

Communication

The Geographical Indication Pathway to Sustainability: A Framework to Assess and Monitor the Contributions of Geographical Indications to Sustainability through a Participatory Process

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Abstract: Geographical Indications (GIs) are widely considered as tools to contribute to sustainability (The Food and Agriculture Organization of the United Nations—FAO, 2009; 2017), if established and well managed. While the literature may not always agree on the positive effects of GIs in all sustainability dimensions (e.g., economic, social, and environmental), there is evidence that engaging GI producers in a sustainability strategy can maximize their contribution to different components of sustainable development. FAO and oriGIn developed the sustainability strategy for GI (SSGI) to support GI producers and their associations so that they could engage in a place-based and participative approach in order to generate concrete progress and results. This paper presents original research for building both a framework and database for the selection and use of relevant sustainability indicators for GIs. A number of SSGI principles have guided the work throughout an iterative process for reviewing, selecting, and improving relevant indicators, while the Sustainability Assessment of Food and Agriculture (SAFA) has provided the structure to align with the Sustainable Development Goals (SDGs) and other widely used and recognized sustainability frameworks. As a result of this work, a database of 372 robust sustainability indicators that are relevant to GIs have been characterized to facilitate their use by practitioners. The discussion highlights the importance of the place-based approach, and the participative, inclusive process that represents the key to empowerment and the ability to develop alliances. It also focuses on action, and the need to strengthen both internal and external communication.

Keywords: geographical indications; sustainability; evaluation; indicators; territory; Sustainable Development Goals (SDG); participatory; inclusiveness



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1. Introduction

In the effort to contribute to and achieve the Sustainable Development Goals (SDG) which form part of the international community's 2030 Agenda, territorial approaches combined with value-chain processes were identified as powerful drivers of necessary rural transformations [1]. In particular, when a local group of producers establishes and manages a geographical indication (GI), it can be used as a tool to contribute to the increasing of the sustainability of their production system by promoting a high-quality product linked to origin. Furthermore, local traditions will be preserved, natural resources protected, and the conditions to ensure fair income for producers will be provided [2]. As defined by

the World Intellectual Property Organization (WIPO), a GI is a sign used on products that have a specific geographical origin and possess qualities or a reputation that are intrinsic to that origin [3]. This intellectual Property Right (IPR) has gained traction among more and more countries, as demonstrated by the increasing number of requests for technical assistance. With the recent entry into force of the Geneva Act of the Lisbon Agreement, which provides countries with an international registration system, the protection of GIs has been moved into the forefront, and increased attention is being placed on how GIs can be used as tools for rural development within national policies.

Literature on GIs illustrates how GIs contribute to various elements of sustainability, in particular in relation to economic and social sustainability [4–8] with references to the preservation of cultural and natural resources as part of local capital [9–11]. Another way to envisage their positive contribution to sustainability is to consider the provision of public goods, as highlighted in the special issue entitled “Geographical Indications, Public Goods, and Sustainable Development” [12]. Indeed, GIs provide a foundation to support a basket of diverse local public goods and resources, including territorial reputation [13], landscape, natural and food heritage, local culture and know-how, and economic and social effects on the territory (i.e., job creation, income, social cohesion) [14,15]. Environmental aspects have also gained increased attention, even if we are reminded that GI protection cannot be considered as an environmental tool per se but it can play a positive role in environmental conservation [16]. The GI literature has also underlined that GIs are not a magical tool and that the local conditions which can influence their establishment and management are crucial to the efficiency and local sustainability of the GI [15]. These necessary conditions can be summarized as follows [17,18]: (i) the specific quality linked to origin that is well defined in the specifications (in order to demonstrate intellectual property right and ensure strong market differentiation) [19]; (ii) the collective action and territorial governance [20]; (iii) the effective marketing efforts (the GI is effectively used to market the products) [8]; and (iv) the legal framework and role of the public sector, at least pertaining to the effective protection of GIs [7,21,22]. Under these conditions, the GI processes have the capacity to support an endogenous approach, as the local community of producers can become primary actors in defining standards. There is a possibility to re-shape relationships along value-chains, in particular international trade, where market players usually impose their requirements on growers [23,24]. In this regard, GI processes actively enhance local governance, which is recognized as a crucial element in sustainability, to the point of being defined as the fourth pillar of sustainability in the FAO framework “Sustainability Assessment for Food and Agriculture Systems” [25].

Analysis of the contribution of GIs to sustainability reveals further issues. First, most producers are either not aware of the capacity of GI processes to contribute to sustainability or they lack the capacities to integrate all sustainability elements into the management of their GI system. Second, GI processes may also have negative externalities on their territories [26], especially when the perspective of local producers has not been integrated into the processes [27]. Therefore, engaging GI producers in a sustainability strategy could help reducing negative externalities, when they occur, and maximize the contribution of the GI scheme to sustainable development.

Aware of both the potentialities and the challenges regarding the contributions GI processes make to sustainability, both FAO and oriGIIn have collaborated since 2016 to support GI producers, defined here as all value-chain actors involved in the production of the final GI product, to develop their own bottom-up GI sustainability strategy. The Sustainability Strategy for GIs (SSGI) has been endorsed by oriGIIn’s membership since 2017 and aims to support the engagement of producers in a strategy that will result in sustainability by traversing a roadmap through the following stages: Prioritize, Assess, and Improve, with a transversal component on Communication [28] (see Figure 1).

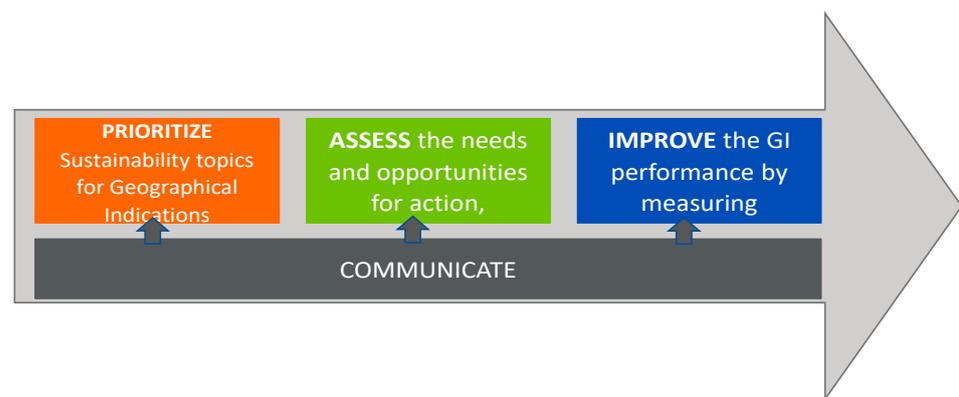


Figure 1. The roadmap for the strategy on GI sustainability and its four components.

From this viewpoint, it is crucial to provide the appropriate tools for GI producers in order to permit them to become aware of the issues related to sustainability and to agree on priorities (Prioritize), from where they can assess the current situation (Assess) and define their action plan to address the issues and increase their sustainability performance (Improve). Throughout this path, communication is crucial for both internal management and externally for public information. A major difficulty for this process is the ability to approach the sustainability of GIs in a comprehensive manner, as the literature on GIs is usually focused only on certain elements of sustainability. Although some research has begun to consider a comprehensive approach to the assessment of the sustainability of GIs, in particular the Strenght2Food project (S2F) [29], not many sources provide a holistic view.

Sustainability assessments are complex processes and require time and capacities. In the framework of the SSGI, the question is whether a comprehensive approach to GI sustainability (i.e., prioritizing issues and assessing and improving GI sustainability) can be accessible to GI producers as part of the endogenous development and place-based approach, which are at the heart of the GI processes to contribute to sustainability.

The aim of this paper is twofold:

- To review and compare the existing frameworks for sustainability, which could apply to GI specificities in order to identify and extract the principles and components for a tailored framework supporting the SSGI.
- To propose an original approach for the assessment of GI sustainability and a sustainability indicator database for GIs that preserves the endogenous development approach to sustainability through a place-based and participatory process.

Apart from this introduction, the paper is structured as follows. The Section 2 presents a review of the literature on GIs, explaining the five main principles of the SSGI that have guided the work on indicators and related guidelines. Section 3 discusses the process that led to the creation of a robust and integrated sustainability indicator database on GIs. The Section 4 (Results) includes a brief description of the structure of the database with a broad overview of the attributes assigned to each indicator. The discussion (Section 5) highlights a few insights related to the originality of the framework (i.e., place-based, participative and inclusive, and focus on action). The concluding remarks can be found in the Section 6.

2. State of the Art and the Principles of a Place-Based and Participative GI Sustainability Assessment

2.1. Specific Contribution to Sustainability of GI Processes

What emerges from the previously mentioned literature is a variety of specificities that can be combined so that GI processes contribute to sustainability and produce public goods. Some particular topics draw our attention.

Among public goods, biodiversity is of increasing attention in relation to the resilience of agri-food systems in the context of climate change. Similar to the other environmental component, only the producers' awareness regarding local biodiversity and their capac-

ity and willingness to preserve it can produce positive effects and, in this case, product specifications can represent a powerful tool to preserve and even enrich local biodiversity [26,30–34]. Another public good that gains increased attention relates to diet diversity and nutrition [35], whose effects can not only be observed at the territorial level. The importance of traditional diets in nutrition and health is not recent [36–38] but focusing on GI products as a tool to address malnutrition has been ignored until today, perhaps because many of the most famous GIs belong to the wine and spirits and fatty or salted products categories. However, comparing a GI product to the standard product of the same category brings interesting insights because of various mechanisms such as the link to origin [39,40], the interest in the health aspects of fermented products [41], or the NOVA classification of foods that recognizes the nutritional advantages of unprocessed or minimally processed foods against those that have been ultra-processed [42].

Governance is another key topic, and represents the key factor in the success of achieving scale in terms of sustainability improvements. Governance is addressed in two ways in the literature on GIs. One approach is to focus on the value-chain with governance to access markets and to ensure the fair redistribution of added values [6,43–45]. The other approach looks at territorial governance, taking a broader view of its scope and impacts. This allows for the coordination of social learning with external actors, public authorities or other sectors within and outside the territory [46]. Governance is a crucial aspect in attaining efficiency of protection, rural development, and sustainability (both in terms of the long-term approach and being multifunctional) [47–50]. It also facilitates endogenous innovation processes and trajectory in a territory [51]. Finally, recognition is accorded to the potential institutional role that GIs can play in food system governance and rural development policies at a larger scale, both regional and national [52]. Of interest is the recent notion of “reflexive governance” applied to GIs when using agroecology principles as a comprehensive framework to analyse the contributions GIs make to sustainability [53]. Reflexive governance is the result of cognitive procedures and feedback to influence actors’ beliefs, norms and perceptions which, as mentioned by Owen et al., are “critical for diverse stakeholders in a given space to “feel” collectively attached to a shared problem and future” so as to ensure transition towards greater sustainability. This approach highlights another key element of sustainability, namely the possibility of being a pathway to improvement rather than just a state or standard to reach. From this perspective, it makes more sense to monitor the progress made on a regular basis and in comparison to a baseline.

2.2. Evaluation of GI Impacts

There are important insights in the literature related to the evaluation of GIs, mostly in relation to economic results [54–60]. Economic impacts are particularly important to ensure the viability of GIs and to provide interested legislators, donors, or development agencies evidence that will stimulate them to invest in this driver of rural development [17]. Economic impacts are also the primary motivation for producers to engage in the GI process, even if the impacts on social and environmental dimensions are also considered as part of the “territorial impact” [61]. Studies evaluating the impact of the use of GIs either a diachronic approach (i.e., before and after GI registration) or a synchronic approach (i.e., a comparison of two similar products, one with a GI and the other without). The choice of method often depends on the availability of necessary data, which is often scarce (especially in developing countries). Quantitative methods are often preferred in these approaches in order to provide precise data that can be analysed by employing statistical methods and used for comparisons. Qualitative methods are used in complementarity to provide an in-depth understanding of attitudes and behaviours, and tend to be more participatory and reflective [62]. Nevertheless, demonstration of the net benefits of GIs is relatively sparse. Again, it is difficult to generalize results that vary significantly between one case and another, in their contexts, in the modalities of their establishment, in the strength of local institutions and, in particular, in the commitment and efforts of all actors in the GI value chain and the stakeholders involved. A common limit revealed in the

evaluations, whatever their focus, is the difficulty in establishing a clear “chain of causality” that links the GI to the measured effect [62] and to separate the impact of the GI from other factors such as technological advances, quality control, advertising, or policy dynamics [63]. Indeed, many factors, events, strategies and human stories are interconnected with GI development, from the first idea discussed within the local community to GI registration and ongoing management. Actually, assessing sustainability as a whole is even more complex as it requires a holistic approach engaging broad multi-criteria assessment so as to cover the many dimensions of sustainability, while bearing in mind that any large set of indicators will still be a simplification of reality (if not a projection of the evaluator’s mindset) [64]. To allow for the correct balance between a manageable number of indicators and simplification, the choice of meaningful indicators is crucial, depending on the focus and general objective. On the one hand, the objective could be to help a system monitor progress by defining integrated indicators that are specifically adapted to the particular system (for example, when assessing the quality and sustainability of small-scale systems) [65]. An opposing approach is to build a generic grid with various sets of indicators that can be applied similarly in different systems in order to allow for comparison. This is the case of the Strenght2Food project (S2F), which assesses the sustainability of various quality schemes (e.g., GI and organic), building on 23 shared indicators [29]. The definition and implementation of such a framework illustrates the importance of selecting the right balance of meaningful indicators, while also taking into account feasibility (in terms of time, resources, data availability, and capacity to interpret the quantity of data). Another difficulty in sustainability assessment is the evolution of the system as soon as it has been studied, since the influence of the system provoked sheds light on its components and values. All these elements support the preference within the SSGI to focus on a sustainability pathway which evolves and can be monitored on its own in its own grid of indicators, rather than being compared with different situations. A specific grid also allows for better understanding of the trade-off inherent in complex decision-making processes. Explicit consideration of a trade-off at the beginning of the process, where there are clear acceptability criteria, is an important component of sustainability assessments [66].

2.3. Principles to Guide the SSGI

Learning from the literature about the specific contribution of GIs to sustainability and impact assessment, the following principles have been defined to guide the development of a framework with relative indicators in the framework of the SSGI (Box 1) [67].

Box 1. Principles of the sustainability strategy for GI.

Sustainability is a pathway and not a state: Thus, it is envisaged as a continuous improvement process. Rather than an approach with certain thresholds that categorize a state of sustainability, the SSGI aims to empower GI organizations by choosing relevant goals based on their own priorities relevant to their contexts. This principle implies that the priorities and actions of GIs must be evaluated regularly. The priorities may change in an evolving world where new challenges to sustainability arise continuously, whereas the effectiveness of sustainability initiatives undertaken must be constantly analysed through iterative processes.

A place-based framework adapted to GI specificities: GIs are intrinsically linked to their territory of origin, including to natural and cultural dimensions. It is therefore crucial to recognize the importance of the local resources and conditions for GI impacts. Such local anchorage is also the foundation for an extended territorial strategy, building on GI governance. For the framework, this implies: (1) the recognition of governance as a driver of sustainability; (2) the need to provide a list of indicators within which GI stakeholders can select the most appropriate to their specific systems, including cultural and natural dimensions and biodiversity; and (3) the need to combine indicators at farm, value chain, and territorial level.

Inclusiveness and participatory process: GIs are voluntary and collective endeavours involving different producers through participative processes. Bottom-up approaches are considered to be more effective in the long term and it is important to envisage local consultation and engagement of producers and allies so that shared priorities and goals are defined, creating the stakeholder dialogues necessary for future cooperation. All GI systems and organizations should be able to engage in the strategy of sustainability. Therefore, the framework should support several types of GIs where there may be different degrees of maturity of the organizations, resource capacity, and knowledge bases for sustainability requirements. In this sense, GI organizations should be able to undertake their sustainability analysis without incurring significant expenses and without facing barriers related to capacity or resources. Additionally, and taking into account possible limits to access to information, self-assessment is considered.

A sound and operational approach: Sustainability is a complex matter that needs a solid scientific approach to avoid greenwashing. Sustainability is about commitment, and engaging in sustainability means acknowledging the challenges and mistakes that require concrete initiatives and actions. Therefore, the framework must benefit from academic work and concrete experience of sustainability in order to be operational and facilitate actions. At the same time, many frameworks already exist and some are well recognized. Thus, the SSGI must be consistent with other recognized sustainability frameworks, not only to ensure that it is solid and robust and combines different types of indicators (e.g., qualitative/quantitative, subjective/objective) but also to allow bridges between the frameworks and indicators used by other value chain actors and potential allies. This will avoid duplication, and provide a common ground for an enhanced and necessary dialogue among stakeholders or possible allies for devising new policies and initiatives.

A collective and individual exercise where cooperation is key: A collective sustainability path is built on the sum of the different individual paths from each GI stakeholder along the value chain. It is important to have both individual and collective indicators to look at both the value-chain and territory levels. No single stakeholder can confront all sustainability challenges. Indicators and initiatives can also be added as a result of alliances that can be developed on strategic topics with relevant specialists, governments, or value chain actors. Both cooperation that initiates within the GI organization and extends with allies and individual engagement are crucial. The framework must be adapted for the use at both levels in order to support processes of internal engagement and external alliances, and to be used for the implementation of collective and individual sustainability strategies.

3. Materials and Methods

In line with the SSGI objectives and principles defined, the research opted for the development of a framework including an integrated set of relevant indicators for GIs and the necessary guidelines to facilitate the understanding of local issues, definition of priorities, assessment of the selected priority topics, monitoring, and improvement of the particular GI system in relation to its sustainability performance. The methodology builds on the aforementioned SSGI principles, which have guided the work throughout an iterative process for reviewing, selecting, and improving relevant indicators, along with a process that can be categorized by the following main steps.

3.1. Identification of the Framework Foundations

Primary background research was conducted in order to understand the fundamental sustainability requirements, including those defined by market actors. The Sustainability Assessment of Food and Agriculture (SAFA) [25] was benchmarked against the SDGs [68], sustainability requirements from the market, and commonly used disclosure standards (GRI, Global Reporting Initiative and SASB, Sustainability Accounting Standards Board [69,70]). SAFA was selected as the best foundation for GI sustainability in terms of credibility (SAFA is backed by the United Nations with multi-stakeholder support; it is science-based with well-developed tools), structure and taxonomy (topics considered), value chain coverage (all agricultural and food sectors included, with a good fit across the value chain while the producer level is emphasized), alignment with SDGs, and frameworks used by key brands and retailers. SAFA guidelines are recognized among the relevant global initiatives to assess the sustainability of farms, farming systems, and supply chains, starting with a precise definition of “sustainability”, and to facilitate comparability of the results [71]. Its flexibility in application (it can be completed with additional criteria and indicators) and applicability to GIs has been also recognized, with the inclusion of relevant topics (governance, culture and traditions within the social pillar, or food quality and biodiversity).

3.2. Review of Pre-Existing and Relevant Indicators

A review of reputable initiatives and key sustainability indicators was conducted on recognized sources in the area of agriculture and food sustainability. The overall goal was to guarantee that the initial set of indicators were as broad as possible in order to cover all key characteristic of GIs. In particular:

- Covering three levels of interest: local producers (farm, enterprise and/or operation/processing unit), value-chains, and territory;
- Ensuring different modalities for data collection, including self-assessment in given circumstances to facilitate an inclusive and bottom-up approach;
- Combining different types of indicators (e.g., individual or collective, objective/subjective, quantitative/qualitative, levels of complexity and cost for data collection, etc.)

Initially a total of 84 possible indicator sources were compiled that can be categorized as follows:

- General methodology and guidelines for sustainability assessment [64,66,72,73];
- Anchors for the database related to SDGs and SAFA [25,68,74–78];
- Specific frameworks related to agriculture and food topics: sustainable agriculture and value chains [79–81], agroecology [82,83], climate change and resilience [84], nutrition sensitive agriculture [85];
- GI specific sustainability assessment [86–88];
- Downstream market frameworks [69,70,89–91];
- Sources associated with measurement of specific topics: carbon footprint [92], water footprint [93], biodiversity [94], social dimension [95,96], fair trade practices [97], and empowerment of women [98];
- Additional indicators from specific certification approaches [99–104]; and
- Specific agricultural sectors [89,105,106].

The review resulted in a list of 543 indicators, among which 23 indicators were specifically created, and 79 indicators were inspired from different sources to tackle specific angles (in particular in the governance pillar). Other set of indicators (28) relate to the “private sector contributions to SDGs” (FAO contribution building on the United Nations Conference on Trade and Development (UNCTAD) indicators), and specific indicators were created to cover the sub-theme of health and nutrition in the social pillar.

3.3. Consolidation of SAFA Structure and Taxonomy

Based on the previous exercise, the original SAFA structure was complemented with additional themes and sub-themes. Then, a process of consolidation led to a more operational reclassification with a balance between the different pillars and themes regarding the number of indicators in order to ensure a good mix between subjective and objective indicators. Indicators were also reviewed according to the topics and subtopics in the database. In this sense, some indicators were moved to other sub-themes. In totally, 31 indicators were reassigned to different sub-themes.

3.4. The Characterization of Indicators

Once structured vertically within the four SAFA pillars, themes, and sub-themes, the work concentrated on the horizontal structure with the characterization of each indicator. In addition to the source, the columns were designed to characterize each of the indicators, in particular its applicability (i.e., whether it can be applied to different GI sectors and contexts) and detailing its relation to other sustainability frameworks and key sustainability certification schemes used in agriculture. The characterization also reflects proportionality in order to better measure the effort in relation to the size of the operation, both from a collective and individual perspective. The initial “vocation” of each indicator was also determined (i.e., whether it is primarily designed for internal process and management or oriented to external communication). Finally, some key indicators were highlighted for a number of sub-themes. These indicators might be considered default indicators for their respective sub-themes, as they are frequently used for the better understanding of the performance by a number of sources, frameworks, and organisations. The criteria used to define these default indicators also included the importance of the sub-theme, the possible low complexity for many GI and ability to self-assess.

3.5. The Final in Depth Review Process—Discarding and Finetuning Indicators

Apart from the normal quality control procedures, the objectives of the final in-depth review were:

1. Precision: each indicator reviewed for clarity and explicit definition of its calculation, suggesting amendments when needed. Numeric indicators focusing on relative rather than absolute performance were preferred.
2. Integration: indicators that had similar formulas were unified following the easier to interpret, ensuring the clarity of the formula and requirements in addition to the capacity of the producer to collect the necessary information to measure the indicator. Four indicators were combined with others, while forty indicators were further contrasted.
3. The creation of the “original formula” and “formula column” to show suggested amendments to the formula, defined by the original source, mostly focused on relative rather than absolute numbers and providing better guidance for the collection of data adapted to the GI context.
4. Explanations for each individual indicator was enhanced, which required the creation of the “Possible Examples and/or significance” column. Finally, an individual indicator analysis resulted in a “default indicator” column, in order to highlight key indicators to be considered for GI practitioners, which may be used in the forthcoming guide as default indicators for given subthemes.

4. Results

4.1. The Database

This iterative indicator review resulted in a dynamic database, allowing users to choose the most relevant indicators according to the specific needs of the GI involved, following the priorities defined in the first stage of the strategy. There are 372 technically robust sustainability indicators that have been classified and deemed relevant to GI. A total of 111 indicators are SAFA sourced, whereas 261 come from other sources (see Table 1).

There are 114 indicators on environmental integrity, 85 on social well-being, 62 on good governance, and 111 on economic resilience.

Table 1. Main source of indicators in the four pillars (top 10).

Sourced or Adapted From	Environmental	Social	Governance	Economic	Total
SAFA	48	19	22	22	111
COSA	6	8	0	24	38
GRI	14	12	5	4	35
UNCTAD-FAO	12	6	7	9	34
SDG	9	9	3	3	24
Authors	1	3	11	5	20
FAO and University of Florence guidelines for evaluation	0	1	2	16	19
FAO (SHARP)	9	1	2	5	17
Barilla BCFN-Food Sustainability Index	3	1	1	8	13
IFPRI-Feed the future	0	3	0	5	8
Others (16 sources)	12	22	9	10	53
Total	114	85	62	111	372

These indicators are organized under 22 themes with a total of 63 sustainability topics or sub-themes for determining sustainability priorities. Among the 63 sub-themes, five governance sub-themes are considered as a priority sustainability topic for every GI organization, as the success of a GI system heavily depends on its ability to create the conditions for collective action to benefit its GI members and to establish significant alliances through a representative body. A total of 159 indicators are included as “key or default indicators” for most of the sub-themes listed. Thus, after a given GI organization has selected its priority subthemes, some will directly provide a key/default indicator for consideration. Finally, the structure allows for the recognition of the SDG convergence. After contrasting all indicators in the database against the objectives and targets of the SDG, there was a direct relationship between 16 of the 17 SDG proposed by the United Nations at the global level for the 2030 sustainability agenda. This exercise must be complemented individually by producers or by GI with respect to the goals at the local level proposed by each country or region. Based on the above-mentioned taxonomy, the structure was designed to characterize all indicators related to each sub-theme. A description and definition, when applicable to each attribute, is provided in Table 2. The list of themes and subthemes is provided in Appendix A.

Table 2. Description of the final database containing SSGI indicators.

Part 1. Sustainability themes		
SAFA's main structure	4 pillars: Good Governance, Environmental Integrity, Economic Resilience and Social Well-being 22 themes 63 sustainability subthemes	371 indicators numbered for easy reference.
Part 2. Indicator source and formula and characterization		
There may be one or more indicator for each sustainability subtheme.	Indicator	Name of indicator
	Original Formula	Explicit or implied mathematical formula to obtain indicator, mentioning variables to be used to obtain the indicator. If not a mathematical formula, then the qualitative definition of the indicator.
	Formula:	Shows the modified formula suggested.
	Indicator Source Code:	Designates the code of each indicator source.
	Indicator Source	Shows the original source of the indicator, whether SAFA or any of the other 25 direct sources used.

Table 2. Cont.

Part 2. Indicator source and formula and characterization		
Qualitative/quantitative:		Describes whether the indicator is numeric or not and, if so, whether it is derived from a mathematical formula or is qualitative in nature.
Management/external		As a result of the expert 's discussion, it was deemed appropriate to define the vocation of the indicator, i.e., if it should be used primarily for internal management or could be used for external communication.
Source (internal/external)		Illustrates whether the information required to obtain the indicator comes from data or information obtained from within the GI organization (internal), requires the participation and/or cooperation of third parties, or comes from a public source (external).
Objective/subjective		Provides an indication as to whether the information is or can be found from a third- party source or obtained internally following protocols that ensure it is rigorous (objective), corresponds to perceptions, or is derived from information that can be considered partial or not reflecting a large or representative sample or database (subjective).
Process/impact		Corresponds to indicators that show the level of performance in terms of actions and/or initiatives taking place (process) versus the expected result of such initiatives (impact).
Requirements		Describes the basic information requirements needed to obtain the indicator.
Default Indicator		Shows whether, in the consultant 's opinion, the GI practitioner should consider the marked indicator always for current or near future sustainability exercises. It also provides elements to consider when gathering the necessary information for their future use if the information is not currently available.
Possible Examples/Significance		It briefly describes (in lay terms) examples of use or the key aspect the indicator identifies or shows.
Part 3: Standards Applicability		
In this section, the correspondence between the selected indicators and those indicator frameworks accepted internationally, market, or science based is presented, allowing for possible use in other sustainability frameworks and cooperation through joint initiatives.		
Broad sustainability frameworks	SDG	This column shows the reference to the SDG objective associated with each indicator.
	GRI	This column shows the reference to the corresponding GRI indicator. This cross reference is important as many downstream players use this standard, implying a connection to the topics and indicators that consumer groups, investors, and other stakeholders regularly see. The relevant GRI topic indicator code is identified.
	Ethos	This column cross-references indicators with the Ethos Social Responsibility framework.
	UNCTAD/FAO	The cross-reference to UNCTAD work is very useful for policy-makers and those interested in the relationship between SDGs and agriculture, as it focuses on the contribution of the private sector towards implementation of the SDGs.
Agriculture and Food	SAFA	The relevant SAFA indicator code is identified here for easy reference.
	Fairtrade	The relevant indicator used in the Fairtrade seal certification system is identified.
	Rainforest	The relevant indicator used in the Rainforest Alliance seal certification system is identified.
Key GI sectors	Reviews whether each indicator can be considered relevant for four selected GI macro-sectors	Dairy and Meat
		Fruits and Vegetables
		Coffee, Cocoa, and Tea
		Wines and spirits

Table 2. Cont.

Part 4: Indicator Usage		
In this section, a number of variables are defined to help the GI representative select the most relevant indicators according to their organizational experience and sustainability expertise, the maturity level in their sustainability pathway or a desired iteration process, choosing the best option to measure their performance.		
Complexity: deals with the difficulty to obtain the data	Cost	Does obtaining the information or calculating the indicator require direct costs payable to a third party or the procurement of costly devices? <i>Scale for cost. Low: No cost or low budget indicator; Medium: Indicator requires a specific, affordable budget; High: Obtaining indicator implies a significant expense</i>
	Requirement of internal resources	Does obtaining the information or calculating the indicator require a significant amount of internal resources, complex procedures in terms of time from the individual or the GI organization? <i>Scale for Requirement of Internal Resources. Low: Current staff does not require significant time to obtain indicator; Medium: Reasonable staff time needs to be allocated to obtain indicators; High: Significant internal resources required to obtain indicator.</i>
	Depth of analysis	Does obtaining, calculating or interpreting the indicator require highly qualified individuals or skills belonging to the organization or not? <i>Scale for Depth of analysis: Low—Indicator is simple to explain/obtain/understand; Medium—Obtaining/interpreting Indicator requires reasonable knowledge/specialization of key individuals; High—Staff needs training—external consultants hired to obtain and use indicator</i>
Value Chain Stakeholder Interest	Illustrates whether the indicator is susceptible to the interest of other actors in the value chain	Farmers or rural producers
		Processing operations
		Distribution actors
		Consumer/retail actors
Indicator Application	Refers to the particular domain that the indicator can reflect. Non-exclusive options	Territorial dimension: indicator related to people/practices/capital in the territory or origin
		Value chain dimension: indicator related to value chain actors beyond the territory of the origin product, including processors, distributors and retailers
		Society dimension: outside of the territory/distribution perspective. This indicator relates to society value and or public goods beyond the territory of the origin product (e.g., heritage for all and the world, guarantees of quality, truth in labelling, traceability and transparency, etc.)
Scope	Whether the indicator can be used to measure progress in individual operations and/or can reflect collective progress.	Collective For example, deforestation. Some can be used both individually and collectively, such as access to employee or producer social security benefits.
		Individual For example, greenhouse emissions may be obtainable and reliable at the individual level
Self-Assessment	Whether the indicator can be obtained through internal process	Yes Internally obtained information or methods such as internal qualifications of performance or internal perceptions
		No

4.2. Guidelines for Prioritization, Assessment and Improvement

In association with the database, the SSGI framework includes a series of guidelines and toolkits to guide the user through the different stages (i.e., prioritization, assessment and improvement and communication) along the roadmap (see Figure 2).

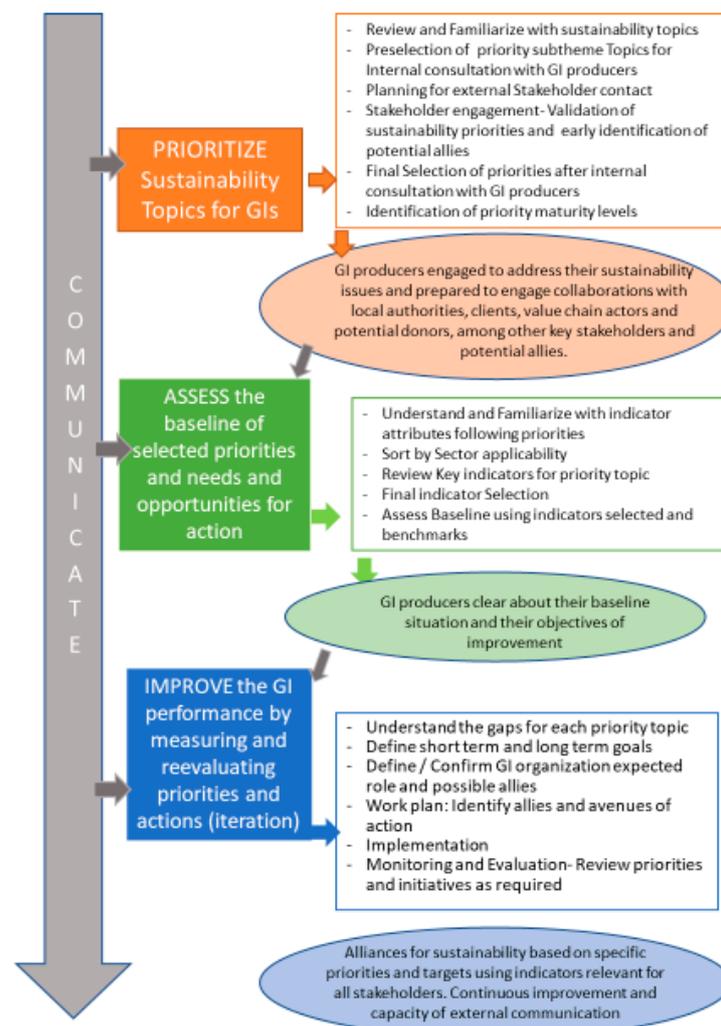


Figure 2. The SSGI roadmap in detail.

The prioritization guidelines and associated toolkit helps GI organizations and producers create their own specific pathway to sustainability by identifying their issues and priorities in terms of sustainability and along the way building alliances with key stakeholders. It guides the stakeholders through seven steps, to be developed in a participatory manner. The prioritization guide and toolkit have been prepared and tested thanks to the involvement of Marcala coffee, a GI producer in Honduras. Their contribution was crucial to ensuring the functionality of the approach. The guidelines for assessment and improvement have been applied to the defined priorities, permitting participants to select the GI indicators that are most consistent with their priorities and relevant to their local context. The guide provides a step-by-step approach to using the different filters in the database, following four main phases: the establishment of the assessment system; organization of the baseline assessment and indicator goals; definition of the workplan for improvement; and communication. Recommendations, depending on the types of GI (e.g., recent, mature) and minimum requirements are included along the phases (e.g., default indicators, minimum number of indicators by pillars and themes, minimum number of quantitative data, etc.).

5. Discussion

The work presented aims to address the need for a specific sustainability framework for GIs that allows GI producers to define their own sustainability pathway and assess and improve accordingly their contribution to the SDGs in an operational manner. It consists,

therefore, of: (1) reviewing the existing framework and indicators; and (2) building a consistent and original framework aligned to reputable sustainability indicators, sources and frameworks, from both academic and market perspectives. This effort is still a work in progress, as the use of the sustainability indicator database and related guides (assessment and improvement) still needs to be tested in the field and on concrete cases in order to better calibrate the indicators and fine-tune guidance to users. The current database and draft guidelines represent an important result that can be discussed in the light of the objectives of the paper and principles of the SSGI regarding the aim to:

- Build a sound approach for GI sustainability through a benchmark of reputable sources;
- Provide an original framework that reflects GI processes endogeneity, i.e., (1) the place-based approach and (2) the participative and inclusive process.

A discussion is also provided in relation to the concrete use of this framework in actions.

5.1. A Sound and Operational Approach

The initial benchmark process reviewed more than 84 sources for sustainability frameworks and indicators, from the most general to the most specialized approaches (either by sector or type of issue), from different stakeholder's points of view (United Nations, researcher, buyer, certifier, etc.), with the intention of ensuring alignment with the most used or reputable frameworks and also allowing for checking linkages in the database. It is acknowledged that an operational framework, such as the one being developed, can allow a large number of GIs and producers to start their own sustainability pathway. At the same time, however, at least two risks may arise. First, there may be a gap between the conceptual level of certain indicators and the producers' knowledge and capacities. Second, there is often a trade-off between simplification and loss of information. The confrontation between so many indicators allows the selection of the most appropriate from the viewpoint of language and the producers, but also provides possibilities to reformulate and create new indicators as required. Functionality, from the viewpoint of the producers' ability to implement the framework, will be determined by the capacity to develop easy guidelines, if not a digital tool.

5.2. The Place-Based Framework

The framework that has been developed is structured so that each GI system can define its own set of priorities and indicators selected from the database, while ensuring some minimum requirements and recommendations for the quality of the results. This is possible thanks to the fundamental stage of prioritization. GI stakeholders, employing a participatory process and supported by specialists (through alliances), can identify their own sustainability issues in the four pillars (i.e., economic, social, environmental, governance), and agree on their priorities based on their maturity level, referring to importance currently being given to each priority topic and the needs to be addressed in the near, medium or long term, as well as its potential impact on a GI product by taking into consideration stakeholder expectations, external pressures, risks and opportunities. This prioritization exercise also allows for an early consideration of trade-offs and best decision-making through a participatory process and for the selection of indicators in relation to the local situation and context. The strength of this approach permits the assessment and understanding of the specific conditions and mechanisms linked to a context and sector, and makes real improvement possible by addressing priorities. On the other hand, this will not allow for easy comparison between different GIs (except for the default indicators, in particular regarding governance), which could reduce emulation between GI systems and the generalization of some insights arising from specific experiences.

5.3. Participative and Inclusive Process

Participative and inclusive processes are the key not only to enhancing the place-based component, but also because they drive empowerment and, thus, rural and sustainable development. The participatory process is the backbone of the SSGI implementation, and is ensured by the different steps described in the guidelines, alternating group discussion and collective agreement with the in-house practitioner in charge of work preparation. Inclusiveness is twofold. It concerns the specific process of the assessment of GI sustainability, by ensuring that each type of stakeholder is represented throughout the use of the framework, and at the global strategy level, to ensure that any GI group can engage (whatever their level of resources and capacities). From this last viewpoint, the flexibility of indicators and methods used to collect data have been carefully considered. The database categorizes indicators depending on their complexity and provides tips for data collection in a way that facilitates self-assessment by GI stakeholders themselves. This means GI stakeholders own the process at all times. Clearly all information is not easily available, which is why the strategy emphasizes, from the very beginning, on the creation of alliances with qualified institutions.

In this way, the use of these sustainability indicators contributes to social development through the empowerment and democratization of decision-making, while the assessment process, including methods and data employed to assess progress, remains accessible to all [64]. This is an important component of SDGs so that no one is left behind and stakeholders are both empowered during the process and free to decide their own goals and commitments. On the negative side, this approach may be at the cost of scientific quality. Therefore, a few limits and guidance are provided through the guidelines in order to ensure the minimum level of quality. Guidance is also adapted to the diversity of GIs, including those that are just starting their path to sustainability and the more mature GI systems, which can use the database to define indicators of higher complexity.

5.4. A Framework Designed for Actions

This tailored approach also enhances the possibility of embarking on a sustainability pathway that includes concrete actions towards sustainability improvement. The assessment is not so much oriented towards research and discovering the causal relation between a result and a factor, but rather on leading to the definition and implementation of an action plan that will improve the system as a whole, and the perspective of developing alliances along the way to increase the impact on agreed upon priorities. The continuous pathway to improvement supposes regular assessment and monitoring of the changes of the indicators over time, as well as the consequent adjustments to the action plan. In this perspective, thanks to the data compiled over time on specific issues and actions taken, it will be possible to:

- Raise producers' awareness of the importance of sustainability and what they can do to improve it;
- Support the monitoring of changes and improvement through the use of indicators that are related to internal management (at the levels of farm, value chain and territory);
- Support credible communication with buyers, consumers, NGOs, public authorities, on the contribution of the GI system to sustainability and SDGs, with concrete data;
- Enhance communication and secure cooperation with key stakeholders and allies, using other renowned frameworks and sustainability systems, by improving the ability to agree and use indicators for joint initiatives.

Field-testing of the prioritization guidelines illustrates the link to action well. Marcala coffee GI producers identified the issues and priorities. The producer then spontaneously discussed the necessary actions to take to address the issues. For example, producers have defined a short-term goal to "Develop a coherent narrative capable of generating loyalty and appropriation" in order to "increase the value added" as part of their action plan. The topic of communication is crucial, within the GI organization and externally with key audiences. Communication not only supports producers' engagement and alliances, but

also helps provide relevant information concerning both the remaining challenges and progress made.

Finally, by enhancing the reporting, the framework can also support, if needed, self-certification systems for sustainability. It is innovative, as it is based on continuous improvement instead of a dual static system (i.e., sustainable, yes or no). Indeed, there are very few examples of certification based on continuous improvement today, although the situation looks promising as in the case of Wood of Alps [107].

6. Conclusions

The SSGI framework is still a work in progress, as feedback from operators and practitioners needs to be integrated during field-testing so as to fine tune aspects of the indicators' characterization and the guidelines with user-friendly modalities. On this basis, a toolkit will be developed to facilitate the operational (and hopefully digital) use of the combination of guidelines and database.

Until now, most of the conceptual work has been completed through the review of existing frameworks and indicators that are relevant to GI sustainability and built on the key principles of the SSGI. The process directly supports empowerment and leadership in improving sustainability locally, and the results of the use of the framework by many GI organizations in different contexts will result in better understanding the influence of local conditions (including the importance of cooperation and alliances) on the evolution of more sustainable systems. On the other hand, the main limitations reside in the principles of flexibility and self-assessment that may reduce the capacity of the final toolkit to produce data that can make appropriate comparisons among GIs. The database is based on existing frameworks in the agricultural and food sectors, which represent most GIs, but it could work as well for handicraft products. Additional work on the database is needed to complete or specify indicators that are more appropriate for the non-agricultural sectors. Furthermore, the database could be used in the given product sectors as a sustainability tool, even if these producer group sectors have not confirmed a GI.

In order to capitalize on this framework and tools, many perspectives should be considered, depending on interest and requests from partners. The following represent examples of actions and projects that may be considered:

- Document the use of the framework for different cases and sectors to provide illustrations, lessons learned and best practices on GI sustainability;
- Tailor the use of the framework for project evaluation;
- Develop a platform to centralize the data resulting from the assessments and monitoring; these data may be useful for practitioners or academics to develop knowledge of GI and sustainability;
- Facilitate individual and global reporting and communication on progress made and GI contributions to sustainability;
- Adapt the guidelines for non-GI value chains that care for sustainability based on local tailored approaches such as a broader contribution to SDGs.

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Appendix A. List of Themes and Sub-Themes in the Four Dimensions with Number of Indicators

Theme	Sub-Theme	Number of Indicators	Theme	Sub-Theme	Number of Indicators	Theme	Sub-Theme	Number of Indicators	Theme	Sub-Theme	Number of Indicators
Economic Resilience			Good Governance			Environmental Integrity			Social Well Being		
Investment	Community investment	2	Accountability	Holistic audits	4	Animal welfare	Animal Health	4	Cultural diversity	Food sovereignty	1
Investment	Costs	15	Accountability	Responsibility	2	Animal welfare	Freedom from Stress	2	Cultural diversity	Indigenous knowledge	2
Investment	Internal investment	4	Accountability	Transparency	8	Atmosphere	Air quality	4	Decent livelihood	Capacity development	3
Investment	Long ranging investment	2	Ethics	Due diligence	2	Atmosphere	Greenhouse gases	11	Decent livelihood	Education and training	7
Investment	Profitability	11	Ethics	Mission statement	3	Biodiversity	Ecosystem diversity	12	Decent livelihood	Fair access to means of production	4
Local economy	Contribution	7	Holistic Management	Full-cost accounting	1	Biodiversity	Genetic Diversity	5	Decent livelihood	Quality of life	9
Local economy	Local procurement	2	Holistic Management	Sustainability management plan	11	Biodiversity	Genetic Species	6	Demography	Producer demographics	3
Local economy	Value creation	4	Participation	Conflict Resolutions	2	Biodiversity	Sustainable fisheries	2	Equity	Gender equality	7
Product quality and information	Food Quality	2	Participation	Stakeholder dialogue	17	Land	Land degradation	5	Equity	Non discrimination	2
Product quality and information	Food safety	7	Rule of law	Civic Responsibility	1	Land	Land use	10	Equity	Support to vulnerable people	2
Product quality and information	Product information	4	Rule of law	Legitimacy	7	Land	Soil quality	9	Human safety and health	Public health and nutrition	3
Vulnerability	Diversification	8	Rule of law	Remedy, restoration and prevention	1	Materials and energy	Energy Use	6	Human safety and health	Workplace safety and health provisions	14
Vulnerability	Liquidity	8	Rule of law	Resource appropriation	3	Materials and energy	Material Use	7	Labour rights	Child labor	4
Vulnerability	Risk management	9				Materials and energy	Waste Reduction and Disposal	8	Labour rights	Employment relations	10
Vulnerability	Stability of market	24				Water	Water quality	10	Labour rights	Forced labor	2
Vulnerability	Stability of production	1				Water	Water withdrawal	13	Labour rights	Freedom of association and rights to bargaining	2
Vulnerability	Stability of supply	1							Unbiased trading practices	Responsible buyers	2
									Unbiased trading practices	Rights of suppliers	2
									Human safety and health	Public health and nutrition	6
		111			62			114			85

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