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**THE SYSTEM OF NATIONAL ACCOUNTS
1993 PRODUCTION BOUNDARY:
UNFINISHED THEORETICAL AND MEASUREMENT ASPECTS**

by

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Introduction*

The *System of National Accounts 1993* (SNA93) is a monumental document. Its contributions are numerous and lasting. Progress in the System of National Accounts (SNA) has been impressive. After tracing the historical evolution of the SNA, and reading the informative articles pertaining to SNA93 by Kendrick (1996: 1-23), Carson (1996: 25-72), van Tongeren (1996: 73-84), Hill (1996: 85-89), Eisner (1996: 91-113), Pyatt (1996: 115-119), Lützel (1996: 121-139), Goldschmidt-Clermont (1996: 141-147), Hulten (1996: 149-181), Blades (1996: 183-190), Levin (1996: 191-208), Reich (1996: 209-229), Dawson (1996: 231-235), Dievert (1996: 237-285), Gordon (1996: 287-297), Roy Choudhury (1996: 299-311), Harrison (1996: 313-315; 339-341), Ivanov and Homenko (1996: 317-338), Vos (1996: 343-379), Kurabayashi (1996: 381-386), Ruggles (1996: 388-416), Postner (1996: 417-421), Young (1996: 423-449) and Hibbert (1996: 451-455), most of us would be inclined to agree with Robert Eisner's statement that "The national income and product accounts have been one of the most important contributions to economic understanding of this century – perhaps of any century" (1996: 91). Much remains to be done, however. The focus of the present paper is on the SNA93 Production Boundary (PB). This permits a selective focus on core issues of SNA93.

The 1993 System of National Accounts has two, fundamental, complementary dimensions, both of which are directly related to its PB. The first dimension, which is the design of SNA93 as a conceptual framework for consistent reporting by various countries, is thoroughly examined by Carol Carson (1996: 25-71). The second dimension, which is the analytical orientation of SNA93, is described and strongly emphasized by Jan van Tongeren (1996: 73-84).

According to SNA93, its "central framework ... presents a number of characteristics which give it the advantages of an integrated accounting structure. It is *exhaustive* and *consistent* within the boundary of the economic activities it covers; that is to say, each unit, transaction, product and purpose is given a *place*, and *only one*, in the classifications and accounts of the System. Moreover, the set of concepts adopted by the system is fully *coherent*" (italics added) (CSNA93: 489).

The present paper aims to highlight selected unfinished theoretical and measurement aspects of the SNA93 production boundary. Inevitably, the paper raises the question of whether the central framework of SNA is indeed exhaustive and coherent and whether the concepts adopted by it are fully consistent. The answer is important because a correct definition of the SNA93 PB, and any efforts to correct, revise, or expand it, require concepts that are coherent, consistent and exhaustive.

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The present paper focuses on selected conceptual aspects and analytical, functional, features of SNA93 in respect to the PB which need further elaboration because they appear to lack consistency and/or clarity. It thereby hopes to expand, complement and, in some instances, even correct the conceptual framework and analytical orientation of SNA93 in order to make them, and the concepts adopted by them, more exhaustive, consistent and coherent.

The conceptual framework and analytical orientation of SNA93 are seen as partly deficient. More specifically, serious unfinished or unresolved design, conceptual, theoretical and functional tasks or problems appear to exist in respect to the following dimensions of the production boundary.

1. SNA93 defines production “to be a physical process.” Its “production boundary” includes “all production ... destined for the market,” and “... all goods and services provided free to individual households or collectively to the community by government units or NPISHs” (CSNA93: 4). Nowhere, however, does SNA93 provide a fully coherent, consistent set of criteria that can be used to define the production boundary and the commodities included in it.

Recommendation 1: Use the Walrasian usefulness and costliness criteria to define the SNA PB and the commodities included in it.

2. SNA93 distinguishes between “market output,” “output produced for own final use,” and “other non-market output” (CSNA93: 128). Nowhere, however, does SNA93 provide a fully coherent, consistent set of criteria that can be used to distinguish between “market” and “non-market” output.

Recommendation 2: All output should be considered as market output. Furthermore, using as a criterion the nature of needs as private, semipublic, and collective, outputs and markets should be divided into private, semipublic and collective.

3. SNA93 deals with “the production of goods and services” (CSNA93: 2; Kendrick, 1996: 12-13). Nowhere, however, does SNA93 provide a coherent, consistent set of criteria that can be used to distinguish between “goods” and “services.”

Recommendation 3: Use the tangible or intangible nature of economic transformation (Mamalakis, 1989; 1997; 1998) as the criterion to distinguish between goods (tangible) and services (intangible economic transformation).

4. SNA93 states that “products,” i.e. “goods and services” “are the result of production” (CSNA93: 22). It also uses the term “value added” as “a measure of the contribution to GDP made by an individual producer, industry or sector” (CSNA93: 2). Nowhere, however, does SNA93 provide a coherent, consistent set of criteria that can be used to define and distinguish between “value added” and “products (goods and services).”

Recommendation 4: The term “value added” should refer to incremental production. The terms “commodities” or “products” should refer to cumulative production. Value added should refer to a single or unbundled value added component. Commodities should refer to bundles, or cumulative, value added components (Mamalakis, 1989; 1997; 1998).

5. The SNA93 production boundary does not recognize in its core design or analytical orientation (a) the vital, complementary role of environmental, natural capital services which are or may become scarce, or (b) the synchronous economic, costly production of useful and useless (damaging) outputs.

Recommendation 5: The Walrasian usefulness and costliness criteria should be adjusted to incorporate the role of environmental/natural capital inputs and services and the impact of non-useful outputs, as a consequence of economic production, on the environment/natural capital.

In the two sections that follow, the SNA93 attempt to expand its PB to include household “goods” production is presented and scrutinized. In the subsequent sections, analytical tools that could prove useful to the effort to coherently, consistently, and exhaustively define the PB are presented.

The Walrasian Usefulness and Costliness Criteria of the Production Boundary

The essence of SNA93 and its production boundary is the creation of economic value. Economic value is created, according to Walras (1984: 65), when needs are satisfied by commodities which are both useful, i.e. capable of satisfying needs, and costly, i.e. available in limited quantities because they use scarce resources. Commodities have economic value if they are useful, i.e. satisfy human needs, and costly, i.e. use scarce factor services. As a consequence, the Walrasian production boundary includes only those commodities that pass the usefulness *and* costliness criteria (Mamalakis, 1996: 293-319).

Although the usefulness and costliness criteria appear at first sight to be quite simple and clear, in practice they have been subject to various interpretations.

In the SNA, the Walrasian usefulness criterion has been accepted and interpreted quite broadly. With few exceptions, as long as commodities satisfy human needs, they are useful. “... we need not concern ourselves with the morality or immorality of any desire, which a useful thing answers or serves to satisfy” (Walras, 1984: 65).

With respect to the costliness criterion, SNA has included within its production boundary all commodities produced with scarce and costly inputs by corporations, government, and nonprofit institutions serving households (NPISHs), and some commodities produced by households.

Initially, SNA93 includes in its PB those commodities that have their usefulness and costliness ascertained in private markets. “All goods and services produced as outputs *must* be such that they can be *sold* on markets or at least be capable of being provided by one unit to another, with or without charge. The System includes within the production boundary all *production destined for the market, whether for sale or barter*” (italics added) (CSNA93: 4; Kendrick, 1996: 12-13). For goods and services to be included in the SNA93 PB they must pass through private markets, where the exclusion principle applies, by being sold or bartered. It is not sufficient to only have market demand and supply. There must also be an exchange through sale or barter.

SNA93 proceeds, however, subsequently to state that its PB “also includes all goods and services provided free to individual households or collectively to the community by government units or NPISHs” (CSNA93: 4). Thus, as long as goods and services are both useful and costly, i.e. go through private, semipublic or collective markets, they are included in the SNA93 PB. It does not matter whether their usefulness and costliness is articulated in private, semipublic or collective markets.

In an effort to provide a new, extended, improved measure of the flow of economic goods and services, SNA93 has introduced a new version of the Walrasian usefulness and costliness criteria. This will be referred to as the “physical or tangible nature” of the output produced by households for own consumption criterion. It can also be referred to as the “household physical economic transformation criterion” (Mamalakis, 1998: 5). According to the new SNA93 criterion only “goods household production for own consumption” is added to the household and the aggregate Pbs.

“The System ... includes all production of goods for own use within its production boundary, as goods can be switched between market and non-market use even after they have been produced, but it excludes all production of services for own final consumption within households (except for the services produced by employing paid domestic staff and the own-account production of housing services by owner occupiers). These services are consumed as they are produced and the links between their production and market activities are more tenuous than for goods production, such as agricultural goods which households may produce partly for own final consumption and partly for sale, or barter, on the market” (CSNA93: 5).

Thus, as long as household production is physical, i.e. involves goods, it is part of the SNA93 PB. Nonphysical household production, i.e. of services, is explicitly excluded. Goods are included because they “can be switched between market and non-market use even after they have been produced” (CSNA93: 5). Services are excluded because they “are consumed as they are produced and the links between their production and market activities are more tenuous than for goods production, ...” (CSNA93: 5).

Evaluation of SNA93 Criteria Used to Include Goods Household Production in Its Production Boundary

The following types of household production are included in the SNA93 PB. First,

“own-account production of housing services by owner occupiers” or stated differently “the values of the housing services consumed by owner occupiers” (CSNA93: 5). These housing services produced and consumed by owner occupiers are composite commodities embodying both goods- and services-value added components. They are included in the SNA PB because they are large, important, quite comparable to housing services produced by institutional units other than households, and it is possible to make reasonable estimates of their value. Inclusion of household-produced composite housing services in the SNA93 PB is important because it clearly breaks down the barrier between the SNA93 PB and household production of services-composite-commodities.

Second, the SNA93 PB includes “all production of goods for own use ... as goods can be switched between market and non-market use even after they have been produced ... such as agricultural goods which households may produce partly for own final consumption and partly for sale, or barter, on the market” (CSNA93: 5). In this instance, as also elsewhere, SNA93 does not distinguish between goods as tangible value added components, on the one hand, and goods as composite commodities with goods, i.e. tangible, characteristic value added components, on the other hand.

SNA93 appears to include in its PB only goods-composite-commodities produced by households. Whether these goods are agricultural, industrial or mining ones, they are, however, always composite commodities embodying both goods- and services-value added components. The argument, therefore, that services are excluded is invalid because the SNA93 PB by definition includes the service value added components of composite goods produced by households.

Another problem arises because of the justification provided by SNA93 in including “goods” but excluding “services” from its PB. Composite goods, e.g. agricultural ones, are included in its PB because they “can be switched between market and non-market use even after they have been produced”, while services are excluded because “they are consumed as they are produced and the links between their production and market activities are more tenuous than for goods production” (CSNA93: 5; Kendrick, 1996: 12-13). Neither one of these arguments is, however, unambiguous.

When composite goods are switched by households between market and non-market use, it is not only their goods- but also their services-value added components that are switched. The ability to be switched criterion cannot, therefore, be used to distinguish between goods- and service-value added components. The services value added components that are embodied in the composite household goods that are included in the SNA93 boundary are, by definition, as “switchable” between market and non-market use when they are part of “goods-composite-commodities” as when they are part of “services-composite-commodities.” Service value added components that are “switchable” between market and non-market use when they are part of goods composite commodities do not automatically lose this characteristic when they are part of a service composite commodity. The links between the production of service value added components and market activities are, thus, as strong as the links between the production of goods value added

components and market activities.

SNA93 is unable to reach this conclusion because it does not distinguish between goods and services as value added components, on the one hand, and composite commodities, on the other hand. As a consequence, on the one hand, SNA93 automatically, although admittedly only implicitly, includes in its PB services when they are value added components of agricultural, industrial and mining composite commodities, but, on the other hand, categorically "... excludes ..." from its PB "all production of services for own final consumption within households" with the exception, as already noted, of housing services and services produced by employing paid domestic staff.

Third, SNA93 includes in its PB "expenditures on goods utilized ..." in the household production of service composite commodities, "... e.g. cleaning materials..." (CSNA93: 5). Even these cleaning materials are, however, composite commodities embodying service value added components.

Fourth, and this point is similar to the first one, SNA93 includes in its PB services produced by employing paid domestic staff, which are composite, i.e. embody both goods and service value added components, rather than purely incremental in nature.

The SNA93 attempt to expand its PB by including only household goods production cannot be considered successful because it fails to provide coherent and consistent criteria that could lead to inclusion of only goods value components but exclusion of service value added components.

It is widely agreed upon that the SNA PB should be expanded to include at least part of household production. Although in the right direction, the SNA93 physical-nature-of-the-household-product criterion does not provide sufficiently coherent and consistent guidelines to the practitioner in respect to the new PB. Household production could and should be analyzed in terms of its tangible-goods and intangible-services macrocomposite and meso-incremental characteristics. Ultimately, however, it is the SNA core criteria of market usefulness and costliness that can provide the most transparent and consistent guidelines.

In the case of household production, the most practical, as of this moment, criterion would be the equivalence, conceptually and in terms of measurement, to private, semipublic, and collective market production. It should not matter whether this macro or meso household production is tangible or intangible as long as it is market-equivalent. The SNA PB could then include value added not only by household goods activities, such as agriculture, manufacturing, construction and mining, but also by services activities, such as transport, storage, trade and finance, where output is continually switched between own consumption and the market.

In the sections that follow an attempt is made to elaborate, clarify and define the concepts used by SNA93 when it expands its PB to include "goods" production by

households.

Macro, Meso and Micro Markets and Production Boundaries

The notion of markets is vital to economics and SNA93. Markets have or can be classified according to a variety of criteria. The SNA93 production boundary has macro, meso and micro dimensions.

The Macroeconomic Design, Analysis and Production Boundary

SNA was born in the era of macroeconomics and monetary and fiscal policies aiming to remove open unemployment and underutilization of capital while maintaining price stability. Its original analytical orientation was macro, emphasizing the Keynesian demand-oriented interplay between consumption and investment to eliminate unemployment and increase labor productivity. The conceptual framework and analytical orientation of its PB were defined by gross domestic product (GDP) and its consumption (C), investment (I), exports (E) and import (M) components. Thus, from a macro perspective, the SNA93 PB can be defined first, as the sum of the C+I+E-M macro components. Second, the SNA93 PB is the sum of the PBs of five mutually exclusive institutional sectors, namely, nonfinancial corporations, financial corporations, general government, households and NPISHs (Carson, 1996: 42). Institutional units are grouped into institutional sectors on the basis of their principal functions, behavior, and objectives (Carson, 1996: 42).

Whether the GDP or macro boundary is right or wrong depends on whether the underlying micro and meso production boundaries are defined and estimated correctly.

The Meso-economic Design, Analysis and Production Boundary

The macro-based and macro-oriented knowledge, design, inner-workings, analytical frontier, needs to be complemented by a meso-based and meso-oriented knowledge, design, inner-workings, analytical frontier that provides a valuable understanding of the meso-links and the meso-dynamics between the micro and macro production boundaries.

The mesoeconomic design focuses on the meso, or value added production boundary. From a meso perspective, the aggregate SNA93 PB is the sum of value added components produced by all goods and service activities, i.e. by agriculture, industry and services.

The mesoeconomic design focuses on the fact that all composite macrovariables, i.e. GDP, C, I, E and M, are the sum of value added components produced by goods (V^g) and service (V^z) activities, where V stands for value added and the right superscripts g and z stand for goods and services activities producing it respectively. Thus, $GDP = {}^{GDP}V^g + {}^{GDP}V^z$, $C = {}^C V^g + {}^C V^z$, $I = {}^I V^g + {}^I V^z$, $E = {}^E V^g + {}^E V^z$, and $M = {}^M V^g + {}^M V^z$. All macro PBs are the sum of meso PBs. The upper left superscripts stand for the macrovariables embodying

the value added components produced by the activities described by the upper right superscript.

Meso, value added, components of national accounts can strengthen the relationship of the SNA to price, micro theory and policy. The meso economic design that distinguishes between unbundled (incremental) and bundled (cumulative) value added components has the analytical orientation that is an indispensable foundation of price, micro, value and market structure theories.

A mesoeconomic conceptual framework and analytical orientation may greatly enhance the usefulness of the SNA. The mesoeconomic approach, which is a vital but neglected part of SNA93, is promising in a number of directions.

First, it can provide consistent and coherent criteria that can be relied upon when contemplating an expansion of the SNA PB. Since total output is the sum of value added by agriculture (V^a), industry (V^i) and services (V^s), the SNA93 PB is the sum of the V^a , V^i and V^s PBs. Or, which is equivalent, $GDP = V^g + V^z$. An extension of the SNA93 PB to include household production could, thus, be facilitated by examining the household-produced V^a , V^i and V^s , or, alternatively, V^g and V^z .

Second, it could greatly help in determining the true PB in developing countries by focusing attention on value creation by enterprises (corporations), general government, NPISHs and households not only in agricultural (mining, etc.) and industrial (construction and so forth) but, also, in all types of service activities. The PB problems in developing countries could be addressed quite efficiently by focusing on value added by activities (the meso approach) and institutional sectors within them.

Third, the meso, activity, value added analytical orientation could help address the numerous issues raised by Goldschmidt-Clermont (1996: 141-147) in respect to the adequacy of the SNA93 conceptual framework and analytical orientation for developing countries. Measures of output and productivity in formal and informal, urban and rural activities could be greatly enhanced by using the meso criteria of tangible and intangible economic transformation/value added.

Fourth, it needs to be recognized that, arguably, the central, core, analytical concept of the SNA is that of economic value being added within agricultural, industrial, and service activities by various institutional sectors as part of a dynamic process of putting together composite commodities that can satisfy final needs. This meso conceptual-and-analytical dimension is vital in achieving both a conceptual framework and an analytical orientation that are coherent, consistent and exhaustive.

Fifth, it could provide a useful platform for the preparation of global meso as well as macro accounts integrating the (1) activities (agriculture, industry, services), (2) institutional sector, (3) private, semipublic, collective need-output and (4) consumption versus investment dimensions and boundaries (Vos, 1996: 343-379).

Sixth, all of the above could enhance the concept and measurement of productivity at the meso and macro, national and global levels.

**The Microeconomic Design, Analysis and Production Boundary.
Monopoly, Oligopoly, Imperfect and Pure Competition in Value Added
(Incremental) and Composite Commodity (Cumulative) Output Markets**

From a micro production perspective, the PB is the sum of outputs of all individual producers-suppliers. From a micro-expenditure perspective, the PB is the sum of expenditures by all individual buyers.

Markets are, therefore, also differentiated according to the number of sellers (poly-categories) and the number of buyers (psony-categories). As a consequence, traditional market theory distinguishes between monopoly, oligopoly, and poli(go)poly, on the one hand, and, monopsony, oligopsony and poli(go)psony, depending on the number of sellers or buyers in a market, on the other hand.

If markets are to be classified into monopolistic, oligopolistic, imperfectly or purely competitive, and so forth, it is necessary, however, to clearly specify whether their products are incremental (value added components) or cumulative outputs (Mamalakis, 1997).

If markets were for value added, meso, incremental outputs, their respective structures would be described as meso or value added monopolies (psonies), oligopolies (psonies), or pure competition. Meso markets would be homogeneous because they would refer to one value added component. If markets were for cumulative value added outputs, or composite commodities, their respective structures would be described as composite monopolies (psonies), oligopolies (psonies) or pure competition.

It could be argued that micro, price theory never fully recognized the difference between “value added” and “composite commodity” markets because SNA failed to make such a distinction. Or, alternatively, it could be claimed that SNA failed to make this core conceptual and analytical dichotomy because it was never given the appropriate guidance by price theory.

Either way, both SNA and price, market theory could derive significant mutual benefits by clearly distinguishing between “value added” and composite product markets and boundaries (Mamalakis, 1997). Public policy could also be greatly enhanced by an improved understanding of these core SNA concepts.

The macro-micro linkages, which are emphasized by Ruggles (1996: 387-416), can be best understood if they are classified first at the single and, then, at the multiple, “value-added-component” level. This would create a micro (individual), meso (value added), macro (sum of individuals and value added components) triangle facilitating our understanding of the dynamics of private, semipublic and collective markets and output

boundaries.

At the micro level, the incremental and cumulative outputs can be, as explained in the sections that follow, goods (tangible) or services (intangible) as well as private, semipublic and collective, in nature. The respective production boundaries would have to be defined and measured by concepts of prices (direct, indirect, etc.) and economic transformation (quantities, volumes, units and so forth) that correspond to the unique characteristics of economic value creation, i.e. usefulness and costliness, in the respective markets. Both economics and SNA may need to go significantly beyond the traditional approach of using prices (Ps) and quantities (Qs) as presented by SNA93 (CSNA93, Chapter 16), Diewert (1996: 237-285) and the authors cited by Diewert to measure usefulness and costliness. This formidable, and rewarding, challenge is the result of the unfulfilled, but urgent, need for improved measures of economic value creation by corporations, general government, NPISHs and households in private, semipublic and collective markets, and of the corresponding production boundaries. Public choice, privatization, (de)regulation, globalization, environmental and other issues will be continuously raising the bar for national accountants by expecting improved measures of usefulness-value of private, semipublic and collective outputs within the production boundaries.

Markets for Value Added (Incremental Outputs) Components and Composite (Cumulative Outputs) Commodities

A correct definition and estimate of the PB needs to be based on the fundamental distinction between incremental and cumulative value added components. Commodities passing through a market can be either unbundled (incremental) or bundled (cumulative) value added components. On the one hand, there exist markets for incremental outputs, i.e. single value added components. On the other hand, there exist markets for cumulative outputs, i.e. for value added components bundled together. The criterion used in defining and distinguishing between “value-added-component” (incremental) and “gross” (cumulative) output markets is the unbundled versus bundled nature of the “product” that is being traded, transacted or created in that market.

Output Markets for Tangible Goods and Intangible Services

Output markets are, and can be, further classified according to the tangible or intangible nature of the commodities passing through them. A correct definition and estimate of the PB thus also requires coherent and consistent definitions of goods and services. SNA93 does not provide criteria that can be used to distinguish between “goods” and “services” either as incremental (value added components) or cumulative (composite commodities) outputs. In the sections that follow a design and analytical orientation are presented that can hopefully provide this vital missing piece in the SNA PB puzzle.

Tangible (Goods) Versus Intangible (Services) Incremental Outputs (Unbundled, Value Added Components) and Their Respective Markets

The incremental output is, or can be, classified as tangible if it embodies a tangible economic transformation by goods activities such as agriculture, mining or manufacturing. It is, then, referred to as a goods value added component or incremental output. Goods activities produce tangible, “goods,” value added components (Mamalakis, 1989: 803-833; 1997: 183-225).

In contrast, the incremental output is classified as intangible if it embodies an intangible economic transformation by service activities such as trade, transport, education, finance or public administration and defense. It is, then, referred to as a service value added component or incremental output. Service activities produce intangible, “service,” value added components (Mamalakis, 1989: 803-833; 1997: 183-225).

In the International Standard Industrial Classification of all Economic Activities (ISIC), Rev. 3 (CSNA93: 594-595) tabulation categories A (agriculture, hunting and forestry), B (fishing), C (mining and quarrying), D (manufacturing), E (electricity, gas and water supply), and F (construction) refer to goods activities producing goods, tangible value added components. Tabulation categories G (wholesale and retail trade, etc.), H (hotels and restaurants), I (transport, storage and communications), J (financial intermediation), K (real estate, renting and business activities), L (public administration and defense, etc.), M (education), N (health and social work), O (other community, social and personal service activities), P (private households with employed persons) and Q (extra-territorial organizations and bodies) refer to service activities producing service, intangible value added components.

The ISIC consistently classifies activities according to the tangible or intangible nature of the value added (economic transformation) by them.

Tangible Goods Versus Intangible Service Composite (Bundled Value Added Components) Outputs (Commodities and their Respective markets)

When composite, cumulative, bundled commodities flow through markets, the tangible or intangible nature of economic transformation again plays a critical role as a criterion but in a distinct, unique, way.

In the case of composite commodities, it is the tangible or intangible nature of the “characteristic” value added component that defines the composite commodity (Mamalakis, 1997: 183-225).

Thus, a composite commodity is defined as a good if a tangible, “goods,” value added component is used as its “characteristic” one, even though it may, and normally does, contain other tangible-goods and intangible-service value added components (Mamalakis, 1997: 183-225).

Furthermore, a composite commodity is defined as a service if an intangible, “service,” value added component is used as its characteristic one, even though it may, and normally does, contain other intangible-service and tangible-goods value added components (Mamalakis, 1997: 183-225).

In the following classifications presented in SNA93 the terms “goods” and “services” are used without a clear indication of their meaning.

In CSNA93: §2.49, products are said to include goods and services (p. 22). The distinction between value-added (unbundled) components and composite commodities (bundled value added components) is not made.

In the Central Product Classification (CPC), all categories from 0 to 9 implicitly refer to composite commodities. The term “product” stands for tangible goods as well as intangible service composite commodities. The use of the term “product” is, however, confusing. On the one hand, “product” is used in the CPC as the umbrella term that includes both products (sections 0-5) and services (sections 6-9) (CSNA93: 597-598). On the other hand, “product” stands for goods-composite-commodities, i.e. only sections 0-5 of CPC.

In the classification of individual consumption by purpose (COICOP) (CSNA93: 416), all categories implicitly refer to composite commodities. Thus, all “goods” and “services” in COICOP embody both goods and service value added components.

Nowhere, however, in SNA93 is it clearly stated that all “goods,” by being composite, also embody bundles of service value added components, or that all “services,” by being composite, also embody bundles of goods value added components.

The lack in SNA93 of a precise framework distinguishing between “value added components” and “composite commodities” becomes evident when the ISIC and CPC are compared. The claim is made that “... each type of good or service distinguished in the CPC is defined in such a way that it is normally produced by only one activity as defined in ISIC. Conversely, each activity of the ISIC is defined in such a way that it produces only one type of product as defined in the CPC.” (CSNA93: §5.44, p. 118)

This claim is, however, unfounded. CPC is used for a breakdown of household final consumption expenditure “by type of good or service” (CSNA93: §9.63), i.e. by type of “good” or “service” composite commodity. CPC includes categories of composite commodities embodying bundles of value added components. ISIC, in contrast, includes categories of single value added components.

The inability of the design and analytical framework of SNA93 and its PB to distinguish in a clear, definite, explicit manner between tangible (goods) and intangible (services) value added components, on the one hand, and bundles of tangible and intangible value added components which are designated as goods when the

characteristic value added component is a good, e.g. food or clothing, or as services when the characteristic value added component is a service, e.g. health or education, is a major weakness and shortcoming that needs to be corrected.

Private, Semipublic and Collective Needs, Outputs and Markets

Total output or gross domestic product (GDP) is the sum of the final output in private, semipublic and collective markets. Thus, the total production boundary, in this instance, is the sum of the private, semipublic and collective production boundaries. As a consequence, the estimate of total output or GDP is as “right” as the estimates of its component private, semipublic and collective outputs are right and accurate.

Private Needs, Outputs and Markets

Private markets are those dealing with commodities that satisfy private needs, i.e. where the exclusion principle applies. The usefulness of private commodities can, but is not necessarily, ascertained by explicit, direct prices that are intended to cover their cost of production. Private commodities are normally sold at a price intended to cover their cost of production. They can also, however, be provided partially or totally “free,” i.e. with the user paying only part, or no part at all, of the cost (price) of production was the case in formerly Centrally Planned Economies (CPEs) (Ivanov and Homenko, 1996: 317-338). Furthermore, private commodities can be produced not only by private, but also mixed or state-owned (government or public), corporations, non-profit institutions and households.

Semipublic Needs, Outputs and Markets

The SNA has experienced an “evolutionary development” (Ruggles, 1996: 387), adding to its micro and macroeconomic roots an increased social orientation (van Tongeren, 1996: 81-83). This has been in response to such issues as education, poverty, vouchers, the welfare-to-workfare movement, old age entitlements, alcoholism, drug addiction, health and so forth. To a large extent, this social orientation reflects the increased role of social, i.e. semipublic and collective, needs, outputs, and markets. Part of this evolutionary development involves the expansion of social orientation into the global arena. There is an ever increasing global interdependence between private, semipublic and collective needs, markets and production boundaries. The usefulness and costliness dimensions have lost their purely national base and orientation. They are incorporating a decidedly global, international component.

As a consequence of the rising importance of semipublic and collective needs and outputs, there is a parallel, increased, interest in developing usefulness and costliness criteria that correspond to the ever-changing, idiosyncratic characteristics of these markets. Both the usefulness and costliness criteria have tangible and intangible dimensions that need, but are difficult, to be measured. The unresolved conceptual and measurement problems are formidable.

At least in part, some of these problems can be addressed and, hopefully, solved by applying the usefulness and costliness criteria to the various value added components of such composite semipublic commodities as health and education. The need for measures of the value-usefulness of semipublic services has always existed. The rising emphasis, however, on accountability and improved measures of labor productivity in intangible value added activities, has imparted a new sense of urgency in addressing the usefulness and costliness issues. The SNA93 PB problem, both in its analytical and measurement dimensions, resembles a mirage. The closer you come to solving some dimensions of this problem, the more likely that new unresolved dimensions of the problem will emerge and a complete solution will become more remote. SNA93 is the culmination of a highly productive era. It also marks the beginning of a new, immensely rich and challenging one. The builders of SNA93 should deservedly be proud of creating solid foundations for the new millennium age of the SNA.

The usefulness of semipublic services likely will be the focus of public policy debate for centuries to come. "Semipublic market" performance measures are already hotly debated. The value-usefulness to users, i.e. the degree of satisfaction of semipublic needs, is increasingly linked to the costliness of the value added components that are cumulatively produced and bundled in largely private component markets. The notion of efficiency in satisfying semipublic needs is inevitably tied to the notion of efficiency in producing the value added components that make up the final semipublic collective commodity. Post 93-SNA can have a glorious future if it can meet the challenge and opportunity of developing new versions of the Walrasian usefulness and costliness criteria that are explicitly applicable to semipublic needs, markets, commodities (services) and productivity.

Collective Needs, Outputs and Markets

Collective markets are defined by the collective nature of the needs which the outputs of their producers satisfy. Collective markets are not defined by the legal nature of the producer. Collective needs can be satisfied by collective services produced by government, NPISHs or corporations. The fact that collective services generally are produced by government does not mean that only government can be their producer.

According to SNA93, collective markets exists "when transaction costs are too high" and production of collective commodities (services) is "financed out of funds other than receipts from sales, namely taxation or other government incomes" (SNA93: §6.49(a), p. 129).

The fact that "while it may be technically possible to charge individual consumers of certain collective services according to their usage or benefits they derive, the transactions costs of so doing would be prohibitively high" (CSNA93) defines collective markets. These transaction costs are not, however, the cause "leading to market failure" (CSNA93: 215). They simply suggest that collective markets bring demand and supply together in a different manner than private or semipublic markets.

It cannot be claimed that SNA93 operates in a vacuum when it comes to the treatment of the PB as it pertains to collective services or government consumption. There is little doubt, however, that the field of collective needs, markets, services, their usefulness and costliness and PB is ranked among the least developed as well as the most promising ones. Jonathan Levin correctly states that “SNA 1993 ... has refined the fine lines distinguishing units carrying out business-like activities from units carrying out government-like activities ...” and that “some issues, such as valuation, remain for future research, ...” (1996: 207).

The SNA93 treatment of government, its production, which is euphemistically and, to say the least, ambiguously referred to as “consumption,” and of collective markets only reinforces the need for a new basic conceptual framework and analytical orientation along the lines presented in this paper. It needs to be recognized that there exist three output markets, namely private, semipublic and collective. There exist also, therefore, private, semipublic and collective output valuation dimensions in the Walrasian usefulness criterion used in determining the SNA93 PB. A general theory of value that encompasses all three dimensions is needed but lacking (Reich, 1996: 210-211). Such a theory could and should be developed within, and as an extension of, the conceptual framework, functional foundation and analytical orientation of SNA93.

The SNA framework of market-price, transaction-based production and consumption needs to be restructured. Such a transformation can possibly be achieved by introducing a “general” market framework encompassing private, semipublic and collective markets; by redefining transactions into private (direct *quid pro quo*), semipublic (indirect) and collective (indirect) ones; by classifying prices into private, semipublic and collective market ones, and developing over time a framework within which various difficult issues can be resolved. The “ingenuity and persistence” (Levin, 1996: 207) of those measuring government justifies the faith and provides hope that the analytical core of SNA93 can be sufficiently transformed to meet these unresolved PB challenges inherited by the new millennium.

**Extending the Walrasian Usefulness and Costliness Criteria to Include
the Environment. Supplementing National Production Accounts (SPA)
With National Pollution Accounts (NLA)**

The articles by Bartelmus (1997; 1999) provide an excellent, comprehensive, review of the relationship between the SNA93 boundary and the environment. Bartelmus and the research of the many authors cited by him make a convincing case that there exists a profound, unsatisfied need for integration of the “Environment” into the SNA core. It is beyond the scope of this paper to discuss all fundamental issues of the two-way relationship between SNA and the environment. Only a few key points will therefore be made.

It is by now fully recognized that when value is being added by producers in

agriculture, industry and services there are costs that go beyond those arising from the use of labor and property services and the “using up” of intermediate inputs. In other words, there are non-SNA costs such as depletion of “natural capital” in its multiple forms. It may not be true that SNA-measured economic welfare is reduced as a consequence of such a renewable or nonrenewable depletion. However, a convincing argument could be made that total welfare may not increase, or even decrease, when SNA output increases as a consequence of the decline in the non-SNA “output” flow from environmental/natural capital (Mamalakis, 1996: 293-296). There is a need, therefore, to expand the notion of Walrasian costliness to include the “cost-value” of environmental, or natural capital, input services that serve as complements to the SNA input services. The fundamental notion of scarcity, which underlies the Walrasian costliness criterion, cannot be ignored anymore in respect to natural-environmental capital-resources and the services provided by them.

Furthermore, it is fully recognized outside the core SNA design and analytical orientation that the link between the “usefulness” criterion and SNA production is not “clean.” In other words, when the useful private, semipublic and collective commodities are produced, there also takes place a parallel, synchronous, production of tangible or intangible, visible or invisible, outputs that do not satisfy any economic needs but are released to the environment/natural capital which may possess a limited capacity to absorb them. This joint production of useful and useless, even damaging-destructive, incremental and cumulative outputs, is too important in public policy to be left outside the SNA core. It would, thus, not be unreasonable to increasingly expect, from the public and government officials, a widening and deepening demand for a preparation of national, even global, pollution accounts (NLA) as supplements to national, even global, production accounts (NPA).

Thus, the core SNA design and analysis need to recognize that all factor services and intermediate inputs are, contrary to accepted theory, not completely used up in production and that, in addition, even when they are used up, new, useless or damaging complementary outputs may arise.

In addition, however, all forms of consumption may not be “clean,” i.e. not all consumer commodities may be fully used up when consumed, and can even create new, useless, or damaging, outputs. Furthermore, an increasing imbalance may be in the horizon between the rising demand, as a consequence of growing world population, for, and the supply of, “free” services flowing from the possibly shrinking, global stock of environmental/natural capital. The menu of unresolved analytical and measurement aspects of the relationship between the production, consumption, investment, export and import boundaries and environmental/natural capital provides an impressive agenda for future research.

Whether SNA, non-SNA economic accounts, or “non-economic” production (environmental) accounts and analysis are considered, it is believed that the tools suggested in this paper can facilitate the supply of correct answers and solutions.

Conclusion

Persistence of the PB problems may be attributed in part to lack of economic theories capable of solving them, in part to inertia, and in part to neglect by SNA experts.

With the exception of the environmental issues, there is no indication that the unresolved analytical and measurements problems of the SNA93 PB, which are highlighted in this paper, were realized by, or were of major concern to, those involved in revision of the 1968 U.N. SNA. As an example, only preparation of integrated economic, sociodemographic and environmental statistics was of concern to Richard Stone (Ruggles, 1996: 410). As reported by Ruggles (1996: 410), the three other issues which Stone stressed in 1986 as deserving attention in the proposed version of the SNA, even though they were not ready for international standardization, were integration of macro and micro data, filling in SNA gaps through statistical methods and links between SNA and MPS (Material Product System). Of these, only the integration of macro and micro data has continued to attract serious attention (Ruggles, 1996).

The present paper suggests the following changes in the design and analytical orientation of the SNA PB:

1. The Walrasian usefulness and costliness criteria should be used to define the SNA PB. It also suggests the use of the concepts of usefulness and costliness of private, semipublic and collective commodities to reveal fundamental dynamics of the economic system.
2. A clear distinction should be made between value added as incremental, unbundled, output, on the one hand, and composite commodities (products) as cumulative bundled value added components, on the other hand. SNA classifications, whenever appropriate, should conform to this fundamental analytical distinction in a coherent, consistent and exhaustive manner.
3. The SNA distinction between market and nonmarket output and needs should be replaced by a classification of needs, markets and output into private, semipublic and collective.
4. The criterion of tangible and intangible economic transformation should be used to distinguish between goods (tangible) and services (intangible) value added components.
5. Composite commodities should be subdivided into composite goods, which have a characteristic "goods" value added component, and composite services, which have a characteristic "service" value added component. Both composite goods and services are bundles of goods and service value added components.
6. The Walrasian usefulness and costliness criteria should be expanded to include

the notions of uselessness and environmental costliness.

7. Production and pollution accounts and production (PB) and pollution (PL) boundaries should be introduced, in a parallel manner, into the SNA core.

8. Extensions of, and beyond, the SNA93 PB should be made on the basis of the hopefully consistent and coherent criteria proposed in this paper.

It is possible that the specific issues of the SNA93 PB examined in the present paper will turn out to be only the tip of an iceberg of challenges that practitioners of national accounts are likely to face in the future. A dynamic field of national accounts should be able, however, to meet the challenge of satisfying the ever changing needs of a dynamic global economic system by continuously filling seen or unforeseen gaps in the conceptual framework and analytical orientation of the SNA. It is hoped that the discussion of the fundamental dimensions of the SNA93 PB of the present paper will make it easier to meet this challenge.

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