

Central Framework of National Accounts and the Satellite Accounts: a Systemic Approach to Organize the Data for Sustainable Development Policy Purposes

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Abstract:

The UN System of National Accounts (SNA) and the European System of Accounts (ESA) both provide a sequence of accounts at national and possibly regional level describing economic activity in a reference accounting year. This is the core of the system of accounts which has been consolidated over several decades of implementation in official statistical offices and subject to periodical revisions. The central framework has been progressively expanded and integrated with specific accounts, to focus on sectors of economic activity, sub-populations of national producers or new areas of interest, going beyond the consolidated representation of the economy and the functioning of society as a whole.

Today, there is a broad consensus among academia and experts in the field that the system of accounts should be wider, especially to cover information on key sustainability topics and issues. This also implies including measurements of the other two dimensions of sustainability: the social one and the environmental one. Probably in the future there will be a refocusing on what should be considered as 'central' to the accounting framework.

Starting from the inputs already provided by the supporting chapters in the available SNA and ESA manuals, an analysis will be carried out of the potential and limits demonstrated by this powerful statistical tool in to specifically support sustainable development policies.

Introduction

The system of national accounts provides a powerful statistical framework to describe at the macro-level the process of development of an economy in a reference accounting year. The UN System of National Accounts (SNA) and the European System of Accounts (ESA) both provide the methodological basis and the sequence of economic accounts at national and possibly regional level. This is the core of the system which has been consolidated over time but also expanded and integrated with specific Satellite Accounts (SA), that attempt to cover the environmental and social dimensions interacting with economic development.

The three dimensions, together, are necessary to properly describe progress in sustainable development and to enable appropriate policy decisions to be made that take into account all existing interactions.

Furthermore, what is considered 'central' in the framework of the system of accounts is evolving on the basis of methodological developments, new data availability and changing policy requirements.

In this paper, after a brief consideration of the systemic approach to accounting, the methodological indications of SNA and ESA manuals are summarized with respect to SA relevant for analysing "sustainability". An analysis of potential advantages and limitations of this statistical tool is reported in the conclusions.

The Systemic Approach to Data Organization

Modern system theory, widely used in science, provides a useful approach for the analysis of sustainability applied to social issues in the broad sense, that is including economics and its natural environment (Dyball, 2015). Extensions, such as those of chaos theory, allowed also to consider the complexity of dynamics in our real world and how even small events and actions can affect the whole system (Lorenz, 1972). That is why even small values or variations in macro aggregates should be kept in great attention.

Macro-(national and regional) accounts have been developed following this systemic approach within the SNA and ESA (UN, 2009; EU, 2013). As mentioned, this is the proper way to describe the complex phenomenon composed of many 'parts' interacting with each other, in particular macroeconomic developments within the environmental and social spheres, even if this have to be expressed only in monetary terms. The SNA/ESA framework is structured in a central set and several satellite sets of accounts, with connected entries that consider feedback effects. This is a typical "application of a **systematic accounting approach**" (ESA, 22.10).

This "accounting framework of the SNA allows economic data to be compiled and presented in a format that is designed for purposes of economic analysis, decision-

taking and policymaking” (1.1; n.b. SNA references are reported in the paper with number only). The data, after the organization into accounts, are suitable for producing statistical macro-indicators to be used for the previous purposes.

Specifically, SA have to be considered in this methodological approach base on system theory.

Satellite Accounts in SNA

In the SNA manual, chapter 29 is dedicated to “Satellite accounts and other extensions”.

For SNA manual “The sequence of accounts is fully integrated in large part because of the underlying rigour of the **[business] accounting system**” (29.1) as it is “derived from the broad *bookkeeping principles*” (3.112). That is why “SNA works with a quadruple-entry accounting system” (26.17).

SNA is, for the previous reason, “integrated, economically complete and internally consistent”; moreover, despite these characteristics, “A great deal of *flexibility* can be applied in its implementation” in different ways (29.1). Based on that, several further systems of accounts *linked* to the “core accounts” (17.193) can be devised.

It is possible “to select a group of products or industries ...designated here as key sectors” and “to compile a complete sequence of accounts for the key sector also” (29.3). This is the development of a *sub-system of “key sector accounts”* (29.3), which is, in this case, fully included and so coherent with the central system. An example of this, provided by the manual, is “the goods and services primarily serving tourism” (29.3).

Following the manual, this approach may lead to very specific choices as “for example concentrating on a single agricultural crop or mineral output” (29.3). This is theoretically possible, but implementation is constrained by the availability, at the time of compilation, of basic data or disaggregated statistics.

“A further and more extensive form of flexibility is that of truly **satellite account**”, “linked to, but distinct from, the central system” (29.4). Note that “each is consistent with the central system, they may not always consistent with each other” (29.4).

“There are two types of satellite accounts” (29.5): “**internal satellite**” or extension Satellite Accounts (SA), by introducing reclassifications and extensions; “**external satellite**” or supplement SA, by introducing alternative concepts (29.85).

In the first case there could be “some rearrangement of central classifications and the possible introduction of complementary elements. Such satellite accounts

mostly cover accounts specific to given fields such as education, tourism and environmental protection expenditures and may be seen as an extension of the key sector accounts just referred to” (29.5). “Many elements shown in a satellite account are invisible in the central accounts” as “they are merged for presentation in more aggregated figures or they are only implicit components of transactions which are estimated globally” (29.5). They are “extensions” “specific to given fields such as education, tourism and environmental protection expenditures” (29.5).

This type of satellite accounts can cover social and environmental topics relevant to analysing progress on sustainability of the development.

“The second type of satellite analysis is mainly based on concepts that are alternatives to those of the SNA” (29.6) or “may add non-economic data” (29.85). For example “a different production boundary, an enlarged concept of consumption” that “may give rise to partial complementary aggregates, the purpose of which is to supplement the central system” (29.6).

This second type of SA “allow experimentation with new concepts and methodologies” that are focused on specific topics of sustainability. An example “may be the role of volunteer labour in the economy” (29.8) and the introduction of a different view of the economy as the “third or social economy (TSE)” (UN, 2018).

As such, these accounts are a “suitable way to explore new areas in a research context” (29.85), open to other scientific areas and to the introduction of theoretical innovations that can lead to “possibility of changes in the central system itself” (29.8). For example, there may be a shift of the central focus from economic growth to *human well-being*, since “an individual’s state of well-being, or welfare, is not determined by economic factors alone (1.83), or, in addition, a full consideration of the critical “link between economic data and non-monetary information” in the system of accounts (29.94).

Satellite Accounts for Sustainable Development

Several examples of satellite accounts are briefly described in the SNA manual which could be important for analyzing the “sustainability” of the development process: “*tourism satellite account* and the *environmental satellite account*”, “the *health satellite account*”, a “fourth area covers unpaid *household production activities*” (29.87), “*accounts for water and forests ... of the main environmental satellite account SEEA*” (29.88), and “further satellite accounts for *agricultural products*” (29.88).

In these and further cases “International guidelines on satellite accounts ... may eventually move towards an accepted international standard” (29.88).

Furthermore, the SNA notes that there are some cases of satellite accounts where “the boundary between satellite accounts and a straightforward elaboration of the SNA ... is not clear cut” (29.86). Relevant examples for our purposes are “the treatment of *NPIs* in chapter 23 and the *informal sector* in chapter 25 are clearly satellite accounts” (29.86).

Three satellite accounts systems are presented in greater detail in SNA, which deal with expanding areas of the economy and are related to sustainability:

- The system of “**Tourism Satellite Sccounts**” (**TSA**) developed by Eurostat, OECD, World Tourism Organization (29.89-29.101);
- The “**System of Environmental and Economic Accounts**” (**SEEA**), that is “the satellite for Integrated Environmental and Economic Accounts” by UN, EC, IMF, OECD and WB (29.102-29.127);
- “The **System of Health Accounts (SHA)** as a joint effort by the OECD, Eurostat and WHO” (29.128 – 29.142).

The last section of SNA, dedicated to “unpaid household activity”, “is not concerned with a normal satellite account” (29.143 – 29.161) but opens the way for the subsequent development of the system to “**Third or Social Economy sector accounts**” (**TSE**).

The **TSA** “is a long established satellite account with more than 70 countries having compiled one at some stage” and a manual of international guidelines, known as the 2008 *Tourism Satellite Accounts: Recommended Methodological Framework*” published by Eurostat, OECD, World Tourism Organization and UN (UN, 2010).

We know that in the modern global economy this is a fast growing sector of activity with a strong impact on the environment and on local communities. The purpose of TSA is to analyze in detail the demand for goods and services associated with this economic activity, in turn associated with the statistical unit of “visitors”; describe how this supply interacts with other economic activities and, in the future, possibly link it to the impact on the environment and society. Recent publications in this context by UNWTO are: *UNWTO Inclusive Recovery Guide – Sociocultural Impacts of Covid-19, Issue 3: Women in tourism* (2021), *Buddhist Tourism in Asia: Towards Sustainable Development* (2000), *UNWTO Recommendations on Tourism and Rural Development – A Guide to Making Tourism an Effective Tool for Rural Development* (2000), *Sport Tourism and the Sustainable Development Goals (SDGs)* (2019),

The **SEEA** Central Framework (SEEA-CF) was adopted by the UNSC in 2012, as the first international standard for environmental-economic accounting, and the official

version was published in 2014 (UN, 2014). A methodological update has been undertaken recently for ecosystem accounting (see below).

“Environmental accounts aim to reflect within a framework based on the SNA the impacts of using (and sometimes using up) natural resources and the generation of residuals that pollute the air and water. They also identify specific activities undertaken to prevent or combat the environmental impacts of human activity” (29.102). This is a topic where physical measurement and accounts could be linked to standard monetary ones in national accounts, “enlarging the scope of the accounting framework by adding non-monetary information, e.g. on pollution and environmental assets” (ESA, 1.41);

The latest UN publication in this field is *SEEA Ecosystem Accounting (SEEA EA)* (UN, 2021) which broadens the vision by adopting a spatial approach to accounting, as the benefits the society receives from ecosystems depend on the position of those assets in the landscape in relation to the beneficiaries.

Finally, Eurostat published several manuals for the SEEA implementation in EU: *Environmental protection expenditure accounts (EPEA)* (2017), *Environmental goods and services sector (EGSS)* (2016), *Manual for air emissions accounts* (2015), *Resource management expenditure accounts (ReMEA) – draft guidelines* (2014), *Physical Energy Flow Accounts (PEFA) Manual* (2014), and more on specific environmental topics.

The **SHA** manual, *A System of Health Accounts (SHA) 2011 - revised edition*, is published by OECD, WHO and the EC in 2017 (OECD et al, 2017).

The healthcare industry is expanding and has a particular role in relation to sustainability, as dealing with the state of the *human body and mind* is a key factor for well-being and the possibility of long-term development of society. The expenditure prospective is considered in SHA but, similarly to the previous satellite accounts, several extensions are possible.

Lastly, there are several methodological developments focusing on households, civil society and the non-market and non-profit economy. Several countries did studies or produced national satellite accounts on this fields. Today we find, among others, manuals on *Household Production and Consumption: Proposal for a Methodology of **Household Satellite Accounts*** (Eurostat, 2003), *Beyond the Market: Designing **Non-market Accounts** for the United States* (US-NRC, 2005) and *Satellite Account on Non-profit and Related Institutions and Volunteer Work* that leads to the **Third or Social Economy (TSE) accounts** system (UN, 2018). These accounting systems combine items for the economy and society, which have been left outside the so-

called production boundary in SNA together with internal information, using data already included in national accounts but hidden in the aggregates or classified differently.

The latter is a promising area for studying social, and even partially economic, resilience and sustainability. For example, “extended accounts can be drawn up which include also the imputed monetary values of, for example: (a) domestic and personal services produced and consumed within the same household; (b) changes in leisure time; (c) amenities and disadvantages of urban life; (d) inequalities” (ESA, 1.46). Even more, considering that “**Welfare** has many dimensions, most of which are not best expressed in monetary terms. A better solution for measuring welfare is therefore to use, for each dimension, separate indicators and units of measurement. The indicators could be, for example, infant mortality, life expectancy, adult literacy and national income per capita. These indicators could be incorporated into a satellite account.” (ESA, 1.47).

In conclusion, but not least, further developments are expected to focus on economic issues relevant to **economic sustainability**, as already mentioned in the original manuals, that “depend on a combination of the evolution of economic processes (such as new financial instruments), advances in statistical estimation and measurement techniques, and improvements in data collection” (*C - The SNA in the context of other statistical systems - Future developments: the research agenda*; UN, 2009). ESA manual also mentions satellite accounts on standard economic topics (labour, productivity and growth, R&D, balance of payments, government finance) and corporate activity (ESA, 22.06), but the “non-observed economy” that includes the informal sector is also very relevant in this context (ESA, 11.26). Finally, new developments are expected in emerging areas of globalization such as, for example, the “digital economy” and proposals for new SA are underway by the UN Advisory Expert Group on National Accounts (UN-ISWGNA) and by some pilot countries (UN, 2020a; BEA, 2020).

In relation to economic sustainability, accounting at corporate level is also evolving due to legislation and regulations in the EU, US and other countries.

Links between national accounts and business accounts

The link between macro- (aggregated) and micro- (corporate) accounts is an important step in their compilation as the latter provide the primary input for the former. SNA introduces the “links to commercial accounting” in the chapter on “Measuring corporate activity” (21.60-21.66). ESA dedicates a chapter to the measurement of corporate activity and the transition from business accounts to national accounts (ESA, Chap. 21).

“Business accounts represent ... a major source of information for corporate activity in national accounts” and they “shares with business accounting a number of characteristics” (ESA, 21.01).

“**Business accounting** is moving to applying shared international standards. Harmonisation at world level began on 29 June 1973 with the creation of the International Accounting Standards Committee (IASC) whose mission was to develop basic accounting standards referred to as IAS (International Accounting Standards) and then later as IFRS (International Financial Reporting Standards), that could be applied across the world. In the European Union, the consolidated accounts of EU listed companies are prepared according to the IFRS frame of reference from 2005 onwards” (ESA, 22.02).

Legislation and regulations in EU are moving forward rapidly with specific non-financial reporting requirements, starting from large entities and group of enterprises and the financial sector: Directive 2014/95/EU specifically on **non-financial reporting** (NFRD), Regulation 2088/2019 on **sustainable finance disclosure** and Regulation 852/2020 on **taxonomy for sustainable finance**. In 2021 the European Commission adopted a “proposal for a **Corporate Sustainability Reporting** Directive (CSRD)” (EC, COM/2021/189 final).

Today, approximately 11700 large companies are subject to the reporting requirements of the NFRD (EC, COM/2021/189 final). This means that in the coming years national accounts will have new data for implementing satellite accounts within the area of social and environmental sustainability, as soon as definitions and forms stabilize in corporate accounting.

Advantages and limitations of SA

SNA and ESA offer a chance to widen the core system by producing satellite accounts which are either internal, using data already included in national accounts but classified differently, or external, including things that are not covered in the core system but based on the same concepts and definitions. For ESA, “the central framework can be used as a building-block-system to serve many important specific data needs” developed in SA (ESA, 22.01).

Let's consider the main advantages and limitations of SA.

First of all, “major advantages of satellite accounts include ... application of a **systematic accounting approach**” (ESA, 22.10). In EU statistical system “The wide range of satellite accounts illustrates that the national accounts serve as a frame of reference for a variety of statistics” (**statistical frame**) (ESA, 22.09). That is why a system of SA makes it possible to enrich macro-information on the

sustainability of the development process, adopting the same accounting framework and approach consolidated in macroeconomics and economic policies.

Keeping a **macro view** on the “totality” of the dynamics by ensuring coherence among the different systemic representations, in terms of categories and definitions, allows the production of compatible measures and to generate many synergies in terms of estimation in a complex and costly-data production world.

SA is a powerful tool to get insights specifically for policy use (**policy focused**), enabling to understand the systemic links among the measured aggregates and the interacting populations of units behind them.

SA are a base for calculating indicators: “as with the SNA, the SEEA accounts provide a score-keeping function from which key indicators can be derived and a management function in that they can be used in the analysis of policy options. The accounts provide a sound basis for the calculation of measures which may already be included in sets of **sustainable development indicators**, but they may also be used to develop new indicators, such as environmentally adjusted macro-aggregates which would not otherwise be available” (29.104).

Furthermore SA, specifically SEEA, allow to consider “extending the SNA to allow the effects of depletion and degradation to impact the macro-aggregates such as GDP”. (**extended view**) (29.105). This means that several feedbacks between accounting systems in different spheres can be analyzed.

The limitations of SA are rooted in two main issues: the difficulty of collecting some kind of data, essential for filling SA accounts, and the methodology and the tool itself, as has been evident in its standard economic applications. It should be added that, in practical implementations of SA, these issues are compounded by the marginality of resources dedicated to SA production in NSOs.

Specific needed data to allow of some disaggregations of main economic aggregates or to measure narrow phenomena are not recorded (**data unavailability**) or difficult to estimate, even if, paradoxically, plenty of big data are nowadays available.

Furthermore, the processing times and disclosure of accounts are often too slow with respect to policy decisions needs (**statistics delay**).

Even the feedbacks in the systems of accounts can make difficult to “read” the registered measures and, to complicate their understanding, the latter require continuous revisions over time of the time series, which can generate uncertainty and a “perception” of unreliability (**accounts readability**).

Finally, oversimplification with numerical representation of the development process, especially for links to environmental and social aspects that have to be expressed in monetary terms, can lead to overly easy conclusions by non-technical readers and, ultimately, ineffective decisions by policymakers (**oversimplified information**).

Conclusions and further developments

Today, there is a broad consensus among academia and experts in the field that the SNA/ESA system of accounts should have a broader coverage, especially over key “sustainability” topics and issues. This implies that social and environmental measurements should be included in the system, connected and coherent with the economic aggregates. Probably, in the future, there will be a refocusing on what should be central to this accounting framework, towards wellbeing and sustainability (UN, 2020b).

The SA systems already studied in the last decade, which focus on areas relevant for sustainable development, should be further developed and implemented in more countries to enable the production of relevant statistics that respond to present policy needs (for example the recent European Green Deal). Further proposals for new SA are underway by UN-ISWGNA. Not all SA have the same relevance for sustainability and some of them are becoming priorities under political pressure.

Recent development in business accounting, particularly in the area on non-financial reporting, will allow to companies to provide data currently unavailable, in the economic but especially environmental and social dimensions. The SA system for sustainability purposes can be improved by following the business accounting developments.

In addition, there are several side statistical benefits and limited costs in implementing SA. That is why there is a wider use today and new applications are being proposed. A criticality that remains, in common with standard accounting systems, is the timing of the final release and dissemination of data: even if it is a very effective tool, information becomes ineffective if does not arrive on time. Statistics is a support to quantitative based decision making. A solution to this specific issue is expected from more efficient technology but also by an improved proportionality of the resources invested on SA production by governments. While a final critical part remains on the narrow estimation of specific data and their quality control, which are necessary to compile reliable SA.

In conclusion, keep a macro and multi-dimensional vision of the development process, as is the case with SA, is extremely important considering the nature of the issues of “sustainability” and the high number of systemic interactions between variables and units involved.

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