0 |
| **Corporate ethics** | Holistic Audits | 2 | 0 | 0 |
| | Responsibility | 203000 | 11 | 1 |
| | Transparency | 121000 | 4 | 7 |
| **Accountability** | Stakeholder Dialogue | 806 | 0 | 2 |
| | Grievance Procedures | 425 | 0 | 1 |
| | Conflict Resolution | 12800 | 1 | 0 |
| **Rule of law** | Legitimacy | 66100 | 3 | 0 |
| | Remedy, Restoration & Prevention | 2 | 0 | 0 |
| | Civic Responsibility | 2200 | 0 | 2 |
| | Resource Appropriation | 167 | 0 | 0 |
| **Holistic management** | Sustainability Management Plan | 8 | 0 | 2 |
| | Full-Cost Accounting | 858 | 0 | 6 |

**<u>Strengths and weaknesses of organic agriculture identified in the on-line survey</u>**

The first part of the survey asked respondents to look through the list of SAFA sub-themes and state which they thought were strengths or weaknesses of organic agriculture and which they thought were neither strengths nor weaknesses. Figure 3 below shows the results for this question. It can be seen from this that there was very little consensus of opinion for most of the sub-themes.

The sub-themes that show the greatest consensus with regards to being a strength for organic production are:

- *Freedom from stress (livestock)*
- *Animal health*
- *Animal welfare*
- *Food quality*

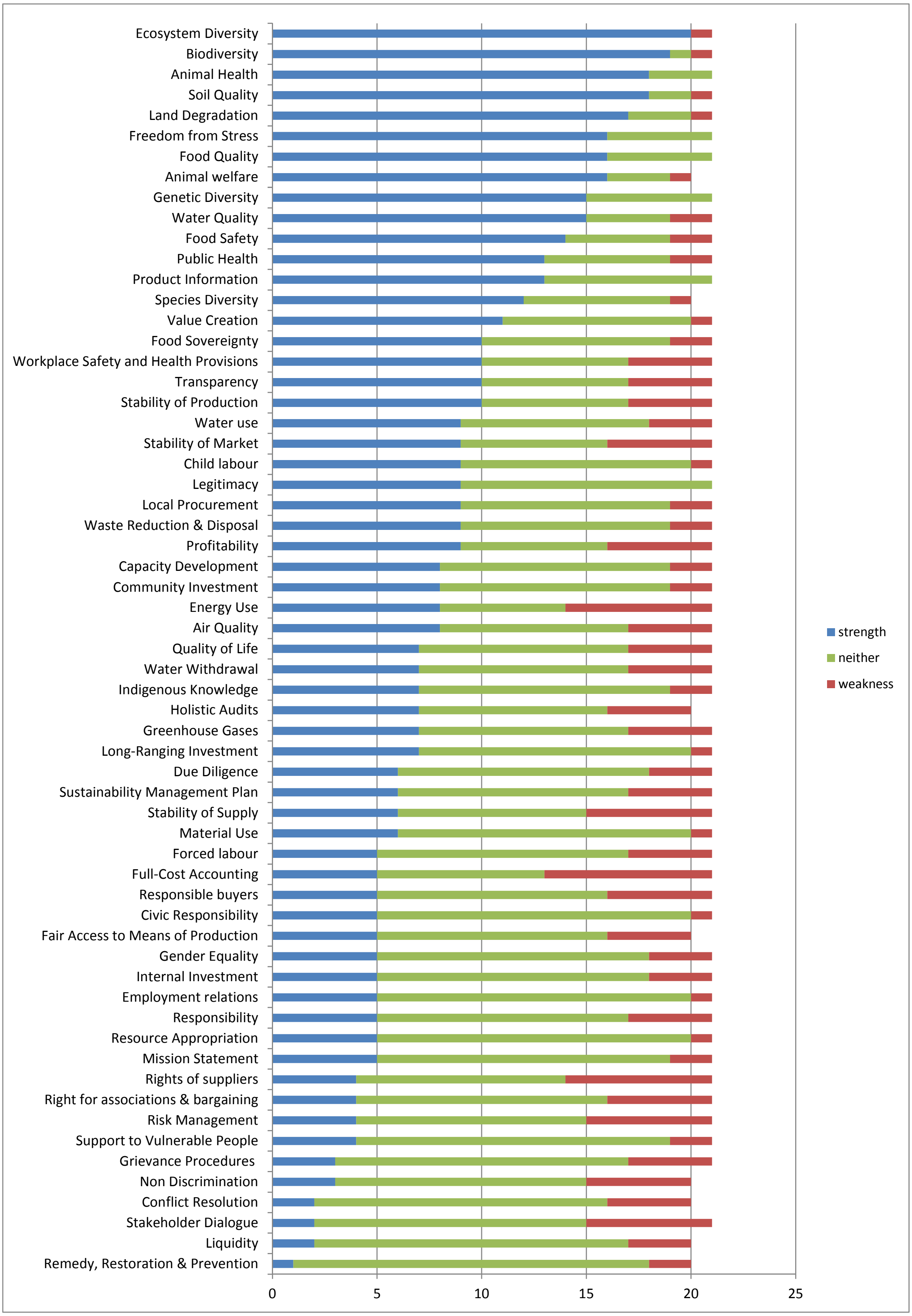
- *Land degradation*
- *Soil quality*
- *Biodiversity*
- *Ecosystem diversity*

These suggest that there is generally good agreement within the organic sector that organic production's strengths lie in animal husbandry, soil management, ecology and food quality.

There were no areas which more than 8 of the 21 respondents felt to be a weakness of organic production. The ones which fewest respondents felt were a strength (most feeling that they were neither a strength nor a weakness) were:

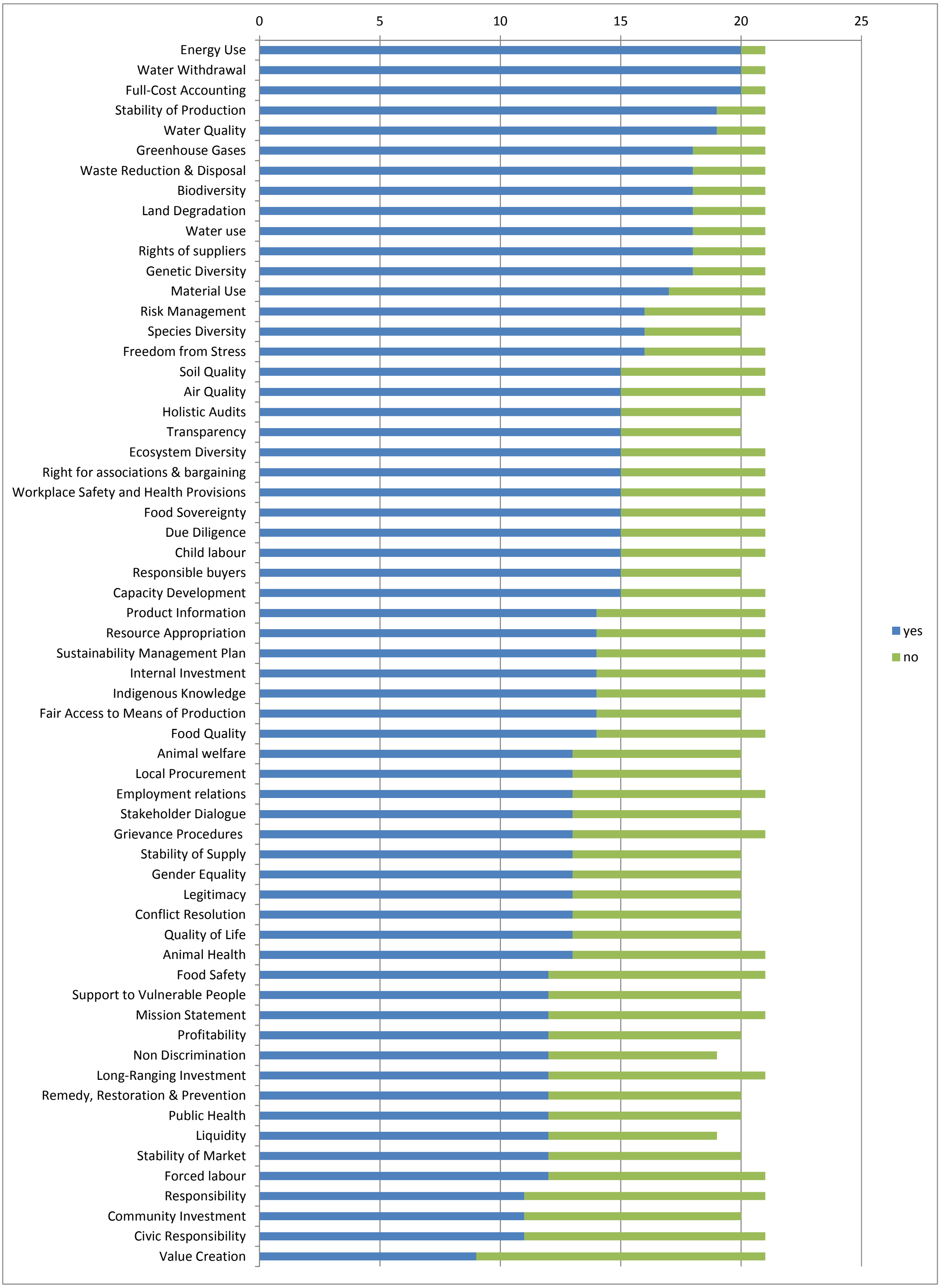
- *Rights of suppliers*
- *Conflict resolution*
- *Rights for associations and bargaining*
- *Grievance procedures*
- *Stakeholder dialogue*
- *Remedy, restoration and prevention*
- *Non-discrimination*
- *Support to vulnerable people*
- *Liquidity*
- *Risk management*

The vast majority of these belong within the governance dimension, which was also less well covered by the sustainability assessment tools which were reviewed (Section 2.1). The remaining two (*liquidity* and *risk management*) refer to the economic dimension and may reflect the higher costs experienced by some organic farms (e.g. higher seed and feed costs) compared with non-organic farms.




Note that not all of the 21 respondents covered all of the sub-themes.

**Figure 3: The responses to the question about which sub-themes are strengths, weaknesses or neither of organic agriculture.**




Note that not all of the 21 respondents covered all of the sub-themes.

**Figure 4: Responses to the question about which sub-themes require further development in the organic sector**

The second question that respondents were asked was whether they thought the sub-theme was a topic where further development of the organic sector was most necessary (Figure 4). The areas with the highest number of “yes” responses – indicating that they were felt to be areas where further development was most necessary were:

- *Full-cost accounting*
- *Stability of production*
- *Water withdrawal*
- *Water quality*
- *Energy use*

Only one sub-theme had fewer than 10 “yes” responses and that was *value creation*.

There was no correlation between whether or not a sub-theme was perceived as a strength and whether or not it was perceived as needing further development.

The outcomes of the different approaches to eliciting the priorities on which the organic sector might want to focus in future are presented in the discussion section.

As part of the survey, respondents could also include open comments. It was pointed out that the survey is trying to summarise too many issues in too simplistic way which makes it less useful, highlighting the problem with trying to address the complex issue of sustainability in a user-friendly manner without it becoming too simplistic. Some comments pointed out that the direction of some of the questions is not clear, for example how the organic sector is defined and questioned whether research was always the best tool to support further development of the organic sector, particular in the area of the Fairness principle. *“… issues like gender equality and suppliers' rights are political matters that require action, not research.”* In contrast, one respondent explained that s/he answered question on the basis of whether research might help clarify the benefits of organic farming.

Two participants wanted more attention to soil fertility and restoring soil health, which was seen as foundational to all the future challenges. And another comment also found attention to future challenges to be absent, such as the end of cheap energy, depleting natural resources, and climate change. “*Any true plan for sustainability must address these and get a head start preparing for them.”* There was also concern about overloading organic farming *with* too many *issues: “Associating organic farming with other non-related issues is objectionable because it is likely to turn people against this form of agriculture that has so much to offer ”* also in relation to what areas should be covered in standard development. *“Keeping the pragmatic spirit, areas requiring attention in organic standards was kept to the minimum. “*

The results from the different approaches (internet search, workshop, survey) and questions about sustainability themes were brought together (see Table 5) by calculating quartiles and including all sub-themes that received a number of hits/votes greater than quartile 3. Table 5 therefore shows whether there is any relationship between the different sub-themes. It appears that there is no clear relationship.

**Table 5: Summary of sustainability themes**

| | Google scholar hits | ISOFAR/ IFOAM votes | Survey - strengths | Survey – areas for development | Survey- weaknesses |
|---|---|---|---|---|---|
| | | *Social well-being* | | | |
| **Quality of life** | X | X | | | |
| **Public health** | X | X | X | | |
| **Capacity development** | | X | | | |
| **Support to vulnerable people** | | X | | | |
| **Food sovereignty** | | X | | | |
| **Responsible buyers** | | | | | X |
| **Rights of suppliers** | | | | X | X |
| **Non-discrimination** | | | | | X |
| **Rights for associations and bargaining** | | | | | X |
| | | *Environmental integrity* | | | |
| **Greenhouse gases** | X | X | | X | |
| **Air quality** | X | | | | |
| **Water use** | X | | | X | |
| **Water quality** | X | X | X | X | |
| **Soil quality** | X | X | X | | |
| **Biodiversity** | X | | X | X | |
| **Energy use** | X | X | | X | X |
| **Ecosystem diversity** | | X | X | | |
| **Animal health** | | | X | | |
| **Animal welfare** | | | X | | |
| **Freedom from stress** | | | X | | |
| **Genetic diversity** | | | X | X | |
| **Species diversity** | | | X | | |
| **Water withdrawal** | | | | X | |
| **Land degradation** | | | X | X | |
| **Value creation** | | | X | | |
| **Material use** | | | | X | |
| **Waste reduction and disposal** | | | | X | |
| | | *Economic resilience* | | | |
| **Profitability** | X | | | | X |
| **Food safety** | X | | X | | |
| **Food quality** | | X | X | | |
| **Stability of production** | | X | | X | |
| **Product information** | | | X | | |
| **Risk management** | | | | | X |
| **Stability of markets** | | | | | X |
| **Stability of supply** | | | | | X |
| | | *Good governance* | | | |
| **Responsibility** | X | | | | |
| **Transparency** | X | X | | | |
| **Legitimacy** | X | | | | |
| **Full-cost accounting** | | X | | X | X |
| **Stakeholder dialogue** | | | | | X |

There was no statistical correlation in the survey data between being an area of strength or weakness and being selected as requiring further development. Similarly it seems that more controversial areas (with a number of google scholar hits) may still be seen as strengths by members of the organic sector. The votes at the workshop were influenced by the other workshops happening at the same time (thus no animal-related themes were chosen at the workshop as an animal science workshop was happening at the same time and so no-one present at the sustainability workshop had a strong interest in livestock).

Some of the areas in need of development are also seen as strengths of organic production by those within the sector, e.g. *water quality, biodiversity, land degradation.* Some of the most debated areas are also seen as areas of strength for the organic sector: e.g. *soil health, greenhouse gas emissions, food safety*. Some areas identified by the organic sector as priority themes are already perceived as strengths of organic production, e.g. *ecosystem diversity, soil quality, food quality*. Other areas identified as priority themes are perceived as less strong, i.e. *full cost accounting.* Some of the most debated areas are also seen by the organic sector as areas that are in need of development e.g. *water quality, energy use,* and *full-cost accounting.*

# 3 Interdependencies and correlations of the sustainability outcomes and indicators (WP2)

Work Package 2 essentially covered the second aim of the project: to look at interdependencies and correlations of the sustainability outcomes and indicators. The work package description is given below in italics.

*WP2 will examine in detail the interdependencies, interactions/feedbacks and correlations of the sustainability outcomes and key indicators identified in WP1 in order to make the synergies and conflicts of indicator performance transparent. The starting point for this task will be a cross impact matrix to be completed by the project partners and selected external experts, which will determine the direction of impact (positive and negative). Existing end-point Life Cycle Impact Assessment Methodologies (e.g. EcoIndicator 99*[2]*) that model the interdependencies between indicators for product level impact assessment will be reviewed to explore to what extent the approaches of Life Cycle Impact Assessment methodologies could be used to further quantify such interdependencies in farm level sustainability assessments. Furthermore, other scientific literature will be reviewed and key experts (researchers) will be interviewed to explore how interdependencies could be expressed (qualitatively or quantitatively) for those areas and indicators where the project cannot learn from Life Cycle Impact Assessment Methodologies.*

## 3.1 Approach

Given the results from WP1 about the principal ways of assessing sustainability dimensions and themes, it was decided not to look at single LCA methodologies as they were viewed as being too narrow. Instead WP2 looked at synergies and trade-offs between all the different sustainability dimensions and themes in the SAFA Guidelines based on the indicator set of the SMART-Farm Tool. The 58 sub-themes of the SAFA Guidelines were compared with one another using a matrix of 3364 fields.

Based on scientific literature, the SMART-Farm Tool (See Appendix 3 for more information on SMART), describes how indicators and management practices contribute to the achievement of one or several sub-theme objectives. For instance, the use of reduced tillage will have a strongly positive impact on *soil quality*. At the same time, the indicator affects *greenhouse gas emissions* positively, as it helps to sequester soil organic matter. So the same indicator affects several sub-theme objectives uniformly and thus there is a synergy between those two sub-themes because of this indicator. At the same time indicators may affect one sub-theme positively and another one negatively. In this case there is a trade-off between the two sub-themes.

For this study, the approximately 1400 relationships between indicators and sub-themes, which are specified in the SMART-Farm Tool, were systematically analysed considering whether the sub-themes are influenced by similar farm management strategies or conflicting ones. This is described in Equation 1. A correlation coefficient which describes the degree of uniformity of impacts of indicators on all combinations of sub-themes, was calculated for each sub-theme ($SYN_{ij}$). It is calculated by the difference between 1 and the sum of squares of the deviations of the single

[2] http://www.pre-sustainability.com/content/eco-indicator-99

impacts of the indicators between two sub-themes ($IM_{ni}$ and $IM_{nj}$) divided by the maximum of the squared deviations between indicators of two sub-themes (665). Synergies between dimensions and within dimensions were calculated as the arithmetic mean of the synergies of a dimension (Equation 1).

$$SYN_{ij} = 1-((\sum_x(IM_{ni} - IM_{nj})^2) / 665) \quad \text{for all i and j} \quad \text{Equation 1}$$

where n is the index for the indicators and i and j are indices of sub-themes.

Trade-offs ($TO_{ij}$) were calculated according to Equation 2 by summing up the squares of deviations of the single impacts of the indicators between two sub-themes ($IM_{ni}$ and $IM_{nj}$). For determining the trade-offs between the dimensions the sum of trade-offs in a sub-theme or between two sub-themes, respectively, was calculated.

$$TO_{ij} = \sum_x(IM_{ni} - IM_{nj})^2 \quad \text{for all i and j} \quad \text{Equation 2}$$

## 3.2 Results

When analysing the individual dimensions, the most similar and synergistic management strategies could be identified for the themes in the governance (86% of correlation between indicator-theme impact relationships on average for the sub-themes in this dimension) and the social dimensions (78%). The least degree of uniformity in management strategies (= least synergistic) was identified for the environmental dimension (52%) and the economic dimension (69%).

Between the dimensions, synergies are greatest between the social and the governance dimension (78 %) and the economic and governance dimension (73%). The similarities between the social and economic dimension (69%) are greater than between the environmental and governance dimension (59%) (Figure 4).

| Synergies | Governance | Environmental integrity | Economic resilience | Social Well-Being |
|---|---|---|---|---|
| Governance | 86% | 59% | 73% | 78% |
| Environmental integrity | 59% | 52% | 54% | 56% |
| Economic resilience | 73% | 54% | 69% | 69% |
| Social Well-Being | 78% | 56% | 69% | 78% |

| Trade-offs | Governance | Environmental integrity | Economic resilience | Social Well-Being |
|---|---|---|---|---|
| Governance | - | - | 59 | - |
| Environmental integrity | - | 540 | 276 | 68 |
| Economic resilience | 59 | 276 | 144 | 115 |
| Social Well-Being | - | 68 | 115 | - |

**Figure 5: Overview of trade-offs and synergies between sustainability dimensions (see Appendix 4 for details on sub-theme level)**

At sub-theme level (see Appendix 4), in the environmental dimension, the least synergies were found between *animal health* and *freedom from stress* on the one hand and the rest of the environmental sub-themes on the other hand. Furthermore, synergies between *material and energy use* on the one hand and *biodiversity*, *water quality*, *soil quality* and *land degradation* on the other hand were low. Greatest synergies were found between a) *animal health* and *freedom from stress*, b) between *air quality* and *energy use* and c) between *ecosystem* and *species diversity*.

In the economic dimension, a) the sub-themes *product information, value creation* and *local procurement* showed the largest synergies as well as b) *stability of markets* and *stability of supply* and c) *internal, community* and *long-term investments*. While *risk management* showed the lowest degree of synergies to other economic sub-themes.

In the social dimension, *public health, workspace safety* and *quality of life* had the lowest degree of synergies to the other social sub-themes. In the governance dimension only *legitimacy* showed a slightly lower degree of synergies to other sub-themes.

The trade-offs were classified into three groups: a) Trade-offs between dimensions, b) trade-offs between sub-themes within one dimension and c) trade-offs between sub-themes in different dimensions. It was found that trade-offs between the environmental and the economic dimension were greatest, mainly due to trade-offs with the sub-theme *stability of production* (see Annex 4). Trade-offs between the social and the economic dimension were also substantial due to *profitability* and *stability of production* on the one hand and *public health* and *workplace safety* on the other hand. There were also trade-offs between the social and the environmental dimension however to a lower extent. The main conflict is between *profitability* on the one hand and *legitimacy* and *responsibility* on the other hand. There are no trade-offs between the governance dimension and the dimensions of environmental integrity and social well-being.

Interestingly the trade-offs within the environmental dimension were even larger than the trade-offs with other dimensions. Most relevant were trade-offs between *greenhouse gas emissions* and *animal welfare*. Also within the economic dimension substantial trade-offs exist. No trade-offs were identified between sub-themes within the social dimension or the governance dimension.

It was concluded that farms optimizing the governance dimension will have positive synergies with most of the environmental, social and economic sub-themes. Trade-offs between the economic dimension on the one hand and the environmental and social dimensions on the other hand, need to be accepted at farm level, but could be addressed by policy makers, to help farmers set the right priorities. The environmental dimension is most difficult to optimise as substantial trade-offs exist both within it and with other dimensions. Priorities need to be set depending on the specific context of the farm. Policy could also play an important role in this regard. The high degree of synergies between governance and the other dimensions reinforces the importance of quality management at farm level with respect to sustainability.

# 4 Discussion and conclusions

The project aimed to contribute to the development of sustainability impact assessments of organic/ecological farms, building on the FAO SAFA Guidelines (FAO, 2015) and other relevant approaches. This involved an analysis and evaluation of existing sustainability assessment approaches which aimed to identify suitable indicators, sets of indicators or sustainability themes to assess the sustainability performance of ecological/organic farms (WP1), to identify interdependencies and correlations between the identified performance outcomes and indicators/sub-themes (WP2) and to synthesise the results regarding indicators and sustainability themes for organic agriculture for dissemination to a wide range of stakeholders (WP3).

Early on in the project it was decided to focus the work in WP 1 and WP2 on sustainability themes rather than individual indicators. The review made clear that the choice of the 'ideal' indicator for use in a particular sustainability assessment will depend on the aim of the assessment, the data available and a range of other factors. This implies that it is not possible, as was originally intended, to produce a reduced sub-set of indicators for use in assessing organic farms. Also, the set of sub-themes requires further discussion with a wider range of stakeholders to ensure that it is a robust shortlist to take forward into future research and for consideration within the wider organic community. However, the project has made a valuable contribution to explore to the process of shortlisting and to clarify the methodological choices that organic sector has to consider which are outlined in the following discussion.

## 4.1 Discussion

Growing interest in assessing the sustainability of agriculture in terms of its environmental, social and economic impact has led to the development of indicators and a variety of tools. The purpose of tool development includes research, product labelling and CSR reporting, policy monitoring and farm advice, and assessments can be carried out at a range of different levels (e.g. field, farm, landscape, supply chain or sector). The extent to which existing tools and the associated indicators can be applied successfully to organic production has been investigated within this study through a range of comparative evaluations and industry consultations.

The results have illustrated that the most appropriate tool or set of indicators will vary according to a range of factors including:

- the overall aim/scope of the assessment (coverage of environmental, economic and social dimensions)
- the ability of cope with diverse systems of agriculture,
- the time available for data collection
- choices concerning the ease of interpretation and transparency in the assessment methodology
- the precision of the indicators and
- the functional unit of the assessment will also be key factors to consider.

The precision of the indicator relates to the choice between indicators/tools that quantify performance (e.g. GHG emissions in terms of $CO_2$ equivalents) and those that use a semi-quantitative approach (e.g. scoring of often multiple outcomes, reviewing the presence of specific practises that are known to have positive outcomes). The functional unit of the assessment refers to choice between assessments and tools that assess the unit of production (e.g. farm, area, supply chain business) or a unit of product (e.g. kg, monetary value or energy unit). The final choice of tool will also be influenced by data availability and/or cost of data collection, and relevance to the users. **All of the approaches of the different tools have advantages and disadvantages and there is a trade-off between the coverage and scope of sustainability themes, the depth and precision of the analysis, and the time required for data collection**. The approaches must also be tailored to a specific purpose. This is in line with the finding by de Ridder *et al*. (2007), as cited by Schader *et al.*, (2014), who stressed that different or specific tasks require different or specific tools.

**Which tool/approach should be chosen depends on the purpose of the individual assessment as well as the goals and objectives for the specific theme/objective to be assessed.** For instance, if the purpose is the quantification and comparison of the carbon footprint between farms, it is most appropriate to quantify the emissions in terms of $CO_2$-equivalents. However, if the purpose of the assessment is mainly to advise farmers on how to improve their sustainability performance in a broader sense, then a tool with management-related indicators leading to management recommendations may be more appropriate. Using different tools on the same farm may lead to different and potentially contradictory results and recommendations due to the use of different indicators, different boundaries on the assessment etc. Ensuring consistency in assessment methods over time will therefore ensure that long-term changes can be monitored and the impact of specific practices identified (Lewis *et al*., 2012).

In common with previous studies (e.g. Buckwell *et al*., 2014, Knight *et al*., 2015) the comparisons within this project showed that the environmental dimension tends to be covered more thoroughly than economic or social areas, possibly because of the emphasis on this area in recent years through the development of international frameworks and statutory targets (e.g. the EU 2030 framework for climate and energy policies). It was also found that most tools did not, as yet, include the fourth dimension of good governance that has been included in the SAFA framework (the review was carried out very shortly after the release of the SAFA guidelines). As many tools are being updated, **the further inclusion of assessment metrics within the area of social sustainability and good governance should be encouraged,** building the SAFA guidelines and on other recent developments (e.g. the UNEP guidelines on social LCA, DFID Sustainable Livelihoods Framework, FAO World Agriculture Watch (WAW)). The newly developed SMART (Sustainability Monitoring and Assessment Routine Tool) already covers all four areas within the SAFA guidelines. The term 'Sustainability assessment' should only be used if at least three dimensions (triple bottom line) are covered and communication of sustainability requires full transparency about the perspectives, values and assumptions.

However, there is a need for prioritisation of topics for detailed sustainability monitoring of the organic sector and for the selection of metrics that might at some point in the future be included into organic certification procedures. There can be two main reasons (or a combination of both) for focusing on particular themes and sub-themes:

a) they are seen as strength of the sector that is not fully proven. Data from the certification process could help to support claims that the sector might want to make;

b) they are seen as weaknesses of the current organic system and better monitoring could help farmers and other operators to improve their systems.

The project investigated the importance of sustainability themes and sub-themes to the organic sector in three ways. An internet search was expected to help in identifying areas where there is currently much debate about the performance of organic farming; a prioritisation workshop at an international organic conference was aimed to identify priority areas for the organic sector (from within the organic sector) and the survey (again aimed at those within the organic sector) aimed to identify areas of strength and weakness and areas in need of further development (see Section 2.3 for further details of the approach).

**Table 6: Results of the identification of sustainability themes important to the organic sector**

| | Unproven strength | Need for improving practises |
|---|---|---|
| | ***Social Well-Being*** | |
| Quality of life | ✓ | |
| Public health | ✓ | |
| Rights of suppliers | | ✓ |
| | ***Environmental Integrity*** | |
| Water quality | ✓ | ✓ |
| Biodiversity | ✓ | ✓ |
| Ecosystem diversity | ✓ | |
| Soil quality | ✓ | |
| Greenhouse gases | ✓ | ✓ |
| Energy use | ✓ | ✓ |
| Water use | ✓ | ✓ |
| Genetic diversity | | ✓ |
| Land degradation | | ✓ |
| | ***Economic resilience*** | |
| Food safety | ✓ | |
| Food quality | ✓ | |
| Profitability | ✓ | |
| Stability of production | | ✓ |
| | ***Good governance*** | |
| Transparency | ✓ | |
| Full-cost accounting | | ✓ |

The results from these three different approaches suggest that that there is **no simple of way of identifying organic sector priorities for assessment** and the two approaches that involved stakeholder participation (workshop and on-line survey) have clear limitations because of the small sample sizes. In total, 18 sub-themes come up in at least two of the different approaches that the project used to identify priority areas (see Table 6) which have been grouped by SAFA dimensions and by which themes appear to be not well proven strength of the organic sector and which areas require further development or both (see also Section 2.3 for detailed results).

**Social Well-Being** *public health* and *quality of life* are seen as strengths, with the results of the internet search suggesting that this strength might not be well proven by evidence at present. The third important sub-theme in this area –*rights of suppliers*- comes up as important for further development of the sector which is particularly relevant for supply chain operators. This is clearly related to the Fairness principles of IFOAM which is as yet not fully reflected in organic standards (IFOAM, 2013).

The dimension of **Environmental Integrity** is closely related to the IFOAM principal of Ecology. *Water quality, biodiversity, ecosystem diversity, soil quality, greenhouse gases* and *energy use* also fall into the category of strength that are not fully proven, several of them are also identified as in need of further development which is also required for *genetic diversity* and *land degradation.* The importance of theme of animal welfare in the international workshop might have been affected by a specific workshop in parallel to this one that happened at the same time.

In the dimension of **Economic Resilience** *food safety, food quality* and *profitability* fall into the category of unproven strengths, whereas there is a need for further development of systems in relation to *stability of production*.

Of the two sub-themes in the **Good Governance** dimension *transparency* falls into the category of unproven strength, whereas the approach of *full-cost accounting* needs further development.
In summary, there are twelve themes that fall into the category of potential strength of the sector that are not fully proven which are:

- *quality of life, public health (social well-being)*
- *soil quality, water quality, biodiversity, ecosystem diversity, greenhouse gas emissions and energy use (environmental integrity)*
- *food safety, food quality, profitability (economic resilience)*
- *transparency, full-cost accounting (good governance).*

In total ten areas were identified for which the stakeholders surveyed in the project felt that practises of organic farming should be improved or further improved:

- *Rights of suppliers (social)*
- *Greenhouse gases, Energy use, Water use, water quality, Land degradation, genetic diversity (Environment),*
- *Stability of production (economics*
- *Transparency, Full-cost accounting (governance)*

Focusing in on these areas for further development could be a useful step-forward in ensuing the continuing growth of the sector and the effective communication of its benefits. It was not possible to develop a comprehensive set of indicators that should be used monitor the organic sector through this project alone. As highlighted by Buckwell *et al*. (2014) it is essential that producers actively engage in this process to stimulate and guide action. Networks for learning and innovation can provide a useful framework for this development, as this approach recognises the important role of farmers as active participants in the development of meaningful indicators and knowledge sharing

(Lampkin *et al*., 2015). Scientists also make an important contribution to this process, providing technical validity and metrics for measuring complex areas and interactions, and, where appropriate developing bespoke tools to assess performance and highlight areas for improvement (Caron *et al.,* 2014). Advisors also have a crucial role to play in bridging the gap between scientists and producers and existing networks and training schemes for advisors should be utilised to ensure that advice delivery channels are kept up to date with latest methodological advances and scientific debate. The project has provided a shortlist of sub-themes that are worthy of further investigation, but further debate in the organic sector is needed to advance the selection.

With regard to synergies and trade-offs between different sustainability dimensions and themes, the assessment in WP2 revealed a range of interactions through a comparison of the indicator set within the SMART tool (constructed to be in line with the 58 sub-themes of the SAFA guidelines). The relationships between indicators and sub-themes determined whether the sub-themes are influenced by similar farm management strategies or conflicting ones. When looking at the individual dimensions, the most similar and synergistic management strategies could be identified for the themes in the governance and the social dimension. The **least degree of uniformity** in management strategies (i.e. the least synergistic management strategies) was identified for the **environmental dimension** and the **economic dimension**. Between the dimensions, **synergies were greatest between the social and the environmental dimension** and the **economic and governance dimension**. The similarities between the social and economic dimension are greater than between the environmental and governance dimension. Overall it was further found that **optimizing the governance dimension is likely to have positive synergies with most of the environmental, social and economic sub-themes**. This is in line with conclusions from the Sustainability Training for Organic Advisors (STOAS) project which state that motivating farmers and enhancing their skills in production techniques and entrepreneurship is an important action to for development of organic farms towards greater sustainability alongside standard setting and certification (STOAS, 2015[3]). **Further research on synergies and trade-offs using samples of farms is urgently required.**

At sub-theme level, in the environmental dimension, **the least synergies were found between the animal welfare sub-theme** (*animal health* and *freedom from stress)* on the one hand **and** rest of the **environmental sub-themes** on the other hand. Furthermore, synergies between *material* and *energy use* on the one hand and *biodiversity, water quality, soil quality* and *land degradation* on the other hand were low. Greatest synergies were found between a) *animal health* and *freedom from stress*, b) between *air quality* and *energy use* and c) between *ecosystem* and *species diversity*. In the economic dimension, the sub-themes a) *product information, value creation* and *local procurement* showed the largest synergies as well as b) *stability of markets* and *stability of supply* and c) *internal, community* and *long-term investments,* while *risk management* showed the lowest degree of synergies to other economic sub-themes. In the social dimension, *public health, workspace safety* and *quality of life* had the lowest degree of synergies to the other social sub-themes. In the governance dimension only *legitimacy* showed a slightly lower degree of synergies to other sub-themes in the governance dimension. Interestingly the trade-offs within the environmental dimensions were even larger than the trade-offs to other dimensions. In particular trade-offs

[3] http://www.organicresearchcentre.com/?go=IOTA&page=STOAS

between *greenhouse gas emissions* and *animal welfare* became apparent through this assessment. Also within the economic dimension substantial trade-offs exist. No trade-offs were identified between sub-themes within the social dimension and within the governance dimension.

## 4.2 Conclusions and Recommendations

Given its underlying ethos, the organic/ecological agriculture sector should aim to be at forefront of sustainability and the development of assessment approaches and recent discussions within the movement have identified continuous improvement towards best practice in sustainability to be one of the important features of the new direction. Producers are already encouraged to identify priorities in their specific context and diverse strategies are contained within recent guidelines (e.g. SOAAN, 2013, Gould and Stopes, 2015). Moreover, positive effects in such areas as 'environment' are seen as one of the most important reasons for the financial support given to the sector, and as one of the reasons for consumers' willingness to pay a premium for organic food. With these elements in mind some key conclusions and recommendations have been drawn from the assessments described in this report:

1. Results from the project have illustrated **that choosing the most promising indicators for the organic sector needs to be driven by the importance of the theme as well as using a suitable method.** Choosing tools solely on the basis of desirable goals may lead to selections that cannot be externally verified. On the other hand, assessing the quality of indicators alone appears too much driven by method and the choice of tools will also need to be influenced by data availability and/or cost of data collection.
2. The results from this study have illustrated that **the inclusion of metrics within the areas of social sustainability and good governance should be encouraged within existing tools.** This development should build on recent frameworks (e.g. SAFA, guidelines on social LCA, DFID Sustainable Livelihoods Framework) and take a multi-actor approach through existing networks (e.g. within the European Innovation Partnership Programme). Indicator development should also consider stakeholder views and perspectives and decide on threshold values that indicate poor, acceptable and good performance.
3. The assessment of synergies and trade-offs has illustrated that **farms optimizing the governance dimension are likely to have positive synergies with most of the environmental, social and economic objectives. Further work on synergies and trade-offs using samples of farms is urgently required.** This also highlights the importance of process-management at farm level. In addition, trade-offs between the economic dimension on the one hand and the environmental and social dimensions on the other hand, may need to be accepted at farm level. There is scope for these to be addressed by policy makers, to help the farmers set the right priorities. The environmental dimension also appears to be the most difficult to optimise as substantial trade-offs exist within itself. Priorities also need to be set depending on the specific context of the farm.
4. **Areas of sustainability that are perceived by those within the sector as being potential strengths were identified. These could be harnessed in terms of communicating the benefits of organic production.** These key strengths include biodiversity, ecosystem diversity, soil quality and greenhouse gas emissions. Although such key strengths may seem obvious to those working within the sector and for several there is some good scientific

evidence available, it is likely that the benefits are not widely-known or publicised and that further development of the evidence base is required.

5. **The study has also revealed some key areas of sustainability that are perceived to require further development by those within the organic sector.** These include the rights of suppliers, genetic diversity and full-cost accounting and issues concerning stability of production as well as several areas also identified as strength where further improvement is desired. Efforts should concentrate on further development of suitable metrics for assessing and improving organic production systems in these areas should take into account the views and expertise of multiple stakeholders (e.g. producers, certification bodies, NGOs).

It is hoped that the recommendations and assessments within this report can provide a useful basis for further development and implementation of sustainability assessment guidelines and organic standards moving forward.

# 5 Outcomes and dissemination (Workpackage 3)

Work package 3 covers the promotion of the project and its results. The full description of the work package is included in italics below.

*WP3 will bring all results of the previous WPs together and report the outcome of the project in a range of ways. It is envisaged that the project will include presentation of the results at one international workshop in cooperation with IFOAM and FAO (such as the Round Table of Organic Agriculture and Climate Change and SOAAN) activity to explore how the indicator set developed in this project can be used as a role model for sustainability monitoring in organic/ecological agriculture.*

*The project outcomes will also be publicized and results disseminated through a range of other activities which will include at least two peer-reviewed journal articles; two conference proceedings; several magazine articles (e.g. in the Organic Research Centre Bulletin, which addresses the UK organic farming community) and a written report submitted to IFOAM and through information posted on the websites of the project partners' organizations. Finally the project will develop a FAQ-section giving detailed recommendations on how the indicator set should be used or applied in various contexts.*

Over the course of the project the following methods were used as a means of promoting the project, revealing its results and involving stakeholders:

**International workshops**

Sustainability workshop, ISOFAR/IFOAM conference meeting in Turkey, 15 October 2014 with two presentations

- Schader, C (2014) Brief introduction to the methodological choices in relation to sustainability assessment.
- Padel, S (2014) A shortlist of sustainability themes highly relevant for monitoring organic agriculture.

Schader, C (2015) SMART- Paradigm shift in sustainability assessment, Biofach, Nuremberg, 13 February 2015

Smith, L and Padel (2015) Presentation of project results at the Organic 3.0 event in South Korea, 9 - 11 October 2015

**Presentations/conference proceedings**

Schader, C., L. Baumgart, J. Landert, A. Muller, S. Padel, C. Gerrard and M. Stolze (2015). 'Assessing the sustainability performance at farm-level: Synergies and trade-offs between environmental, social and economic sustainability themes'. World Sustainability Forum. 7-9 September 2015, Basel, Switzerland, Multidisciplinary Digital Publishing Institute (MDPI).

**Research papers**

Schader, C., Grenz, J., Meier, M. S., & Stolze, M. (2014). Scope and precision of sustainability assessment approaches to food systems. *Ecology and Society*, 19(3): 42.

Marchand, F., Debruyne, L., Triste, L., Gerrard, C., Padel, S. and Lauwers, L. (2014) Key characteristics for tool choice in indicator-based sustainability assessment at farm level. *Ecology and Society,* 19 (3)

Schader C, Baumgart L, Landert J, Muller A, Sebunya B, Blockeel J, Weisshaidinger R, Petrasek R, Mészáros D, Padel S, Gerrard CL, Smith L, Lindenthal T, Niggli U, Stolze M (2016) Using the Sustainability Monitoring and Assessment Routine (SMART) for the Systematic Analysis of Trade-Offs and Synergies between Sustainability Dimensions and Themes at Farm Level. *Sustainability,* 8 274

**Other output/articles**

Foresi, L (2013) Further Development of Methodologies for Sustainablity Assessment in Ecologial/Organic Agriculture. Unpublished Report on Internship at ORC. Organic Research Centre, Newbury.

Smith, L.G., Gerrard, C., Schader, C., Padel, S. (2015). Developing Sustainability Assessment Methods for Organic Agriculture. The Organic Research Centre Bulletin 119 (Autumn/Winter), p17.

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http://www.organicresearchcentre.com/?go=Research%20and%20development&page=Resource%20use%20and%20sustainability&i=projects.php&p_id=40

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# Appendix 1: The tools and guidelines reviewed

## 6.1 SAFA guidelines

The SAFA (Sustainability Assessment for Food and Agriculture systems) Guidelines, developed by FAO, provide an international reference for sustainability management, monitoring and reporting in food and agriculture at all levels of the supply chain. In December 2013, the final SAFA Guidelines were published. Due to time constraints in our project plan, we had to base our assessment in Section 3 on the preliminary version, published in June 2012.

SAFA defines sustainable food and agriculture systems based on an extensive global stakeholder survey and face-to-face interviews with selected experts. The SAFA Guidelines include environmental integrity, economic resilience, social well-being and good governance as dimensions of sustainability. The guidelines outline a procedure for an integrated and holistic analysis of all dimensions of sustainability, including the selection of appropriate indicators and rating of sustainability performance (best, good, moderate, insufficient). They also describe sustainability themes, sub-themes, goals and indicators (FAO, 2015).

A SAFA is an assessment of the sustainability performance of one or several entities forming part of a supply chain rooted in agriculture, forestry, fisheries or aquaculture; it can address all entities from the primary production site to that of final sales to the consumer.

Running a SAFA results in a “sustainability polygon” that represents the performance of the entity on each of 20 core issues (or themes) that are identified as being crucial for the environmental, social, economic and governance dimensions of sustainability:

1) environmental – atmosphere, freshwater, biodiversity, land, materials and energy, animal welfare;
2) social – decent livelihood, labour rights, equity, human health and safety, cultural diversity;
3) economic – investment, vulnerability, product safety and quality, local economy;
4) governance – governance structure, accountability, participation, rule of law, holistic management.

The sustainability polygon, which provides a visual interpretation of the results, utilizes a “traffic light” representation that highlights where an activity’s performance is insufficient (red), moderate, (orange), good (light green) or at best (dark green). Through this representation, an entity can quickly visualise its performance and identify areas for development.

The FAO states that even though Good Governance is considered to be an underlying concept rather than a pillar of sustainability, the core issues identified therein are key components in the credibility of sustainability interventions (FAO, 2015).

The SAFA Guidelines are publicly available and there is no charge for their use; the correct application of the Guidelines is the responsibility of the implementing body.

## 6.2 PG Tool

The PG Tool was originally developed for use in assessing the sustainability of organic farms in England and later developed to assess conventional (non-organic) farms. It is considered an example of a rapid assessment method and relies on readily available data such as accounts data, cropping records, animal health plans and farmer's knowledge (Gerrard *et al*., 2011; Marchand *et al*., 2012). The data requirements, qualitative and quantitative, necessary for each indicator were selected to give sufficient in-depth information on the farm's performance on that sustainability area while allowing the assessment to be carried out in 2-4 hours without taking too much of the farmer's time.

It incorporates a variety of areas of sustainability, which are defined and summarized through 11 "spurs", accounting for a range of benefits: social, environmental and economic; by means of these spurs, the tool assesses each individual farm:

1) environmental – soil management, biodiversity, landscape and heritage, water management, manure management and nutrients, energy and carbon, agricultural systems diversity;
2) social – social capital, food security, animal health and welfare;
3) economic – farm business resilience.

Indicators are scored between 1 and 5.

For each spur a range of activities were selected based on a discussion during a stakeholder workshop and a subsequent literature review (bottom-up process); the scores for each spur are obtained by averaging the scores for all its activities.

The results are then shown on a radar diagram, allowing farmers to directly see areas of good performance and potential improvement; furthermore, a bar chart showing the activities on each spur gives more detailed information. These are available at the end of the assessment and so give the farmer immediate feedback and the possibility to discuss the results with the farm advisor who has carried out the assessment.

The version which was assessed within this study was the organic version of the PG tool.

## 6.3 MOTIFS

MOTIFS (Monitoring Tool for Integrated Farm Sustainability) is an indicator-based tool designed specifically to advise Flemish dairy farmers on several aspects of farm sustainability, and hence to guide them towards more sustainable agricultural production (Marchand *et al*., 2010; Meul *et al*., 2008; Van Passel and Meul 2012).

The process of developing MOTIFS was based on a trans-disciplinary dialogue between many stakeholders and the result integrates major principles for the ecological, economic and social sustainability dimensions of agricultural systems.

These principles have been then translated into 10 concrete themes (in a top-down process) to make sustainability more tangible at a practical level, to be able to take directed actions and to design a set of relevant indicators (von Wiren-Lehr, 2001):

1) ecological – use of inputs, quality of natural resources, biodiversity;
2) economic – profitability, productivity and efficiency, risk;
3) social – internal social sustainability, external social sustainability, disposable income;
4) entrepreneurship, as an additional monitoring theme.

To calculate indicator values, data readily available on farms or entailing minimum additional cost or effort to collect have been used; some indicators require qualitative data while others are based on quantitative data (Meul *et al*., 2008).

For each indicator, minimum and maximum benchmarks were defined – through the application of different methods (e.g. scientific knowledge and legislative standards, reference group of comparable farms, production possibility curve, best available techniques, results of a questionnaire, expert judgment), in order to rescale indicator values into scores between 0 (worst-case situation) and 100 (maximum sustainability); this rescaling allows for a comprehensive overview and mutual comparison of indicators for different aspects of sustainability (Marchand *et al*., 2010; Meul *et al*., 2008; Meul *et al*., 2009; Van Passel and Meul 2012).

Indicators were weighted assuming that all selected sustainability themes are equally important, taking into account the equality of the three pillars; within a specific theme, all the indicators were equally important and consequently assigned an equal weight – except in two cases, 'productivity and efficiency' and 'soil quality'[4] (Meul *et al*., 2008).

A trans-disciplinary approach of expert and stakeholder participation was used to carry out the validation of the indicators, presenting each indicator to a feedback group of experts and stakeholders to discuss the indicators' relevance and underlining methodological choices such as indicator design, data use, benchmarks and indicator weights (Meul *et al*., 2008).

Focusing on a user-friendly and communicative design of the tool – allowing for an immediate visual interpretation of a farm's sustainability performance, indicators were then aggregated in a graphical way (e.g. radar graphs), where all relevant themes are presented individually, through a multi-level approach: at level 3 the individual indicator scores for each theme are visually aggregated in a graph; at level 2 three graphs give an overview of the sustainability themes within each dimension and each theme's score is calculated as a weighted average of its individual indicator scores; at level 1 a graph gives an overview of the farm's overall sustainability, aggregating all selected themes in one graph (Marchand *et al*., 2010; Meul *et al*., 2008; Meul *et al*., 2009).

The practical application of the tool functions as an end-use validation of MOTIFS, since feedback is received from the farmers on the practical use, data collection, invested time and costs, allowing an optimization of the indicators and the tool as a whole (Marchand *et al*., 2010; Meul *et al*., 2008) and stimulating communication and exchange of knowledge between farmers (DeMey 2008; Marchand *et al*., 2010).

[4] According to Meul *et al*. (2008), some indicators were given a specific weight if considered more or less important than others; this was the case with the indicators of "productivity and efficiency" and "soil quality". In the latter case, since the organic matter content greatly influences the chemical, physical and biological quality of a soil, it is a key indicator and was therefore assigned half of the total weight of the theme.

## 6.4 RISE

RISE (Response-Inducing Sustainability Evaluation) is a computer-based tool for assessing the sustainability of farm operations across the three sustainability dimensions (Grenz *et al*., 2012). It was developed to provide a holistic assessment of the sustainability of an individual farm and practical and easy-to-understand indications of the changes necessary to improve the sustainability of the farming operations (Hani *et al*., 2003).

RISE was developed at the School of Agricultural, Forest and Food Sciences (HAFL) in Switzerland in 2000, in cooperation with and supported by public and private entities (e.g. Gebert Rüf Foundation, Nestlé, SNSF).

Based on the experience in practical applications - over 1400 farms in more than 40 countries worldwide were analysed by May 2015 (HAFL, 2015) - RISE is adapted and improved on a continuous basis. Due to this continuous development and adaptation several versions of RISE exist and the published scientific literature tends to refer to older versions.

In this system-oriented tool, data is mostly collected at farm level through a 3-4 hour interview using a comprehensive questionnaire (other sources of data include regional and reference data), and the scores for approximately 50 parameters are calculated and transformed onto a scale from 0 to 100, through comparison between farm and reference data and by using valuation functions; the values are then condensed into 10 indicator scores and visualized as a radar chart:

1) soil use
2) animal husbandry
3) nutrient flows
4) water use
5) energy and climate
6) biodiversity and plant production
7) working conditions
8) quality of life
9) economic viability
10) farm management.

The analysis is spatially defined by the farm's area and temporally by a one-year period (Hani *et al*., 2003).

The results are thoroughly discussed with farmers and further explained with the support of a trained agronomist; based on the report, farm potentials and deficits are discussed, alongside potential measures for improvement which could be taken and discussion of how to facilitate the next steps (Grenz *et al*., 2012). Furthermore, the results allow farmers to situate themselves within a benchmark and provide the basis for identifying successful farm management practices (Binder *et al*., 2010).

## 6.5 IRENA

IRENA (Indicator Reporting on the Integration of Environmental Concerns into Agricultural Policy) is an indicator framework designed by the European Union in 2005, in order to be used at national or EU level for guiding policy or for diagnosis of agricultural systems (Halberg *et al*., 2005).

As its name suggests, it focuses on only one aspect of sustainability, the environmental dimension.

It follows the principles of the DPSIR conceptual framework - Driving forces, Pressures, State, Impact, Response, developed by OECD (1997) - which is used as a structure for the selection of environmental indicators. The indicators are selected based on whether they describe an agro-economic Driving force (input and land use, management trends), the environmental Pressure (pollution, resource depletion, benefits), the State of the environment, the Impact on the health of people, animals and ecosystems or a Response in the form of policies and targets (EEA 2005).

The model is structured within 4 major environmental themes:

1) water;
2) land use and soil;
3) climate change and air quality;
4) biodiversity and landscape.

For the IRENA project, 42 (sub-) indicators were produced in order to identify the essential agri-environmental issues (D-P-S-I) and to analyse the targeting of policy responses (R) (EEA 2005); the concept builds on the idea that indicator selection should be guided by the cause-effect relationships between the Drivers and their related Pressure, and the changes in the State and the resulting Impact.

The IRENA indicators are to be used at a high hierarchical level (regions and countries), not as a blueprint for selection of indicators for farm level management tools; furthermore, they are to be used on an aggregated level, using statistical data.

## 6.6 SOAAN guidelines

SOAAN (Sustainable Organic Agriculture Action Network) is a world-wide group project initiated by IFOAM (International Federation of Organic Agriculture Movements), to develop a reference and programme that positions organic agriculture and its related supply chain as a holistic, sustainable approach.

The scope of SOAAN's work encompasses all aspects of organic agricultural production and product supply chains, centering around the products themselves but also taking into consideration the infrastructure on which their production, distribution and consumption depends; in addition to these ecological aspects, the human aspect of these interactions is considered, all together reflecting and respecting the IFOAM's Principles of Organic Agriculture (health, ecology, fairness and care).

One of the initial aims of SOAAN is the creation and testing of a reference guide that describes the best practices of sustainable organic agriculture and its value chains; this document, along with others, can be used for many purposes including: education, training and research; planning, assessment and reporting; guide for policy, strategy and research agenda setting (IFOAM 2013).

The SOAAN guidelines are at present very aspirational and top-level and so do not suggest potential indicators.

## Appendix 2: Programme of the International workshop

ORGANIC RESEARCH CENTRE ELM FARM

FiBL Forschungsinstitut für biologischen Landbau Institut de recherche de l'agriculture biologique Research Institute of Organic Agriculture

EXCELLENCE FOR SUSTAINABILITY

**MONITORING THE SUSTAINABILITY OF ORGANIC FARMING SYSTEMS WITHIN THE SAFA FRAMEWORK**

**WORKSHOP at the World Organic Congress:**

**15 October 2014**

**11:30 - 12:15**

Sustainability is increasingly important for organic and non-organic businesses, but the metrics used to measure performance in this area are diverse, ranging from improved energy efficiency (and associated emissions and reduced costs) to improving on-farm biodiversity.

For the organic sector, the past two years have been characterised by two major international initiatives: FAO's publication of Guidelines for Sustainability Assessment of Food and Agriculture systems (SAFA) which provide a common framework for a full sustainability impact assessment (FAO, 2012) and the SOAAN initiative of IFOAM, which provides a contribution to the global discussion on sustainable agriculture from the organic movement. A number of tools to measure sustainability have also been developed, but so far, there is no international consensus on what "sustainable food production" entails and how this can be monitored. Many questions arise, such as "On *what aspect of sustainability should we focus*? "*How can we measure it in robust way?"* The aim of the workshop is to clarify these choices.

In a project supported by the Ekhaga Foundation, two leading research institutes in the organic sector have had intensive discussions about how to measure the sustainability of organic farms, building on experience in developing monitoring tools (the PG Tool of the Organic Research Centre and the SMART tool of FIBL). In this forum we will provide two short presentations, followed by a forum for discussions.

- Brief introduction to the methodological choices in relation to sustainability assessment (presented by Christian Schader from FIBL).
- A shortlist of sustainability themes highly relevant for monitoring organic agriculture (presented by Susanne Padel, ORC).

The outcome of the discussion will help to validate the choices and provide guidance for the organic sector on how to measure sustainability. The workshop is open to all.

**Contact person:** Susanne Padel, The Organic Research Centre, Hamstead Marshall, Newbury, RG20 0HA, UK;

E-mail: susanne.p@organicresearchcentre.com

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# Appendix 3: Sustainability Monitoring and Assessment Routine (SMART)

## 6.7 SMART method

SMART mainly consists of a specifically created database including a sophisticated rating methodology as well as a comprehensive pool of indicators. With these, the sustainability performance of farms and companies can be assessed in a credible, transparent and comparable way.

SMART allows the sustainability assessment of primary producers (agricultural and horticultural farms) as well as food processing companies up to complex food corporations. Despite its scientific background and its approach of very detailed analysis, SMART is very efficient and pragmatic in its application.

At the moment, customers are offered two assessment options:

1. SMART – analysis of companies
   A company analysis with SMART is conducted by experts from SFS GmbH using a clearly defined approach. Depending on the sphere of influence, suppliers and primary producers will also be included in the analysis and separately assessed. If a separate analysis of all suppliers and primary producers is not feasible, for example in the case of companies that have a very large product portfolio or supplier structure, assessments can be limited to representative samples or separate sectors of the operation or lines of production.

2. SMART – analysis of agricultural producers
   In the case of an analysis of agricultural producers, all supplying farms or a representative sample of a certain group, for example the agricultural suppliers of a company or the licensees of an association, may be assessed. The assessment, including a tour of the operation and an interview with the farm manager, will usually not take longer than 2-3 hours per farm.

## 6.8 Science-based set of indicators and methodology

The indicators, as well as the methodology, have been developed over several years by researchers at FiBL and are regularly updated based on the latest scientific knowledge. Further reference documents have been considered during the development of the tool, such as the sustainability reporting guidelines of the Global Reporting Initiative GRI-G4, the UN Global Compact, the ISO 26000 “Guidance for social responsibility”, the SA8000 standard for social responsibility, the ILO work and social standards as well as the indicator matrix of the Economy for the Common Good.

The assessment method involves, among other things, a weighting of the indicators according to the level of impact on the various SAFA sub-themes. Furthermore, the sphere of influence and responsibility of the respective farm or company as well as the time, place and responsible party of sustainability impacts within the supply chain are considered.

## 6.9 Sphere of influence – Assessment of the entire supply chain

For an assessment, not only the procedures on the farm or company premises are considered, but also the entire sphere of influence and responsibility of the farm or company within the supply chain. The sphere of influence usually depends on the position of the farm or company within the supply chain, its size and market power and will normally be identified before or at the beginning of a SMART assessment.

It may include upstream processes, through to primary producers, as well as downstream processes through to the consumer. With regards to products, the complete lifecycle from the production of raw materials up to their disposal is taken into account.

A distinction is made between the direct and indirect sphere of influence. The direct sphere of influence includes all processes that take place on the farm's or company's premises as well as all processes that take place at suppliers or buyers on which a direct influence exists, e.g. in the form of close business relations or mutual dependence. The indirect sphere of influence includes all areas in which actions of the assessed entity only have an indirect impact, as for example, when buying agricultural raw material from intermediaries.

The consideration of the indirect sphere of influence is crucial, since the most important environmental and social impacts of operations often occur in preliminary stages of the supply chain.

## Appendix 4: Overview of synergies and trade offs

Results of calculation of the synergies between sub-themes according to Equation 1.

| | | Corporate Ethics | Corporate Ethics | Accountability | Accountability | Accountability | Participation | Participation | Participation | Rule of Law | Rule of Law | Rule of Law | Rule of Law | Holistic Management | Holistic Management | Atmosphere | Atmosphere | Water | Water | Land | Land | Biodiversity | Biodiversity | Biodiversity | Materials and Energy | Materials and Energy | Materials and Energy | Animal Welfare | Animal Welfare | Investment | Investment | Investment | Investment | Vulnerability | Vulnerability | Vulnerability | Vulnerability | Vulnerability | Product Quality & Information | Product Quality & Information | Product Quality & Information | Local Economy | Local Economy | Decent Livelihood | Decent Livelihood | Decent Livelihood | Fair Trading Practices | Fair Trading Practices | Labour Rights | Labour Rights | Labour Rights | Labour Rights | Equity | Equity | Equity | Human Safety & Health | Human Safety & Health | Cultural Diversity | Cultural Diversity |
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| | | Mission Statement | Due Diligence | Holistic Audits | Responsibility | Transparency | Stakeholder Dialogue | Grievance Procedures | Conflict Resolution | Legitimacy | Remedy, Restoration & Prevention | Civic Responsibility | Resource Appropriation | Sustainability Management Plan | Full-Cost Accounting | Greenhouse Gases | Air Quality | Water Withdrawal | Water Quality | Soil Quality | Land Degradation | Ecosystem Diversity | Species Diversity | Genetic Diversity | Material Use | Energy Use | Waste Reduction & Disposal | Animal Health | Freedom from Stress | Internal Investment | Community Investment | Long-Ranging Investment | Profitability | Stability of Production | Stability of Supply | Stability of Market | Liquidity | Risk Management | Food Safety | Food Quality | Product Information | Value Creation | Local Procurement | Quality of Life | Capacity Development | Fair Access to Means of | Responsible Buyers | Rights of Suppliers | Employment Relations | Forced Labour | Child Labour | Freedom of Association and Right to | Non Discrimination | Gender Equality | Support to Vulnerable People | Workplace Safety and Health | Public Health | Indigenous Knowledge | Food Sovereignty |
| Corporate Ethics | Mission Statement | 100% | 81% | 90% | 97% | 92% | 85% | 90% | 84% | 78% | 88% | 90% | 78% | 95% | 96% | 53% | 68% | 80% | 61% | 55% | 65% | 63% | 55% | 85% | 64% | 62% | 71% | 47% | 46% | 76% | 83% | 88% | 70% | 56% | 80% | 81% | 88% | 46% | 60% | 76% | 83% | 86% | 91% | 62% | 86% | 83% | 83% | 87% | 79% | 85% | 86% | 86% | 86% | 86% | 87% | 67% | 43% | 91% | 81% |
| Corporate Ethics | Due Diligence | 81% | 100% | 78% | 81% | 76% | 82% | 82% | 81% | 76% | 82% | 82% | 78% | 78% | 80% | 44% | 58% | 70% | 53% | 47% | 57% | 53% | 49% | 78% | 56% | 54% | 64% | 37% | 36% | 66% | 74% | 79% | 60% | 46% | 71% | 71% | 78% | 47% | 66% | 70% | 80% | 76% | 81% | 62% | 77% | 77% | 76% | 79% | 71% | 78% | 78% | 79% | 79% | 81% | 82% | 64% | 47% | 86% | 74% |
| Accountability | Holistic Audits | 90% | 78% | 100% | 90% | 91% | 82% | 86% | 80% | 77% | 83% | 86% | 76% | 89% | 94% | 49% | 63% | 76% | 57% | 50% | 61% | 59% | 51% | 80% | 61% | 58% | 68% | 43% | 41% | 72% | 79% | 84% | 67% | 53% | 76% | 76% | 83% | 47% | 60% | 76% | 86% | 81% | 87% | 60% | 82% | 78% | 79% | 84% | 75% | 83% | 84% | 84% | 81% | 81% | 84% | 66% | 40% | 86% | 76% |
| Accountability | Responsibility | 97% | 81% | 90% | 100% | 92% | 86% | 88% | 85% | 78% | 89% | 93% | 79% | 95% | 95% | 51% | 65% | 78% | 59% | 52% | 63% | 61% | 53% | 83% | 63% | 61% | 69% | 45% | 43% | 74% | 83% | 86% | 66% | 54% | 78% | 78% | 85% | 44% | 58% | 74% | 83% | 84% | 89% | 62% | 84% | 80% | 81% | 86% | 77% | 84% | 85% | 85% | 83% | 83% | 85% | 65% | 41% | 89% | 78% |
| Accountability | Transparency | 92% | 76% | 91% | 92% | 100% | 80% | 81% | 78% | 72% | 80% | 82% | 75% | 88% | 91% | 44% | 58% | 71% | 52% | 46% | 56% | 54% | 46% | 76% | 55% | 53% | 63% | 38% | 37% | 67% | 74% | 79% | 61% | 48% | 71% | 72% | 79% | 46% | 57% | 69% | 82% | 77% | 82% | 54% | 77% | 74% | 74% | 78% | 71% | 77% | 77% | 78% | 76% | 76% | 78% | 62% | 36% | 82% | 72% |
| Participation | Stakeholder Dialogue | 85% | 82% | 82% | 86% | 80% | 100% | 93% | 98% | 78% | 91% | 89% | 86% | 81% | 86% | 51% | 65% | 78% | 59% | 52% | 62% | 60% | 53% | 82% | 62% | 60% | 69% | 45% | 43% | 73% | 80% | 86% | 68% | 55% | 78% | 80% | 86% | 43% | 57% | 73% | 81% | 83% | 88% | 68% | 84% | 86% | 83% | 86% | 78% | 85% | 83% | 87% | 82% | 83% | 85% | 65% | 42% | 89% | 78% |
| Participation | Grievance Procedures | 90% | 82% | 86% | 88% | 81% | 93% | 100% | 91% | 82% | 89% | 90% | 82% | 85% | 90% | 54% | 68% | 81% | 62% | 56% | 66% | 64% | 56% | 86% | 65% | 63% | 72% | 48% | 47% | 77% | 85% | 89% | 70% | 57% | 81% | 82% | 89% | 43% | 61% | 77% | 86% | 87% | 92% | 71% | 87% | 85% | 86% | 90% | 84% | 91% | 88% | 94% | 87% | 89% | 90% | 68% | 44% | 92% | 82% |
| Participation | Conflict Resolution | 84% | 81% | 80% | 85% | 78% | 98% | 91% | 100% | 77% | 92% | 87% | 87% | 80% | 85% | 50% | 64% | 77% | 58% | 51% | 61% | 59% | 52% | 81% | 60% | 58% | 68% | 43% | 42% | 72% | 79% | 85% | 66% | 54% | 77% | 79% | 85% | 42% | 56% | 72% | 80% | 82% | 87% | 68% | 83% | 86% | 86% | 88% | 76% | 83% | 82% | 85% | 81% | 82% | 84% | 64% | 41% | 88% | 77% |
| Rule of Law | Legitimacy | 78% | 76% | 77% | 78% | 72% | 78% | 82% | 77% | 100% | 82% | 82% | 77% | 77% | 80% | 44% | 59% | 71% | 55% | 49% | 56% | 54% | 48% | 76% | 56% | 55% | 68% | 38% | 37% | 67% | 74% | 79% | 60% | 47% | 71% | 72% | 78% | 40% | 65% | 69% | 78% | 79% | 82% | 61% | 77% | 79% | 76% | 80% | 77% | 82% | 82% | 81% | 77% | 77% | 78% | 60% | 50% | 83% | 73% |
| Rule of Law | Remedy, Restoration & Prevention | 88% | 82% | 83% | 89% | 80% | 91% | 89% | 92% | 82% | 100% | 89% | 84% | 85% | 88% | 50% | 64% | 77% | 58% | 52% | 62% | 60% | 52% | 82% | 61% | 59% | 70% | 44% | 43% | 73% | 80% | 85% | 66% | 53% | 77% | 77% | 85% | 43% | 60% | 73% | 80% | 82% | 88% | 66% | 83% | 87% | 84% | 87% | 75% | 82% | 83% | 83% | 82% | 82% | 83% | 64% | 42% | 89% | 79% |
| Rule of Law | Civic Responsibility | 90% | 82% | 86% | 93% | 82% | 89% | 90% | 87% | 82% | 89% | 100% | 82% | 89% | 90% | 54% | 68% | 81% | 62% | 56% | 66% | 64% | 56% | 86% | 66% | 64% | 73% | 48% | 47% | 77% | 88% | 89% | 69% | 57% | 81% | 82% | 89% | 44% | 61% | 77% | 88% | 88% | 92% | 68% | 87% | 84% | 85% | 90% | 81% | 88% | 89% | 89% | 87% | 87% | 89% | 69% | 45% | 92% | 83% |
| Rule of Law | Resource Appropriation | 78% | 78% | 76% | 79% | 75% | 86% | 82% | 87% | 77% | 84% | 82% | 100% | 76% | 79% | 44% | 58% | 74% | 55% | 46% | 56% | 54% | 46% | 75% | 55% | 53% | 62% | 38% | 36% | 67% | 74% | 79% | 61% | 47% | 71% | 71% | 78% | 35% | 51% | 66% | 81% | 77% | 82% | 66% | 77% | 91% | 86% | 86% | 76% | 82% | 82% | 83% | 80% | 80% | 82% | 62% | 39% | 86% | 77% |
| Holistic Management | Sustainability Management Plan | 95% | 78% | 89% | 95% | 88% | 81% | 85% | 80% | 77% | 85% | 89% | 76% | 100% | 94% | 49% | 63% | 76% | 57% | 51% | 61% | 59% | 51% | 81% | 61% | 59% | 68% | 43% | 42% | 72% | 79% | 84% | 70% | 55% | 76% | 77% | 84% | 48% | 56% | 72% | 83% | 82% | 87% | 60% | 84% | 79% | 80% | 85% | 76% | 83% | 84% | 84% | 82% | 82% | 84% | 64% | 39% | 87% | 77% |
| Holistic Management | Full-Cost Accounting | 96% | 80% | 94% | 95% | 91% | 86% | 90% | 85% | 80% | 88% | 90% | 79% | 94% | 100% | 55% | 69% | 81% | 62% | 56% | 66% | 64% | 57% | 86% | 65% | 63% | 72% | 48% | 47% | 77% | 84% | 90% | 73% | 57% | 82% | 82% | 89% | 48% | 62% | 77% | 85% | 87% | 92% | 63% | 88% | 84% | 84% | 88% | 80% | 86% | 87% | 88% | 86% | 86% | 88% | 68% | 44% | 92% | 82% |
| Atmosphere | Greenhouse Gases | 53% | 44% | 49% | 51% | 44% | 51% | 54% | 50% | 44% | 50% | 54% | 44% | 49% | 55% | 100% | 81% | 46% | 39% | 39% | 52% | 51% | 42% | 53% | 44% | 68% | 42% | 15% | 14% | 56% | 49% | 57% | 41% | 31% | 53% | 46% | 53% | 9% | 28% | 43% | 51% | 51% | 62% | 28% | 52% | 48% | 48% | 53% | 44% | 51% | 52% | 52% | 51% | 51% | 52% | 33% | 10% | 57% | 47% |
| Atmosphere | Air Quality | 68% | 58% | 63% | 65% | 58% | 65% | 68% | 64% | 59% | 64% | 68% | 58% | 63% | 69% | 81% | 100% | 60% | 54% | 47% | 49% | 55% | 50% | 67% | 54% | 78% | 57% | 28% | 27% | 66% | 63% | 68% | 55% | 41% | 70% | 60% | 68% | 22% | 45% | 61% | 65% | 65% | 76% | 42% | 66% | 63% | 63% | 67% | 58% | 65% | 66% | 66% | 65% | 65% | 66% | 48% | 30% | 71% | 60% |
| Water | Water Withdrawal | 80% | 70% | 76% | 78% | 71% | 78% | 81% | 77% | 71% | 77% | 81% | 74% | 76% | 81% | 46% | 60% | 100% | 57% | 48% | 58% | 56% | 50% | 77% | 66% | 55% | 64% | 40% | 38% | 72% | 75% | 81% | 63% | 52% | 73% | 73% | 80% | 37% | 55% | 68% | 76% | 78% | 83% | 54% | 79% | 78% | 75% | 80% | 71% | 78% | 78% | 79% | 77% | 77% | 79% | 59% | 42% | 83% | 73% |
| Water | Water Quality | 61% | 53% | 57% | 59% | 52% | 59% | 62% | 58% | 55% | 58% | 62% | 55% | 57% | 62% | 39% | 54% | 57% | 100% | 55% | 56% | 50% | 53% | 61% | 51% | 47% | 61% | 22% | 19% | 52% | 56% | 62% | 47% | 35% | 61% | 54% | 61% | 19% | 52% | 62% | 57% | 59% | 65% | 35% | 60% | 59% | 56% | 61% | 52% | 59% | 60% | 60% | 58% | 58% | 60% | 44% | 57% | 64% | 55% |
| Land | Soil Quality | 55% | 47% | 50% | 52% | 46% | 52% | 56% | 51% | 49% | 52% | 56% | 46% | 51% | 56% | 39% | 47% | 48% | 55% | 100% | 72% | 64% | 70% | 56% | 44% | 43% | 51% | 14% | 13% | 46% | 50% | 58% | 41% | 35% | 55% | 48% | 55% | 14% | 46% | 55% | 50% | 53% | 58% | 29% | 54% | 50% | 50% | 54% | 46% | 52% | 53% | 54% | 52% | 52% | 54% | 40% | 36% | 58% | 48% |
| Land | Land Degradation | 65% | 57% | 61% | 63% | 56% | 62% | 66% | 61% | 56% | 62% | 66% | 56% | 61% | 66% | 52% | 49% | 58% | 56% | 72% | 100% | 67% | 63% | 65% | 47% | 43% | 49% | 25% | 23% | 57% | 60% | 68% | 52% | 45% | 58% | 58% | 65% | 28% | 40% | 53% | 61% | 63% | 69% | 39% | 64% | 60% | 60% | 65% | 56% | 63% | 64% | 64% | 62% | 63% | 64% | 46% | 23% | 68% | 58% |
| Biodiversity | Ecosystem Diversity | 63% | 53% | 59% | 61% | 54% | 60% | 64% | 59% | 54% | 60% | 64% | 54% | 59% | 64% | 51% | 55% | 56% | 50% | 64% | 67% | 100% | 87% | 66% | 46% | 45% | 53% | 23% | 24% | 57% | 64% | 65% | 47% | 39% | 63% | 56% | 63% | 21% | 42% | 59% | 59% | 61% | 66% | 37% | 62% | 58% | 58% | 63% | 54% | 61% | 62% | 62% | 60% | 60% | 62% | 42% | 29% | 66% | 56% |
| Biodiversity | Species Diversity | 55% | 49% | 51% | 53% | 46% | 53% | 56% | 52% | 48% | 52% | 56% | 46% | 51% | 57% | 42% | 50% | 50% | 53% | 70% | 63% | 87% | 100% | 64% | 42% | 43% | 47% | 15% | 16% | 49% | 55% | 57% | 41% | 31% | 57% | 48% | 55% | 17% | 44% | 57% | 51% | 53% | 59% | 29% | 54% | 50% | 50% | 55% | 46% | 53% | 54% | 54% | 53% | 53% | 54% | 38% | 35% | 60% | 53% |
| Biodiversity | Genetic Diversity | 85% | 78% | 80% | 83% | 76% | 82% | 86% | 81% | 76% | 82% | 86% | 75% | 81% | 86% | 53% | 67% | 77% | 61% | 56% | 65% | 66% | 64% | 100% | 64% | 61% | 68% | 44% | 44% | 74% | 81% | 86% | 67% | 55% | 77% | 78% | 85% | 42% | 59% | 77% | 80% | 83% | 88% | 59% | 84% | 80% | 80% | 84% | 76% | 82% | 83% | 84% | 82% | 82% | 84% | 65% | 43% | 90% | 91% |
| Materials and Energy | Material Use | 64% | 56% | 61% | 63% | 55% | 62% | 65% | 60% | 56% | 61% | 66% | 55% | 61% | 65% | 44% | 54% | 66% | 51% | 44% | 47% | 46% | 42% | 64% | 100% | 60% | 71% | 25% | 23% | 54% | 60% | 65% | 46% | 37% | 61% | 58% | 64% | 20% | 39% | 57% | 64% | 62% | 73% | 38% | 63% | 59% | 59% | 64% | 55% | 62% | 63% | 63% | 62% | 62% | 63% | 47% | 32% | 67% | 59% |
| Materials and Energy | Energy Use | 62% | 54% | 58% | 61% | 53% | 60% | 63% | 58% | 55% | 59% | 64% | 53% | 59% | 63% | 68% | 78% | 55% | 47% | 43% | 43% | 45% | 43% | 61% | 60% | 100% | 62% | 23% | 20% | 62% | 58% | 63% | 51% | 40% | 66% | 57% | 62% | 17% | 42% | 56% | 62% | 60% | 71% | 36% | 61% | 57% | 57% | 62% | 53% | 60% | 61% | 61% | 60% | 60% | 61% | 43% | 26% | 65% | 56% |
| Materials and Energy | Waste Reduction & Disposal | 71% | 64% | 68% | 69% | 63% | 69% | 72% | 68% | 68% | 70% | 73% | 62% | 68% | 72% | 42% | 57% | 64% | 61% | 51% | 49% | 53% | 47% | 68% | 71% | 62% | 100% | 33% | 29% | 63% | 67% | 72% | 55% | 42% | 69% | 68% | 71% | 30% | 60% | 70% | 70% | 69% | 75% | 46% | 70% | 66% | 66% | 71% | 62% | 69% | 70% | 70% | 69% | 69% | 70% | 53% | 51% | 74% | 65% |
| Animal Welfare | Animal Health | 47% | 37% | 43% | 45% | 38% | 45% | 48% | 43% | 38% | 44% | 48% | 38% | 43% | 48% | 15% | 28% | 40% | 22% | 14% | 25% | 23% | 15% | 44% | 25% | 23% | 33% | 100% | 79% | 36% | 43% | 48% | 38% | 31% | 40% | 40% | 47% | 11% | 24% | 48% | 43% | 45% | 51% | 21% | 46% | 42% | 42% | 47% | 38% | 45% | 46% | 46% | 45% | 45% | 46% | 27% | 7% | 50% | 40% |
| Animal Welfare | Freedom from Stress | 46% | 36% | 41% | 43% | 37% | 43% | 47% | 42% | 37% | 43% | 47% | 36% | 42% | 47% | 14% | 27% | 38% | 19% | 13% | 23% | 24% | 16% | 44% | 23% | 20% | 29% | 79% | 100% | 34% | 41% | 46% | 35% | 24% | 40% | 39% | 46% | 5% | 19% | 42% | 42% | 44% | 49% | 20% | 45% | 41% | 41% | 45% | 37% | 43% | 44% | 45% | 43% | 43% | 45% | 25% | 0% | 49% | 41% |
| Investment | Internal Investment | 76% | 66% | 72% | 74% | 67% | 73% | 77% | 72% | 67% | 73% | 77% | 67% | 72% | 77% | 56% | 66% | 72% | 52% | 46% | 57% | 57% | 49% | 74% | 54% | 62% | 63% | 36% | 34% | 100% | 76% | 85% | 68% | 52% | 74% | 69% | 76% | 35% | 50% | 64% | 72% | 74% | 80% | 50% | 79% | 74% | 71% | 76% | 67% | 74% | 75% | 75% | 73% | 74% | 75% | 56% | 30% | 79% | 69% |
| Investment | Community Investment | 83% | 74% | 79% | 83% | 74% | 80% | 85% | 79% | 74% | 80% | 88% | 74% | 79% | 84% | 49% | 63% | 75% | 56% | 50% | 60% | 64% | 55% | 81% | 60% | 58% | 67% | 43% | 41% | 76% | 100% | 87% | 61% | 51% | 76% | 76% | 83% | 38% | 55% | 71% | 79% | 90% | 86% | 61% | 89% | 80% | 78% | 83% | 76% | 81% | 82% | 82% | 80% | 80% | 82% | 62% | 40% | 87% | 76% |
| Investment | Long-Ranging Investment | 88% | 79% | 84% | 86% | 79% | 86% | 89% | 85% | 79% | 85% | 89% | 79% | 84% | 90% | 57% | 68% | 81% | 62% | 58% | 68% | 65% | 57% | 86% | 65% | 63% | 72% | 48% | 46% | 85% | 87% | 100% | 72% | 60% | 81% | 81% | 88% | 46% | 61% | 77% | 84% | 86% | 92% | 64% | 92% | 86% | 83% | 88% | 81% | 86% | 87% | 87% | 86% | 88% | 87% | 68% | 44% | 92% | 81% |
| Investment | Profitability | 70% | 60% | 67% | 66% | 61% | 68% | 70% | 66% | 60% | 66% | 69% | 61% | 70% | 73% | 41% | 55% | 63% | 47% | 41% | 52% | 47% | 41% | 67% | 46% | 51% | 55% | 38% | 35% | 68% | 61% | 72% | 100% | 60% | 67% | 65% | 76% | 34% | 43% | 58% | 65% | 66% | 73% | 41% | 68% | 65% | 65% | 69% | 61% | 67% | 68% | 68% | 67% | 67% | 68% | 49% | 24% | 72% | 63% |
| Vulnerability | Stability of Production | 56% | 46% | 53% | 54% | 48% | 55% | 57% | 54% | 47% | 53% | 57% | 47% | 55% | 57% | 31% | 41% | 52% | 35% | 35% | 45% | 39% | 31% | 55% | 37% | 40% | 42% | 31% | 24% | 52% | 51% | 60% | 60% | 100% | 55% | 54% | 65% | 53% | 29% | 46% | 52% | 54% | 60% | 34% | 58% | 54% | 52% | 56% | 49% | 54% | 55% | 55% | 54% | 55% | 55% | 35% | 11% | 59% | 50% |
| Vulnerability | Stability of Supply | 80% | 71% | 76% | 78% | 71% | 78% | 81% | 77% | 71% | 77% | 81% | 71% | 76% | 82% | 53% | 70% | 73% | 61% | 55% | 58% | 63% | 57% | 77% | 61% | 66% | 69% | 40% | 40% | 74% | 76% | 81% | 67% | 55% | 100% | 74% | 80% | 38% | 58% | 73% | 77% | 78% | 84% | 55% | 81% | 77% | 79% | 83% | 71% | 79% | 79% | 79% | 78% | 78% | 79% | 60% | 43% | 83% | 73% |
| Vulnerability | Stability of Market | 81% | 71% | 76% | 78% | 72% | 80% | 82% | 79% | 72% | 77% | 82% | 71% | 77% | 82% | 46% | 60% | 73% | 54% | 48% | 58% | 56% | 48% | 78% | 58% | 57% | 68% | 40% | 39% | 69% | 76% | 81% | 65% | 54% | 74% | 100% | 83% | 49% | 56% | 72% | 79% | 78% | 84% | 55% | 81% | 77% | 76% | 80% | 72% | 78% | 79% | 79% | 78% | 78% | 79% | 60% | 38% | 84% | 100% |
| Vulnerability | Liquidity | 88% | 78% | 83% | 85% | 79% | 86% | 89% | 85% | 78% | 85% | 89% | 78% | 84% | 89% | 53% | 68% | 80% | 61% | 55% | 65% | 63% | 55% | 85% | 64% | 62% | 71% | 47% | 46% | 76% | 83% | 88% | 76% | 65% | 80% | 83% | 100% | 52% | 60% | 76% | 83% | 86% | 91% | 62% | 86% | 83% | 83% | 87% | 79% | 85% | 86% | 86% | 85% | 85% | 86% | 67% | 43% | 91% | 81% |
| Vulnerability | Risk Management | 46% | 47% | 47% | 44% | 46% | 43% | 43% | 42% | 40% | 43% | 44% | 35% | 48% | 48% | 9% | 22% | 37% | 19% | 14% | 28% | 21% | 17% | 42% | 20% | 17% | 30% | 11% | 5% | 35% | 38% | 46% | 34% | 53% | 38% | 49% | 52% | 100% | 41% | 43% | 42% | 42% | 46% | 30% | 41% | 38% | 41% | 44% | 40% | 41% | 41% | 42% | 41% | 43% | 43% | 34% | 18% | 48% | 38% |
| Product Quality & Information | Food Safety | 60% | 66% | 60% | 58% | 57% | 57% | 61% | 56% | 65% | 60% | 61% | 51% | 56% | 62% | 28% | 45% | 55% | 52% | 46% | 40% | 42% | 44% | 59% | 39% | 42% | 60% | 24% | 19% | 50% | 55% | 61% | 43% | 29% | 58% | 56% | 60% | 41% | 100% | 75% | 61% | 58% | 64% | 34% | 59% | 55% | 55% | 60% | 51% | 58% | 59% | 59% | 57% | 58% | 59% | 48% | 74% | 66% | 55% |
| Product Quality & Information | Food Quality | 76% | 70% | 76% | 74% | 69% | 73% | 77% | 72% | 69% | 73% | 77% | 66% | 72% | 77% | 43% | 61% | 68% | 62% | 55% | 53% | 59% | 57% | 77% | 57% | 56% | 70% | 48% | 42% | 64% | 71% | 77% | 58% | 46% | 73% | 72% | 76% | 43% | 75% | 100% | 73% | 74% | 79% | 50% | 75% | 71% | 71% | 75% | 67% | 74% | 74% | 75% | 73% | 73% | 75% | 55% | 56% | 81% | 72% |
| Product Quality & Information | Product Information | 83% | 80% | 86% | 83% | 82% | 81% | 86% | 80% | 78% | 80% | 88% | 81% | 83% | 85% | 51% | 65% | 76% | 57% | 50% | 61% | 59% | 51% | 80% | 64% | 62% | 70% | 43% | 42% | 72% | 79% | 84% | 65% | 52% | 77% | 79% | 83% | 42% | 61% | 73% | 100% | 81% | 89% | 61% | 82% | 80% | 83% | 87% | 81% | 86% | 87% | 88% | 84% | 84% | 87% | 68% | 40% | 86% | 78% |
| Local Economy | Value Creation | 86% | 76% | 81% | 84% | 77% | 83% | 87% | 82% | 79% | 82% | 88% | 77% | 82% | 87% | 51% | 65% | 78% | 59% | 53% | 63% | 61% | 53% | 83% | 62% | 60% | 69% | 45% | 44% | 74% | 90% | 86% | 66% | 54% | 78% | 78% | 86% | 42% | 58% | 74% | 81% | 100% | 89% | 67% | 90% | 81% | 81% | 85% | 85% | 85% | 85% | 86% | 83% | 83% | 86% | 65% | 42% | 89% | 78% |
| Local Economy | Local Procurement | 91% | 81% | 87% | 89% | 82% | 88% | 92% | 87% | 82% | 88% | 92% | 82% | 87% | 92% | 62% | 76% | 83% | 65% | 58% | 69% | 66% | 59% | 88% | 73% | 71% | 75% | 51% | 49% | 80% | 86% | 92% | 73% | 60% | 84% | 84% | 91% | 46% | 64% | 79% | 89% | 89% | 100% | 65% | 90% | 86% | 86% | 91% | 82% | 89% | 90% | 90% | 88% | 89% | 90% | 71% | 46% | 94% | 84% |
| Decent Livelihood | Quality of Life | 62% | 62% | 60% | 62% | 54% | 68% | 71% | 68% | 61% | 66% | 68% | 66% | 60% | 63% | 28% | 42% | 54% | 35% | 29% | 39% | 37% | 29% | 59% | 38% | 36% | 46% | 21% | 20% | 50% | 61% | 64% | 41% | 34% | 55% | 55% | 62% | 30% | 34% | 50% | 61% | 67% | 65% | 100% | 61% | 65% | 68% | 71% | 73% | 72% | 71% | 72% | 74% | 74% | 71% | 60% | 18% | 67% | 59% |
| Decent Livelihood | Capacity Development | 86% | 77% | 82% | 84% | 77% | 84% | 87% | 83% | 77% | 83% | 87% | 77% | 84% | 88% | 52% | 66% | 79% | 60% | 54% | 64% | 62% | 54% | 84% | 63% | 61% | 70% | 46% | 45% | 79% | 89% | 92% | 68% | 58% | 81% | 81% | 86% | 41% | 59% | 75% | 82% | 90% | 90% | 61% | 100% | 87% | 82% | 86% | 79% | 84% | 85% | 85% | 84% | 84% | 85% | 66% | 42% | 90% | 79% |
| Decent Livelihood | Fair Access to Means of Production | 83% | 77% | 78% | 80% | 74% | 86% | 85% | 86% | 79% | 87% | 84% | 91% | 79% | 84% | 48% | 63% | 78% | 59% | 50% | 60% | 58% | 50% | 80% | 59% | 57% | 66% | 42% | 41% | 74% | 80% | 86% | 65% | 54% | 77% | 77% | 83% | 38% | 55% | 71% | 80% | 81% | 86% | 65% | 87% | 100% | 83% | 86% | 76% | 83% | 84% | 84% | 83% | 83% | 84% | 65% | 43% | 88% | 81% |
| Fair Trading Practices | Responsible Buyers | 83% | 76% | 79% | 81% | 74% | 83% | 86% | 86% | 76% | 84% | 85% | 86% | 80% | 84% | 48% | 63% | 75% | 56% | 50% | 60% | 58% | 50% | 80% | 59% | 57% | 66% | 42% | 41% | 71% | 78% | 83% | 65% | 52% | 79% | 76% | 83% | 41% | 55% | 71% | 83% | 81% | 86% | 68% | 82% | 83% | 100% | 97% | 81% | 88% | 87% | 87% | 85% | 85% | 86% | 67% | 38% | 89% | 78% |
| Fair Trading Practices | Rights of Suppliers | 87% | 79% | 84% | 86% | 78% | 86% | 90% | 88% | 80% | 87% | 90% | 86% | 85% | 88% | 53% | 67% | 80% | 61% | 54% | 65% | 63% | 55% | 84% | 64% | 62% | 71% | 47% | 45% | 76% | 83% | 88% | 69% | 56% | 83% | 80% | 87% | 44% | 60% | 75% | 87% | 85% | 91% | 71% | 86% | 86% | 97% | 100% | 84% | 93% | 91% | 91% | 89% | 89% | 91% | 71% | 42% | 90% | 83% |
| Labour Rights | Employment Relations | 79% | 71% | 75% | 77% | 71% | 78% | 84% | 76% | 77% | 75% | 81% | 76% | 76% | 80% | 44% | 58% | 71% | 52% | 46% | 56% | 54% | 46% | 76% | 55% | 53% | 62% | 38% | 37% | 67% | 76% | 81% | 61% | 49% | 71% | 72% | 79% | 40% | 51% | 67% | 81% | 85% | 82% | 73% | 79% | 76% | 81% | 84% | 100% | 91% | 91% | 92% | 81% | 82% | 86% | 66% | 34% | 82% | 74% |
| Labour Rights | Forced Labour | 85% | 78% | 83% | 84% | 77% | 85% | 91% | 83% | 82% | 82% | 88% | 82% | 83% | 86% | 51% | 65% | 78% | 59% | 52% | 63% | 61% | 53% | 82% | 62% | 60% | 69% | 45% | 43% | 74% | 81% | 86% | 67% | 54% | 79% | 78% | 85% | 41% | 58% | 74% | 86% | 85% | 89% | 72% | 84% | 83% | 88% | 93% | 91% | 100% | 91% | 96% | 87% | 87% | 90% | 69% | 40% | 88% | 81% |
| Labour Rights | Child Labour | 86% | 78% | 84% | 85% | 77% | 83% | 88% | 82% | 82% | 83% | 89% | 82% | 84% | 87% | 52% | 66% | 78% | 60% | 53% | 64% | 62% | 54% | 83% | 63% | 61% | 70% | 46% | 44% | 75% | 82% | 87% | 68% | 55% | 79% | 79% | 86% | 41% | 59% | 74% | 87% | 85% | 90% | 71% | 85% | 84% | 87% | 91% | 91% | 91% | 100% | 91% | 88% | 88% | 90% | 75% | 41% | 89% | 82% |
| Labour Rights | Freedom of Association and Right to Bargaining | 86% | 79% | 84% | 85% | 78% | 87% | 94% | 85% | 81% | 83% | 89% | 83% | 84% | 88% | 52% | 66% | 79% | 60% | 54% | 64% | 62% | 54% | 84% | 63% | 61% | 70% | 46% | 45% | 75% | 82% | 87% | 68% | 55% | 79% | 79% | 86% | 42% | 59% | 75% | 88% | 86% | 90% | 72% | 85% | 84% | 87% | 91% | 92% | 96% | 91% | 100% | 88% | 88% | 92% | 70% | 42% | 90% | 82% |
| Equity | Non Discrimination | 86% | 79% | 81% | 83% | 76% | 82% | 87% | 81% | 77% | 82% | 87% | 80% | 82% | 86% | 51% | 65% | 77% | 58% | 52% | 62% | 60% | 53% | 82% | 62% | 60% | 69% | 45% | 43% | 73% | 80% | 86% | 67% | 54% | 78% | 78% | 85% | 41% | 57% | 73% | 84% | 83% | 88% | 74% | 84% | 83% | 85% | 89% | 81% | 87% | 88% | 88% | 100% | 95% | 95% | 68% | 40% | 88% | 81% |
| Equity | Gender Equality | 86% | 81% | 81% | 83% | 76% | 83% | 89% | 82% | 77% | 82% | 87% | 80% | 82% | 86% | 51% | 65% | 77% | 58% | 52% | 63% | 60% | 53% | 82% | 62% | 60% | 69% | 45% | 43% | 74% | 80% | 88% | 67% | 55% | 78% | 78% | 85% | 43% | 58% | 73% | 84% | 83% | 89% | 74% | 84% | 83% | 85% | 89% | 82% | 87% | 88% | 88% | 95% | 100% | 95% | 68% | 40% | 88% | 81% |
| Equity | Support to Vulnerable People | 87% | 82% | 84% | 85% | 78% | 85% | 90% | 84% | 78% | 83% | 89% | 82% | 84% | 88% | 52% | 66% | 79% | 60% | 54% | 64% | 62% | 54% | 84% | 63% | 61% | 70% | 46% | 45% | 75% | 82% | 87% | 68% | 55% | 79% | 79% | 86% | 43% | 59% | 75% | 87% | 86% | 90% | 71% | 85% | 84% | 86% | 91% | 86% | 90% | 90% | 92% | 95% | 95% | 100% | 70% | 42% | 90% | 82% |
| Human Safety & Health | Workplace Safety and Health Provisions | 67% | 64% | 66% | 65% | 62% | 65% | 68% | 64% | 60% | 64% | 69% | 62% | 64% | 68% | 33% | 48% | 59% | 44% | 40% | 46% | 42% | 38% | 65% | 47% | 43% | 53% | 27% | 25% | 56% | 62% | 68% | 49% | 35% | 60% | 60% | 67% | 34% | 48% | 55% | 68% | 65% | 71% | 60% | 66% | 65% | 67% | 71% | 66% | 69% | 75% | 70% | 68% | 68% | 70% | 100% | 36% | 70% | 63% |
| Human Safety & Health | Public Health | 43% | 47% | 40% | 41% | 36% | 42% | 44% | 41% | 50% | 42% | 45% | 39% | 39% | 44% | 10% | 30% | 42% | 57% | 36% | 23% | 29% | 35% | 43% | 32% | 26% | 51% | 7% | 0% | 30% | 40% | 44% | 24% | 11% | 43% | 38% | 43% | 18% | 74% | 56% | 40% | 42% | 46% | 18% | 42% | 43% | 38% | 42% | 34% | 40% | 41% | 42% | 40% | 40% | 42% | 36% | 100% | 48% | 40% |
| Cultural Diversity | Indigenous Knowledge | 91% | 86% | 86% | 89% | 82% | 89% | 92% | 88% | 83% | 89% | 92% | 86% | 87% | 92% | 57% | 71% | 83% | 64% | 58% | 68% | 66% | 60% | 90% | 67% | 65% | 74% | 50% | 49% | 79% | 87% | 92% | 72% | 59% | 83% | 84% | 91% | 48% | 66% | 81% | 86% | 89% | 94% | 67% | 90% | 88% | 89% | 90% | 82% | 88% | 89% | 90% | 88% | 88% | 90% | 70% | 48% | 100% | 86% |
| Cultural Diversity | Food Sovereignty | 81% | 74% | 76% | 78% | 72% | 78% | 82% | 77% | 73% | 79% | 83% | 77% | 77% | 82% | 47% | 60% | 73% | 55% | 48% | 58% | 56% | 53% | 91% | 59% | 56% | 65% | 40% | 41% | 69% | 76% | 81% | 63% | 50% | 73% | 73% | 81% | 38% | 55% | 72% | 78% | 78% | 84% | 59% | 79% | 81% | 78% | 83% | 74% | 81% | 82% | 82% | 81% | 81% | 82% | 63% | 40% | 86% | 100% |

Results of calculation of the trade-offs between sub-themes according to Equation 2.

| TRADE-OFFS | | Corporate Ethics | Corporate Ethics | Accountability | Accountability | Accountability | Participation | Participation | Participation | Rule of Law | Rule of Law | Rule of Law | Rule of Law | Holistic Management | Holistic Management | Atmosphere | Atmosphere | Water | Water | Land | Land | Biodiversity | Biodiversity | Biodiversity | Materials and Energy | Materials and Energy | Materials and Energy | Animal Welfare | Animal Welfare | Investment | Investment | Investment | Investment | Vulnerability | Vulnerability | Vulnerability | Vulnerability | Vulnerability | Product Quality & Information | Product Quality & Information | Product Quality & Information | Local Economy | Local Economy | Decent Livelihood | Decent Livelihood | Decent Livelihood | Fair Trading Practices | Fair Trading Practices | Labour Rights | Labour Rights | Labour Rights | Labour Rights | Equity | Equity | Equity | Human Safety & Health | Human Safety & Health | Cultural Diversity | Cultural Diversity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mission Statement | Due Diligence | Holistic Audits | Responsibility | Transparency | Stakeholder Dialogue | Grievance Procedures | Conflict Resolution | Legitimacy | Remedy, Restoration & Prevention | Civic Responsibility | Resource Appropriation | Sustainability Management Plan | Full-Cost Accounting | Greenhouse Gases | Air Quality | Water Withdrawal | Water Quality | Soil Quality | Land Degradation | Ecosystem Diversity | Species Diversity | Genetic Diversity | Material Use | Energy Use | Waste Reduction & Disposal | Animal Health | Freedom from Stress | Internal Investment | Community Investment | Long-Ranging Investment | Profitability | Stability of Production | Stability of Supply | Stability of Market | Liquidity | Risk Management | Food Safety | Food Quality | Product Information | Value Creation | Local Procurement | Quality of Life | Capacity Development | Fair Access to Means of Production | Responsible Buyers | Rights of Suppliers | Employment Relations | Forced Labour | Child Labour | Freedom of Association and Right to Bargaining | Non Discrimination | Gender Equality | Support to Vulnerable People | Workplace Safety and Health | Public Health | Indigenous Knowledge | Food Sovereignty |
| Corporate Ethics | Mission Statement | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Corporate Ethics | Due Diligence | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Accountability | Holistic Audits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Accountability | Responsibility | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Accountability | Transparency | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Participation | Stakeholder Dialogue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Participation | Grievance Procedures | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Participation | Conflict Resolution | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rule of Law | Legitimacy | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rule of Law | Remedy, Restoration & Prevention | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rule of Law | Civic Responsibility | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rule of Law | Resource Appropriation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Holistic Management | Sustainability Management Plan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Holistic Management | Full-Cost Accounting | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Atmosphere | Greenhouse Gases | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 16 | 4 | 4 | 4 | 0 | 0 | 25 | 25 | 8 | 32 | 0 | 0 | 0 | 4 | 4 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 |
| Atmosphere | Air Quality | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 41 | 34 | 8 | 32 | 0 | 0 | 0 | 4 | 9 | 41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 |
| Water | Water Withdrawal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | Water Quality | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Land | Soil Quality | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Land | Land Degradation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiversity | Ecosystem Diversity | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiversity | Species Diversity | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiversity | Genetic Diversity | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Materials and Energy | Material Use | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Materials and Energy | Energy Use | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 |
| Materials and Energy | Waste Reduction & Disposal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 |
| Animal Welfare | Animal Health | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | 0 |
| Animal Welfare | Freedom from Stress | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | 0 |
| Investment | Internal Investment | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | 0 |
| Investment | Community Investment | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Investment | Long-Ranging Investment | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Investment | Profitability | 0 | 0 | 0 | 18 | 0 | 0 | 9 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 9 | 0 |
| Vulnerability | Stability of Production | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 9 | 0 | 21 | 32 | 0 | 0 | 18 | 8 | 32 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 25 | 0 | 0 |
| Vulnerability | Stability of Supply | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Vulnerability | Stability of Market | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| Vulnerability | Liquidity | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Vulnerability | Risk Management | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Product Quality & Information | Food Safety | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Product Quality & Information | Food Quality | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Product Quality & Information | Product Information | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Economy | Value Creation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Economy | Local Procurement | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Decent Livelihood | Quality of Life | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Decent Livelihood | Capacity Development | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Decent Livelihood | Fair Access to Means of Production | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fair Trading Practices | Responsible Buyers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fair Trading Practices | Rights of Suppliers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Labour Rights | Employment Relations | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Labour Rights | Forced Labour | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Labour Rights | Child Labour | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Labour Rights | Freedom of Association and Right to Bargaining | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Equity | Non Discrimination | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Equity | Gender Equality | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Equity | Support to Vulnerable People | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Human Safety & Health | Workplace Safety and Health Provisions | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Human Safety & Health | Public Health | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 9 | 16 | 16 | 16 | 0 | 0 | 9 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cultural Diversity | Indigenous Knowledge | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cultural Diversity | Food Sovereignty | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |