

Metrics of Sustainable Diets and Food Systems

November 4-5, 2014 - Montpellier, France

Workshop Report

Bioversity International & CIHEAM-IAMM

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REPORT ON THE 1ST MEETING OF THE EXPERT WORKING GROUP

“METRICS OF SUSTAINABLE DIETS AND FOOD SYSTEMS”

BIOVERSITY INTERNATIONAL and CIHEAM-IAMM

NOVEMBER 4-5, 2014, in MONTPELIER, FRANCE

21 November 2014



Prepared by T. Allen and P. Prospero

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1- Programme of the workshop

The agenda was structured in *three main sessions*:

- 1- One session dedicated to the framework;
- 2- One session dedicated to the indicators, organized in 8 shorter sessions;
- 3- And a final session to discuss next steps and methodology for data analysis.



Metrics of Sustainable Diets and Food Systems – Expert Workshop

4th – 5th November 2014 - Agropolis International - Montpellier, France

Agenda

Day One – Tuesday 4th November 2014

14:00-14:30 Introduction

14:30-15:30 Session 1 – Framework [Discussant: S. Morse]

14:30-15:00 - Presentation [T. Allen & P. Prospero]

15:00-15:30 - Discussions

15:30-17:45 Session 2 – Selected indicators by cross-dimensions

15:30-16:00 Biodiversity loss/Nutritional quality of food supply [Discussant: C. Staver]
Illustrative indicator: Nutritional Functional Diversity [R. Remans]

16:00-16:30 Water depletion/Affordability of food [Discussant: S. Franco]
Illustrative indicator: Water footprint of an average diet [A. Chapagain]

16:30-16:45 Coffee break

16:45-17:15 Price volatility/Affordability of food [Discussant: GA. Simon]
Illustrative indicator: % Food HH expenditure [S. Dury]

17:15-17:45 Biodiversity loss/Satisfaction of cultural food preferences [Discussant: L. Panzone]
Illustrative indicator: Diets locally produced [M. Padilla]

17:45-18:00 Day 1 wrap-up

Day Two – Wednesday 5th November 2014

8:45-10:45 Session 2 (suite) – Indicators by cross-dimensions

8:45-9:15: Changing food consumption patterns/Dietary energy balance [Discussant: J. Coates]
Illustrative indicator: Prevalence rate of overweight and obesity [Y. Martin-Prevel]

9:15-9:45: Changing food consumption patterns/Nutritional quality of food supply
[Discussant: T. Johns]
Illustrative indicator: Food Purchasing Power Index [S. Mili]

9:45-10:15: Price volatility/Nutritional quality of food supply [Discussant: A. Marquina]
Illustrative indicator: HDDS [B. Cogill]

10:15-10:45: Water depletion/Nutritional quality of food supply [Discussant: M. Srairi]
Illustrative indicator: Irrigation Water Efficiency Index [H. Belhouchette]

10:45-11:00 Coffee break

11:00-12:15 Session 3 – Gaps and roadmap

11:00-11:30: Aggregation and composite indicators [Discussant: C. Cafiero]

11:30-12:15: Identifying gaps and agreeing on future work [Discussants: M. Padilla & B. Cogill]

12:15 - 12:45 Workshop wrap-up

12:45-13:00 Closing remarks from the *Fondation Daniel & Nina Carasso*

2- Objectives of the workshop

In his introduction, T. Allen pointed out the three main objectives of the workshop:

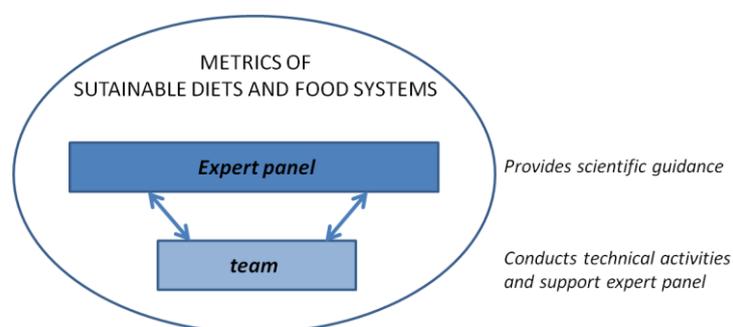
- 1- **Establish a multidisciplinary task force of experts.** Joint effort is key to advance on the agenda on the metrics of sustainable diets and food systems. The organizing team would like to promote future personal and institutional cooperation in the field of sustainability analysis and assessment of the food systems and encourage project oriented co-operations.
- 2- **Explore the different approaches** to assess the sustainability of diets and food systems. It is also broadly expected that the symposium and workshop will be an opportunity for the participants to exchange of information on current initiatives and research activities.
- 3- **Refine a framework and shortlist of indicators for sustainable diets and food systems.** The final objective is to gather some recommendations with regard to the development of indicators of sustainable diets and food systems and identify a process for an improved list of indicators.

The assembled group of experts should be seen as a *scientific network* which, on the one hand, discusses the work done to monitor and assist the *team* in establishing the metrics and, on the other hand, as a group of possible partners to join the *team* – though their own activities or in prevision of future collaborative activities – to design, validate and apply the system of indicators.

This first workshop aimed to provide a forum to discuss jointly key questions with regard to indicators of food system sustainability reflecting the various backgrounds and different perspectives. It builds on the expert consultation undertaken through a Delphi process to select candidate indicators. It is expected that the expert panel functions as an expert network which meets on a regular basis.

In this context, Bioversity International and CIHEAM-IAMM intend to engage further with the participants, review and test different methods for measuring sustainability that have already been developed, but also to examine different features of sustainability which have not yet been captured sufficiently in existing approaches.

Figure 2.1: Organizational design



[Note: By *team*, we mean the technical staff that conducts the activities towards the development and application of the metric system, and operates as a secretariat to support the

panel of experts, which provides the overall scientific guidance. See Figure 2.1. The team is currently composed of members of staff at CIHEAM-IAMM and Bioversity International, but it is desired to give the possibility to other scientists and technicians in other institutions to join the team and contribute in the technical activities.]

3- Brief overview of the proposed framework and related discussions

In their presentation, T. Allen and P. Prosperi pointed out the three principal objectives of the metric system: informing, measuring progress and support decision-making. They presented the research process, suggesting the following steps: 1) extensive review of indicators and conceptual frameworks; 2) two focus group sessions with a small group of experts to discuss and refine framework and list of indicators; and 3) three iterative rounds of a Delphi survey for the selection of indicators with a large panel of experts. See Figure 3.1.

It was explained the system-oriented approach proposed – for the assessment of sustainable diets and food systems – incorporating elements from the vulnerability and resilience theories. Exposure, sensitivity and resilience provide the concepts to identify the system’s properties that shape a causal pathway towards food system’s outcomes. Results of the consensus on the indicators were then presented.

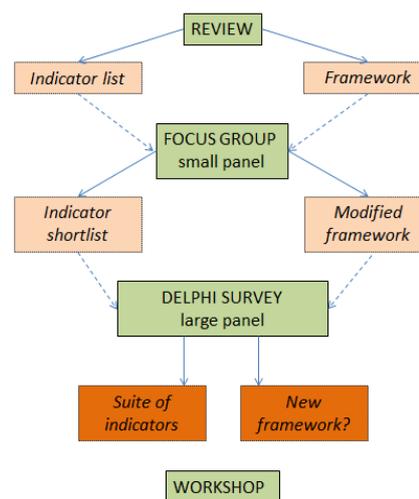


Figure 3.1: Research design

There is one crucial question to answer when applying this approach: **Vulnerability/resilience of what to what?** Four main food and nutrition security issues – i.e. food system outcomes at risk specific to the Spanish, French and Italian context – and four global and regional drivers of change – relevant to the Mediterranean region and likely to impact the identified issues – were identified. Brief definitions of these main issues and drivers were repeated and are provided below.

Identified global environmental and socio-economic drivers of change

Water depletion:

Water depletion is “a use or removal of water from a water basin that renders it unavailable for further use” (Molden, 1997). Water availability is closely related to climate change trends altering precipitation patterns and rainwater (Freibauer et al., 2011). It is also related to agrofood patterns and the use and concentration of agrochemicals, impacting the quality of water, further contributing to water scarcity.

Biodiversity loss:

Biodiversity loss is defined as “the long-term or permanent qualitative or quantitative reduction in components of biodiversity and their potential to provide goods and services, to be measured at global, regional and national levels” (CBD, 2004). Biodiversity loss is cogenerated by climate change, environment depletion and water stress. It is strongly related

to modern food production and consumption patterns (Altieri, 2000) that have become more intensive and homogenizing.

Food price volatility:

Food price volatility refers to large and atypical “variations in agricultural prices over time” (FAO, 2011). Climate change impacts, changing trade patterns, new dietary trends and growing demand for biofuels are often invoked as among the causes of food price volatility. The rising demand for food and fuel, originated from consumption and industrial purposes, is engendered by both population growth and changes in food consumption patterns (Brown, 2008). Furthermore speculation on commodity markets and reduction of food stocks are also crucial determinants of price variations (Fisher, 2008; Robles et al., 2009).

Changing food consumption patterns:

Changes in food consumption patterns¹ refers to the changing structure of global food consumption, related to changing dominant values, attitude and behaviours (Kearney, 2010). Food choices are deeply embedded in social norms. Individual food consumption patterns – i.e. diets – are the results of changes in culture, social values and representations attached to food consumption, driving effectively behavioral changes and resulting in modified diets. The global changes in food consumption patterns – some talk about a “westernization” of food consumption patterns (Drewnowski and Popkin, 1997) – are largely driven by demographic factors and income growth, and related to changes in dominant values and lifestyle, influenced by globalization, urbanization, changes in occupational status and employment distribution, and more effective dissemination of information (Meade, 2012).

Identified food and nutrition security issues

Nutritional quality of the food supply:

The Nutritional quality of food supply refers to the nutritional composition of the food products on the market (Oquali, INRA/ANES). The improvement of the nutritional quality of the food supply is one of the eight specific actions defined by the WHO European Action Plan for Food and Nutrition Policy 2007-2012. A balanced diet is achieved through personal habits but also requires that the foods on offer to consumers have a satisfactory nutritional composition. In France, a food quality observatory (Oqali) was set up to monitor the quality of the food supply.

Affordability of food:

According to Ingram (2011), affordability of food is “the purchasing power of households or communities relative to the price of food”. It refers to the “economic access” to food (Foran et al., 2014). Affordability is about food being available at prices that people can afford to pay, and in particular, whether low-income consumers can afford to buy enough nutritious food to meet basic needs (Barling et al., 2010).

Dietary energy balance:

Dietary energy balance refers to the balance between caloric intake and energy expenditure (Patel et al. 2004). Excessive fat accumulation is acknowledged to be a risk factor for various health problems, including cardio-vascular diseases, diabetes, cancers and osteoarthritis

¹ This social driver is proposed as one regime driver by the SCAR 2nd Foresight exercise report (2009), closely linked to the other social global driver “changing dominant values”, and is exactly phrased “Consumption quantities and patterns”, referring to literally to “food consumption patterns” and “nutritional transition”.

(WHO, 2014). A range of environmental, social and behavioral factors interact to determine energy intake and expenditure, such as sedentary lifestyles, heavy marketing of both energy-dense foods and fast food outlets, adverse social and economic conditions, the consumption of high-sugar drinks, etc. (WHO, 2000; Swinburn et al., 2004).

Satisfaction of cultural food preferences:

Cultural food preferences are environmental factors related to social background, which contribute to food choices and intakes. It is now acknowledged that honoring ethnic and cultural food preferences, compatible with nutritional requirements, is essential for food acceptance and wellbeing. Food preferences, socially or culturally determined, are now recognized as a key consideration in food security, as highlighted already in the 1996 definition of food security². Assessing cultural issues surrounding food preferences may also help improve dietary adherence to recommendations.

² “Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (World Food Summit, 1996).

4- Summary of the discussions

The main purpose of the indicator sessions, initiated with presentations from participants of specific indicators selected during the Delphi survey, was to intensify the discussions and develop first recommendations on how to proceed with regards to the development of indicators, taking existing approaches and indicators into account.

Some discussions concentrated mainly on the framework, highlighting the needs from some participants to open up the framework to other food systems' outcomes than food and nutrition security. Other discussions focused on specific indicator and technical issues regarding the selection and validation of indicators.

Based on the presentations in the morning and group discussion in the afternoon of the first day, it was agreed to amend the agenda on the second day to accommodate for *brainstorming activities* on three main points that emerge. It was proposed to the participants, individually or in group, to:

- 1- List critical food system's outcomes, for each of the economic, social and environmental dimensions, which need to be considered;
- 2- List potential indicators and detail what they are supposed to measure;
- 3- A final important subject discussed during the workshop referred to the criteria for indicator selection and validation.

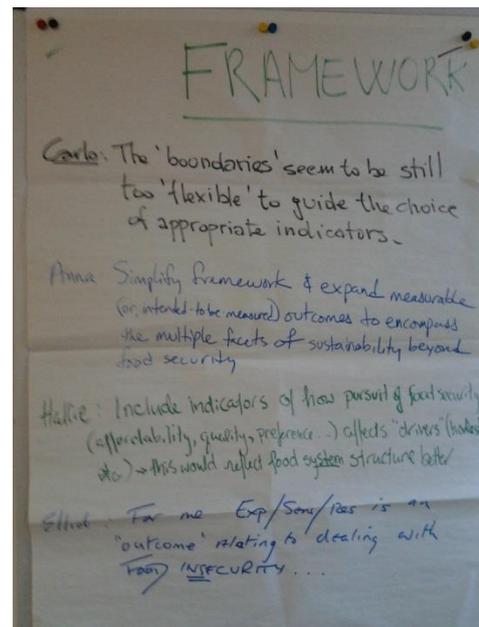


Figure 4.1: Questions on the framework

The following is a brief summary of the issues and aspects discussed during the workshop; it will follow the three points mentioned above and does not intend to be comprehensive.

4-1 Discussions on the outcomes of food systems

An important part of the discussion focused on the framework. This emerged from an acknowledged incomplete understanding of the proposed framework, but also from questions around its comprehensiveness. The proposed framework builds on the vulnerability and resilience theories. A participant explicitly wondered what was “the direct link [between these concepts and] sustainability”.

Several participants would have liked to see other food systems' outcomes than food and nutrition security issues considered. As was already emerging from the Delphi consultation, environmental and social outcomes are standing out as crucial elements to consider and include in the assessment exercise. “Environmental and social factors are key in the process and need to be considered as a product of the activities” [of the food system]. It should be “recognized that food systems are responsible also for diverse environmental and social

outcomes”. It was highlighted that this would be more in line with the general perception of what sustainability means: “People think about sustainability as an outcome”. “People want a descriptor of a state rather than the prediction of a state”. Furthermore, some experts would have also liked to complement the list of food and nutrition issues, adding elements such as “dietary quality”.

Related to the topic, a connected discussion emerged around the type of policy-makers targeted and the role of the media in informing policy-makers. “Who are the stakeholders we need to influence?” “What would be the policy makers?” A participant added that “the media are critical” [for informing policy-makers].

The use of the framework to anticipate and predict possible future outcomes of the food systems was acknowledged. A participant presented the framework as “a model”, highlighting the causal pathway that it aimed at providing. Some participants recalled in particular that “understanding what is driving the outcomes is important”.

An expert summarized nicely the discussions by suggesting that there might be different goals for policy-makers at different level: 1) “Goal to communicate to high-level policy makers (/consumers) and media about the overall state of the food systems. We have thus to focus on outcomes, but need to know more of them”. 2) “Diagnostic models and causal analyses can help policy-makers but other type of policy-makers”.

Another comments stressed the linear dimension of the vulnerability/resilience framework. “There is a missing part concerning the feedback”. It was suggested to “add more non-linearities to [the] framework” to account for the “dynamics of the food systems”. Although specific areas and topics need to be defined more precisely, a participant stressed the point that the approach should integrate systemic approaches.

Following these discussions, it was decided to accommodate a new session to give the group the opportunity to list the essential food systems’ outcomes that need to be added and considered. The propositions were written down on boards (See Figure 4.2) and are recorded below. Participants had also the possibility to comment on others’ inputs. Some match already proposed issues, others were already suggested by participants during the Delphi survey, and others are new proposals. When enumerating outcomes of interest, participants were encouraged to think globally, and not only on the contexts of France, Spain and Italy, the initial focus of the first phase.

Environmental outcomes:

- Air quality
- Biological quality/Biodiversity
- Ecosystem services
- Energy security
- Global food environment indicators
 - > Food Imports/exports³
 - > Local food production⁴
- Land quality
- Pollution
- Soil quality
- Water quality
 - > Water scarcity (quantity)
 - > Water pollution level (quality)



Figure 4.2: Proposed outcomes

Suggested interpretation by a participant: Food Security is guaranteed within Earth's carrying capacity (or Planetary limits). This means that Biodiversity loss is avoided, water depletion avoided, etc.

Social outcomes:

Social Capital:

- Food safety nets⁵
- Social relationships between consumers and producers ("bridging and "bonding" capital)

Cultural:

- Awareness of values concerning food sustainability
- Household food skills knowledge
- Consumption patterns of "sustainable" food/behavioral change

Social equity/justice:

- Governance/food regulation
- Participation in decision-making
- Food sovereignty
- Wealth inequality
- Accessibility to resource use/availability/land prices
- Farm debt level
- Age of farm population
- Labour rights

Economic outcomes:

- Employment⁶/labour availability ["Increased amount of people employed in the food sector"]

³ An expert suggested to "see 'Import dependency ratio'" as it has been already considered in the proposed list of indicators for the Delphi survey.

⁴ An expert suggested that these indicators are somehow available via ecological footprint accounting.

⁵ Reminder: An indicator was proposed to assess this point.

- Market concentration
- Financial stability
- Access to markets
- Distribution of wealth/income/benefits⁷
- Competitiveness [“How competitive is food production sector compared to neighboring countries”]
- Land availability/price

Other Food and Nutrition Security outcomes:

- Availability: “The supply outcome/issue currently only considers the nutritional quality of food and completely ignores the topic of quantities at play”. “Is the amount of food supplied sufficient and likely to be sufficient in the future? This needs to be captured”.
- Access: “Food access/Food affordability/Food price”
- Utilization: “Diet quality or nutritional content of diet (not only energy)”
- “Access to animal products”
- “Human health/Optimal health/Longevity”
- Stability

4-2 Discussions on some selected indicators

Seven indicators were presented, namely the water footprint of an average diet, the nutritional functional diversity, the percentage share of household food expenditure, the percentage share of diets locally produced, the prevalence rate of overweight and obesity, the household dietary diversity score, and the irrigation water efficiency index.

Discussions followed each of the presentations, and tend to focus more on the specificities – strengths and weaknesses – of the indicators, than on its inclusion in the framework and relevance to address the question of the sustainability of the food systems.

Common subjects of discussion across most of the seven indicators are:

- Applicability at diverse scale;
- Comparability across countries [To compare between the scoring of other countries”];
- Relevance in all contexts [“Index of deprivation to guide interventions in the UK? A policy maker already knows the area where we need to do something”];
- Availability of data: “Data availability is most important”.

Participants were then asked to list candidate indicators, including indicators already proposed in the Delphi consultation or suggesting new ones, and answer the following question⁸: *What is the attribute that the indicator is supposed to be measuring? (describe it in words as precisely as possible, including the object to which it applies and the time-frame reference)*

⁶ An expert asked: “Could we consider an economic outcome of sustainable food systems that of generating employment?”

⁷ An expert wondered if this outcome “maybe an issue of social equity?”

⁸ This question was suggested by a participant to help direct discussions.

Please find below brief syntheses of the propositions and comments on some specific indicators that have been discussed and highlighted during this session:

- *Prevalence rate of overweight and obesity*: “Focus on a specific group of critical relevance for the future, e.g. adolescents [or women]”.

- *Household Dietary Diversity Score*: “Measure of the number of unique foods or food groups consumed by household members over a given period (24 hr). At household level, it is a proxy for the average economic ability of a household to access a variety of foods”⁹. A participant indicated that this indicator might be more “helpful in really critical places”. This score is different to the measure of micronutrient adequacy used in low income countries of child and women’s dietary diversity score.

- *Irrigation Water Efficiency Index*: “Product of ‘network for irrigation water transport and distribution’ efficiency by plot efficiency”¹⁰. A participant noted that this indicator better reflect the quality of the infrastructure, rather than water depletion. It was reminded that this was precisely the reason why it had been proposed as an indicator of system’s resilience to water depletion.

- *% of food household expenditure*: A participant proposed another indicator “of access to food” “that is simple to access [and] easier [to compute]: % of poor people or number of poor people”.

- *Nutritional Functional Diversity*: “The indicator is capturing the diversity of food supply [in terms of nutrients]”¹¹.

- *Healthy Food Basket Index*¹²: “Indicator about food nutritional quality [...] describing food availability/access”.

- *Water Footprint of [nutrient-dense] foods*: “An indicator of environmental outcomes of food systems (foods that make up the overall supply)”.

- *Water Footprint for an average diet*: Suggestion to compute the indicator by “income quintile”. A participant suggested these added water footprint indicators: Blue & green water footprint; gray water footprint; blue water scarcity; water pollution level; water use efficiency.

- *Presence of safety net programs*: “Measures the presence of public programmes to intervene – when needed – to facilitate access to food by providing an additional income to vulnerable people, thus enabling them to purchase food on free markets”.

- *Ecological footprint*¹³: “Deals with intensity of land and resource use and [...] compares current rate of resource supply with rate of resource demand by humans”.

⁹ Note from the presenter’s slides.

¹⁰ Note from the presenter’s slides.

¹¹ Note from the presenter’s slides: “Specific objectives: 1. Monitor the diversity in nutritional composition produced or supplied by agriculture and market systems; 2. Identify species/ varieties that add nutritional diversity to a system; 3. Evaluate sensitivity/ resilience of a system for providing nutritional diversity”.

¹² For information, this indicator was in the first proposal of the Delphi consultation, but was not selected at the end of the third round.

- *Screen time*: “Measures propensity to obesity”;
- *Internet use*¹⁴: “Measures consumer information access”;
- *Import Dependency Ratio*: Two participants highlighted the “need to look at export volume and local production volume”. Another participant added that the IDR “can [...] be calculated on the basis of the [...] cropland footprint variables”.
- *% of diets locally produced*: “What is ‘local’? What spatial scale [...]? What food are included?” A participant mentioned the “Traditional Food Variety Scores (TFVS) [Roche et al. 2008] or Traditional Food Diversity Score (TFDS): indicates the number of traditional foods consumed by each individual in a 24-hour recall. This means having an inventory of traditional foods. Consumption frequency of 30 traditional foods, selected for their nutritional value from the preliminary investigation of the traditional food system (Creed-Kanashiro et al., 2009)”.

Reminder of the other indicators discussed or selected in the Delphi consultation:

- *Crop Agrobiodiversity Factor* [89%]
- *% of nutrient intakes from 10 most volatile foods* [72%]
- *Food Purchasing Power Index* [64%]
- *Sensitivity to price volatility* [86%]
- *Intensity of use of actual water resources* [61%]
- *% of total acreage of top 5 varieties* [64%]

(Note: In parenthesis, the % of consensus reached during the Delphi survey)

The outcome shows that some indicators cannot be assigned solely to one category, but capture both social and economic aspects. It turned out also that the different understandings of sustainability influenced the selection of proposed indicators and complicated the discussion. An expert highlighted that some of the proposed indicators are more “outcome indicators” and others more “predicting/system indicators”, and suggested splitting the indicator in two groups.

4-3 Discussions on the criteria of indicator selection and validation

The exercise of selecting metrics imperatively implies considering selection and validation criteria for good quality indicators. This aimed at discussing the strengths and weaknesses of the indicators that were chosen. Special attention was given to the relation between indicators, goals, framework and data. A list of important criteria was drawn up to help select “good and appropriate” indicators. Classical scientific criteria, like statistical reproducibility and representativeness, were also mentioned.

¹³ For information, this indicator was proposed by a participant in the Delphi consultation, but was not selected at the end of the third round.

¹⁴ For information, this indicator was in the first proposal of the Delphi consultation, but was not selected at the end of the third round.

Criteria:

A participant proposed 4 priority criteria, and a set of appropriate questions, to assess the quality of a proposed indicator:

- *Causality*: Is it causally linked to the attribute, in the sense that a change in the attribute causes a change in the indicator value?
- *Identification*: Are there other phenomena that may ‘move’ the indicator, apart from the target attribute?
- *Reliability*: Is there a way to assess how ‘noisy’ is the indicator? (i.e., what is the extent of ‘measurement error’ around the value of the indicator?)
- *Feasibility*: Are the necessary data available? What is the geographic coverage of existing data? What is the time coverage?

Another set of criteria has also been mentioned during the discussion:

- Understandable and easy to interpret, in particular for policy-makers if they are the targeted users
- Policy-relevant
- Cost-effective and easy to collect
- Accessible over time
- Appropriate scope
- Capture causal mechanisms
- Accurate or statistically sound
- Sensitive or responsive to change

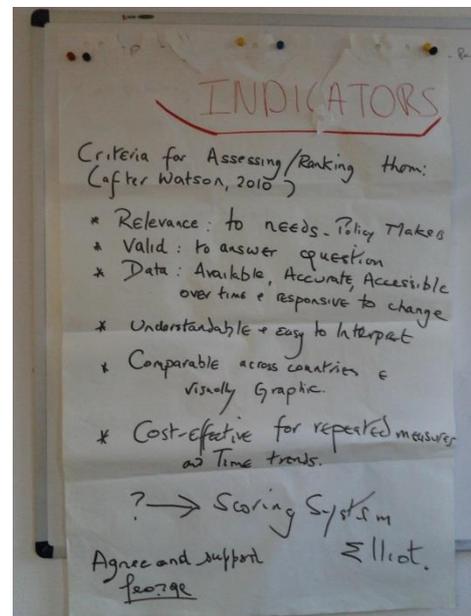


Figure 4.3: Proposed criteria

Principal Components Analysis (PCA) was mentioned as a statistical tool used to select variables through the identification of association and dependency relationships between variables. It was reported that PCA is appropriate to synthesize information from data, but it needs a dense matrix of data to be representative and reveal a metric structure. Otherwise, it is necessary to define a structure or framework first.

5- Conclusions and next steps

The main findings of the discussion can be summarized in the following bullet points:

- The development of indicators for food systems' sustainability requires a broader reflection on outcomes;
- The approach should further take into account systems' dynamics and feedback, focusing on the dynamics between elements of the system and underlying process;
- Final indicator selection should be based on a set of agreed and recognized criteria. These can include analytical soundness, feasibility, relevance, etc. See discussion 4.3. The final aim being to discuss the strengths and weaknesses of each selected indicator and to check the quality of the available indicators;
- More analysis of the various elements of sustainability of diets and food systems, as well as the development of an appropriate and applicable information tool for decision-making processes, are necessary.

Although we will reflect on how to improve the discussion methods used in the workshop, the overall results met the expectations. Altogether the presentations and the discussion provided a good basis for the future work of the team and the related research at Bioversity International and CIHEAM-IAMM. In this context the workshop held directly after the symposium provided an excellent basis for the exchange of information with regard to current concepts and research activities. A special *visiting scheme* has been proposed to expand further the personal and intellectual engagement achieved during these two days and will lead to concrete institutional co-operation initiatives in the future. The workshop showed that more research is needed.

Next steps:

- **Continue the community of practice** already established for a consolidated and scientifically robust understanding and application of the multiple dimensions of food system sustainability. The community of practice built with the Delphi method in Phase 1 and the two international symposia¹⁵ will be used to provide a reference for the further development of the indicators. A set of core partners will be instrumental in supporting the community of practice, as well as the host for further technical development of the tools.
- Further development and **testing of candidate indicators**: The systematic selection of indicators for sustainable diets and food systems has been initiated during the first phase of the project and resulted in a first shortlist of candidate indicators. However, missing dimensions and gaps have also been identified, and further work is needed.

Following recommendations from the recent workshop, the selected indicators should now be confirmed as validated measures of the crucial system elements and outcomes that need to be monitored. New indicators need also to be identified. Each proposed indicator will be assessed regarding a set of agreed criteria for final selection. Using

¹⁵ One roundtable – Madrid (Spain) in November 2012 – and two international symposia – Granada (Spain) in September 2013 and Montpellier (France) in November 2014 – were organized.

quantitative analyses, the degree of correspondence between the framework elements or constructs with the indicators will be tested. Members from the panel will be consulted and a specific visiting scheme has been proposed to engage further with the experts.

- **The indicators will be applied in different contexts.** It is desirable that indicators are tested in different settings and mapped out at different scales. Geographical Information System (GIS) could be used to display the diverse dimensions fundamental to understanding the food system outcomes at different geospatial levels. To ensure the relevance of the maps and results, **stakeholders will be consulted** at specific points throughout the project. The CIHEAM-IAMM proposed to compute and include the final set of indicators in the database of its Mediterranean Observatory¹⁶ for the 19 countries it monitors.

¹⁶ <http://www.ciheam.org/index.php/en/observatory/indicators>

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Annex 1: List of participants

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