

# BETWEEN THE MATERIAL PRODUCT SYSTEM AND THE SYSTEM OF NATIONAL ACCOUNT: RICHARD STONE AND THE INCOMPATIBILITY BETWEEN THE TWO SYSTEMS OF NATIONAL ACCOUNT<sup>1</sup>

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## RESUMO

Este trabalho tem por objetivo mostrar como Richard Stone, o principal protagonista na consolidação da metodologia padrão de apuração da contas nacionais, demonstrou a incompatibilidade do *System of National Account* (SNA) proposto pelas Nações Unidas a partir de 1953 com o *Material Product System* (MPS), um sistema de contas nacionais desenvolvido pela antiga União Soviética em 1923 e que vigorou na mesma e nos demais países socialistas até o final do século XX. O MPS foi desenvolvido tendo por fundamento a divisão da economia entre a esfera material de produção e o setor não produtivo da economia. Esta diferença será fundamental no sentido de determinar a incompatibilidade do MPS com o SNA a partir de dois critérios utilizados por Stone: as estruturas distintas dos dois respectivos sistemas e a aplicação do conceito de produto líquido.

Palavras-chave: História do Pensamento Econômico, Macroeconomia, Contabilidade Nacional.

## ABSTRACT

The subject of this paper is to show how Richard Stone, the main protagonist in the consolidation of the standard methodology for calculating national accounts, demonstrated the incompatibility of the *System of National Account* (SNA) proposed by the United Nations in 1953 with the *Material Product System* (MPS), a system of national accounts developed by the former Soviet Union in 1923 and which was in force in the same and other socialist countries until the end of the 20th century. The MPS was developed based on the division of the economy between the material sphere of production and the non-productive sector of the economy. This difference will be fundamental in determining the incompatibility of the MPS with the SNA based on two arguments used by Stone: the different structures of the two systems and the application of the concept of net output.

**Keywords:** History of Economic Thought, Macroeconomics, National Accounts.

**JEL Classification:** B22, E01

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## 01. INTRODUCTION

National Account is an invention of the 20th century, as stated by Backhouse (2002) and Vanoli (2002). Its development over the aforementioned period aimed to improve a set of statistical and econometric techniques that aimed to measure the main macroeconomic monitoring variables, where the main statistic is GDP.

The *National Account* was consolidated as a standard methodology in 1953 with the publication of the first *System of National Account* (SNA). However, there were already important estimates of national income before the publication of the above system as follows:

(1) Simon Kuznets developed a methodology for studying economic growth problems in developed countries;

(2) Wassily Leontief in the 1920s worked on the methodology of input-output matrices for the United States economy;

(3) the former Soviet Union (USSR), from 1923 onwards, began measuring its macroeconomic variables using the *Material Product System* (MPS), a methodology for national accounts that had the same purpose as the SNA.

Despite the consolidation of the national accounts from 1953 onwards, the former USSR and the other socialist countries that emerged after the Second World War did not apply the SNA, as did both developed and underdeveloped capitalist countries. In this way, the world economy coexisted with both systems until these nations transitioned to capitalism at the end of the 20th century.

From the 1970s onwards, the *United Nations* (UN) attempted not only to make the MPS public but also to make a comparison with the SNA. However, how MPS and SNA may be compared?

This question was the subject of someone who was the main protagonist in the process of consolidating the national account methodology: Richard Stone. Through a seminal article presented at the *Central Statistical Office of Poland* in 1968, *A Comparisons of SNA and the MPS*, the author demonstrates that the MPS and the SNA are incompatible due to the theoretical bases that support them.

The main purpose of this paper is to answer the following question: how and on what arguments does Stone demonstrate the incompatibility between the two systems of national accounts? To answer this question, this paper is divided into five parts. In addition to this introduction, the other parts will cover:

(a) The basic principles and methodological foundations of the MPS, highlighting the concepts of the material sphere of production and the non-productive sector;

(b) The social accounting of the MPS in Richard Stone's thinking and the incompatibility with the SNA;

(c) The incompatibility between the MPS and the SNA based on the application of the net output concept.

(d) The conclusion where the elements that answer the proposed question will be highlighted.

## ***02. THE MATERIAL PRODUCT SYSTEM: BASIC PRINCIPLES AND METHODOLOGICAL FOUNDATIONS***

The first MPS schemes were worked out by the URRS in 1923 and progressively improved. Until 1950, material balances were created and improved where it was possible to link national income and investment, which was considered the fundamental element of the country's annual plans. The integration of material balances into an exchange framework along the lines of an input-output matrix was an example of creating a synthesis of a national economy.

However, what are the concepts and methodological foundations of the MPS? This question is justified because Richard Stone's paper mentioned above does not explore this topic in sufficient depth when comparing the MPS with the SNA. Based on the reports released by the *Department of Economic and Social Affairs of the United Nations*<sup>2</sup>, it is possible to systematize the circular flow of income for a socialist system.

The MPS aimed to be a guide for economics and planning based on information on the fundamental aspects of the national economy organized in a database. The method used in processing primary data is based on a rigorous theoretical foundation of Marxist<sup>3</sup> economics. The social accounting of this system is built from tables and indicators designed to elucidate the concrete form of economic processes and the results of social reproduction (UN, 1971 and 1989a).

Its primary functions were to provide information on:

- (a) The production and disposal of the global product and the national economy;
- (b) The relationships and proportions between basic economic categories;
- (c) The production, distribution, redistribution, and final use of income;
- (d) The level of income and the total consumption of material goods and services by the population;
- (e) The community's manpower, its distribution among the sectors of the national economy, and its uses;
- (f) The size of the structure of fixed capital and other parts of national wealth and their uses in the national economy;
- (g) The composition of production by socioeconomic categories.

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<sup>2</sup> United Nations (1968, 1971, 1981, 1989a, 1989b). A didactic exposition of the MPS, although superficial, can also be found in Pichot (1988).

<sup>3</sup> An in-depth look at this issue can be found in *Theories of Productive and Unproductive Labor*, Marx (1863)

The MPS is a system of concrete representation of the process and results of social reproduction, i.e. it aims to describe the production, distribution, and use of material goods based on their formation, distribution, and use of income and the reproduction of labor like the SNA.

The key concept that delimits the domain of observation is production. In the study of the production process, what is essential is the distinction between economic activities of a collective nature and other forms of activities placed outside the boundaries of economic relations and that belong to the field of pure consumption without touching social relations.

Economic activity, therefore, consists of a set of collective labor inputs in connection with production, distribution, exchange, and consumption in the course of the production process, that is, it is the activity of work in the production of material goods and services for this defendant. Activities outside the boundaries of production and not connected with the process of movement of the global product and national income are not part of the material sphere.

The services provided in the circulation of these products, such as transport and others, are considered productive. It is content that restricts production to its material sphere. The non-productive sector (non-material services) creates neither product nor income. Its function is to use and redistribute material goods and income produced in the material sphere.

The delimitation of the concept of production only in the material sphere is fundamental not only for understanding the MPS as a whole but also for making it incompatible with the SNAs.

The MPS conceives a society with a planned economy divided into primary sectors as shown in Table 1.

TABLE 1

| DIVISION OF THE NATIONAL ECONOMY ACCORDING TO THE MPS                            |  |  |   |   |  |
|--|--|--|---|---|--|
| PRIMARY SECTORS  |  |  |   |   |  |
| PRODUCTIVE SECTORS   |  |  |   | SOCIAL SECTORS  |  |
| PRODUCTIVE   |  | NON PRODUCTIVE   |   | SOCIALISTS  | PRIVATE  |
| CREATION OF MATERIAL GOODS   | MATERIAL PRODUCTION SERVICES                                       | INDIVIDUAL UTILITY SERVICES  | COLLECTIVE UTILITY SERVICES   | State<br>Cooperatives<br>Social Organizations<br>Others | Craftsmen<br>Workers not allocated to cooperatives |
| Industry<br>Construction<br>Agriculture<br>Transport<br>Communications<br>Others | Transport of goods<br>Sectors that ensure the circulation of goods | Public services<br>Health services<br>Education<br>Services<br>social Security | Research and Development<br>Finance Credit and Insurance<br>Administration<br>Other sectors in the non-productive sectors |   |  |

Sources: Pichot (1988) and UN (971, 1989 a and b). Compilation by the author.

Although the MPS scheme provides for the establishment of a framework of national wealth indicators, the national account model is made up of agents and operations. In MPS, primary institutional units are regrouped following a set of needs, according to functional or institutional class.

The economic activity takes place in economically autonomous primary units of the division of labor, that is, companies and financial institutions, financial units for the state budget, social organizations, and private agricultural properties.

Alongside these organic units listed above appears the concept of family. The MPS places them on the margins of economic activity, given that they do not increase the volume of material goods and do not provide services, i.e. they are treated as units of consumption units. Due to the need for economic analysis, a regrouping of these primary units into production sectors and social sectors was inevitable.

Despite the specialization of a group of companies, it is necessary to compose them into homogeneous accounting units from the point of view of the activity they carry out. These are regrouped into production sectors, which are divided between the material production sector and the non-productive sector. The first encompasses the sectors of economic activities that produce material goods, while the non-productive sector comprises services.

The portion that comprises material production is divided into two groups:

- 01) The first group comprises the sectors that create goods and their concrete form;
- 02) The second group comprises the sectors that will deliver the goods created by the goods in the first group to the final consumer, i.e. the services that are linked to material production.

The non-productive sectors are divided as follows:

- 01) The first group corresponds to public services of private interest;
- 02) The second group encompasses services that aim to respond to the general collective needs of society. This second group ensures the necessary conditions for community life.

The division of the non-productive sector into two groups allows services aimed at satisfying individual needs to be taken into account so that the population's level of well-being can be determined based on their overall consumption.

To analyze the technical production processes, it is advisable to regroup the primary units into sectors. The perspective changes when it comes to studying processes of social reproduction understood as the production, distribution, and use of material goods, as well as income and the reproduction of work.

The main elements of social reproduction are determined by the structures in which a given economy is placed where the appropriate perspective here is institutional. The productive activities of material goods and services will be regrouped in social sectors.

The criterion for classifying social sectors is the mode of ownership of the means of production, which will determine the mode of ownership of the product and the income derived from the flow of the output.

The social sectors according to the MPS are the socialist and the private sectors where:

01.: The socialist sector encompasses an entire set of companies and institutions where fixed capital and funds flow under a socialist production regime;

02.: The private sector encompasses a whole set of companies and institutions where fixed capital and funds are developed under a private production regime.

From the division of the national economy into productive and social sectors, the MPS conceives the economic process as a continuous, renewed, and repetitive process of production, distribution, exchange, and consumption constituting a continuous flow of material goods required to replace the means of production consumed and for final consumption, as well as net capital formation (United Nations (1968, pp. 32 1971, pp. 17)).

This circular income flow of MPS is detailed in Table 2.

TABLE 2  
*CIRCULAR FLOW OF MPS INCOME*

|   |  |            |
|---|--|------------|
| <b>GROSS SOCIAL OUTPUT (GSO)</b>  |  |            |
| =   |  |            |
| <b>PRODUCTIVE CONSUMPTION + UNPRODUCTIVE CONSUMPTION +<br/>PRODUCTIVE ACCUMULATION + NON-PRODUCTIVE ACCUMULATION<br/>+ EXPORTS – IMPORTS - DEPRECIATION</b> |  |            |
| <b>NATIONAL INCOME (NI)</b>   |  |            |
| =   |  |            |
| <b>NET VALUE ADDED</b>  |  |            |
| =   |  |            |
| <b>GSO – PRODUCTIVE CONSUMPTION</b>   |  |            |
| Primary Income of the Population from<br>the Material Production Sector   | Primary Income of Companies in the<br>Material Production Sector |            |
| Redistribution of Primary Income:<br>a) by the finance and credit system<br>b) outside the finance and credit system  |  |            |
| <b>FINAL INCOME (FI)</b>  |  |            |
| Production Sector   | Non-Productive Sector  | Population |
| Accumulation  | Consumption  |            |

Sources: Pichot (1988, pp.245) and UN (1989a). Compilation by the author

The relationship between production and final consumption, i.e. the beginning and end of an economic process, is established through distribution and exchange in a process where the material conditions of existence are continually renewed in an aggregate of social relations that result in a specific set of forms of organization of production, exchange, and accumulation.

The two aspects of the production process should be considered: material production of goods for sale and private use and the formation of income. This makes it possible to represent the economic process in the form of flows of material goods and also in terms of flows of income and expenditure so that production is the basic stage of the entire economic process.

Social production results in the creation of material goods used for consumption and expansion of production. The replacement of human resources takes shape during the economic process. The national accounting derived from this concept of economy is based on two fundamental aggregates: the *Gross Social Output* (GSO) and the *National Income* (NI).

The GSO comprises a whole set of material goods produced over a certain period between the different sectors of material production. From the point of view of its concrete composition, the GSO consists of the means of production (primary products and others), consumer goods conceived as non-productive, both in the country and abroad.

The GSO is divided into transferred value represented here by material expenses, that is, the means of production consumed in the aforementioned process such as intermediate consumption and amortization of fixed funds, and into value created again. The GSO corresponds to the SNAs' notion of gross value of production which includes the consumption of intermediate goods with the difference that in the GSO the depreciation has already been discounted.

NI represents the net value-added of all sectors of material production. In a given state of production, income corresponds to that part of the product that remains after transfers (intermediate consumption and depreciation).

In a given state of distribution, national income is decomposed into the primary income of the population employed in the material production sector and the primary income of companies in that sector. Based on the concepts of GSO and NI, there is a circular flow of income for MPS, as already shown in Table 2.

National income has its source in material production. The totality of the value created is the object of primary distribution, which are those who participate in production: workers and companies. In this way, national income is made up of the sum of the income appropriated by the population employed in the material production sector and the primary income of the companies that make up the respective sector.

All primary income is understood to be before taxes. They are the object of a redistribution that ultimately consists of the transfer of resources by workers and companies from the productive sector to the non-productive sector and the population.

The concept of redistribution used here derives from the fact that the 'consumption' of services produced by the non-material sphere does not fall into the respective category, as well as the salaries of the population allocated to the non-productive sector are not considered as primary income due to the facts of the same do not generate net value-added. The result of the redistribution of national income will be the final income that will be used both for consumption and for the accumulation of material goods.

Finally, the MPS national account consists of 5 matrices, including another set of supplementary tables designed to present in a greater level of detail the description of both the GSO and the NI, which describe:

- (1) The production, consumption, and accumulation of the material product;
- (2) The balance of production, distribution, redistribution, and final use of the global product and national income;
- (3) The availability of the manpower;
- (4) The balance of fixed assets;
- (5) The indicators of national wealth.

Due to the objectives of this work, a detailed presentation of the matrices of this national account is not necessary. However, more details can be found in the UN (1989a, 1989b).

As a conclusion to this first part, the MPS has the basic principles and the same foundations as the SNAs, conceiving the economy as a large circular flow of income based on already known categories of economic activities. However, by limiting the production of the economy to its material sphere dividing the economy between productive and unproductive sectors, the MPS will be incompatible with the SNA, as Richard Stone will prove.

### ***03. RICHARD STONE AND THE MATERIAL PRODUCT SYSTEM***

The MPS, like the SNA, is based upon the same principles of both accounting and economic theory, i.e., the circular flow of income and the principle of double entries, respectively. In the second half of the 20th century, the *Department of Economic and Social Affairs of the United Nations* sought to publicize and differentiate both systems of national accounts. Richard Stone (1968), however, was motivated not only to make comparisons but also to show how a contrast of this nature can provide an understanding of different reproduction processes, both economic and social.

The MPS can be defined, like the SNA, as an empirical construction in which it is possible to obtain a set of macroeconomic monitoring variables (Stone, (1947 and 1951)). Stone compares the two systems of national account by the following methodology: (1) identify the principles of both systems; (2) conceptualize the categories of activities that show the functioning of the respective economies; (3) make a relationship between them and; (4) calculate the fundamental aggregates.

As for the first part, the fundamental principles of the MPS have already been duly exhausted in the first part of this essay.

Stone (1968, pp. 168) highlights that the conceptual basis exposed in the MPS structure derives from the division of the economy between the material and non-material spheres, therefore, as a consequence, the other categories of economic activities will reflect this principle. For the objectives of this paper, it is essential to stress the particularities of the MPS and its differences with the SNA. These categories are listed in Table 3.

TABLE 3

| SNA AND MPS: ACTIVITY CATEGORIES  |                             |   |
|---|-----------------------------|---|
| <i>SNA</i>  | <i>FUNDAMENTAL CONCEPTS</i> | <i>MPS</i>  |
| Product of industrial activity, goods, and services, whose primary objective is to place on the market      | COMMODITIES                 | Commodities are restricted to goods produced in the material sphere of production.  |
| These are activities that include industries and services produced by the government and other institutions | ACTIVITY                    | Those listed in Table 1 include services that support material production.  |
| Consumption is related to private spending and those made by the government in both goods and services.     | CONSUMPTION                 | Consumption is related to both the part of material goods absorbed privately and those used by the non-productive sector. |
| It represents payments made to primary factors, that is, it is the excess value over the cost of inputs.    | NET VALUE ADDED             | It has the same meaning as in the SNA, however, in this specific case, it is restricted to the material sphere.           |
| All depreciation is debited to the respective activity account and  | DEPRECIATION                | It is part of both the material sphere and services of any nature.  |



|  |                         |   |
|--|-------------------------|---|
| credited to the capital financing account  |                         |   |
| It consists of demonstrating the sources and destinations of all income transfers.   | REDISTRIBUTION          | It consists of a whole set of services related to the non-productive sector of the economy.   |
| It consists of demonstrating the sources and uses of income appropriated by the factors of production.                                       | INCOMING AND OUTGOING   | The MPS considers both the material and non-material spheres of the economy as sources of income.   |
| It is made up of the value of the fixed asset whose objective is to increase the existing capital stock, as well as to replenish part of it. | GROSS CAPITAL FORMATION | Restricts this category of expenses to those carried out in the material sphere. Non-productive sector expenditures on capital goods are not considered in this category. |
| This account lists a whole set of transactions involving other capital transfers.  | A REDISTRIBUTION II     | This category is not part of the MPS.   |
| Account that is related to financing capital formation and other acquisitions.   | CAPITAL FINANCE         | Account that is only related to financing the acquisition of an asset of this nature;   |
| It is the same in both systems.  | REST OF WORLD           | It is the same in both systems.   |

Source: Stone (1968) and UN (1971). Data compiled by the author.

From the concepts of Table 3, it's possible to have an economic accounting matrix for MPS where it is possible to disaggregate the circular flow of income as well as make a relationship between the elements of the conceptual base placed in the above table.

TABLE 4

| THE MAIN STRUCTURE OF THE MPS - ECONOMIC ACCOUNTING MATRIX |     |     |     |     |   |     |     |    |   |     |    |       |
|--|-----|-----|-----|-----|---|-----|-----|----|---|-----|----|-------|
| D \ O  | 1   | 2   | 3   | 4   | 5 | 6   | 7   | 8  | 9 | 10  | 11 | TOTAL |
| 1. Goods   | 0   | 204 | 157 | 0   | 0 | 0   | 0   | 45 |   | 0   | 47 | 455   |
| 2. Activities  | 402 | 0   | 0   | 0   | 0 | 0   | 0   | 0  |   | 0   | 0  | 402   |
| 3. Consumption   | 0   | 0   | 0   | 0   | 0 | 0   | 157 | 0  |   | 0   | 0  | 157   |
| 4. Net Value Added   | 0   | 184 | 0   | 0   | 0 | 0   | 0   | 0  |   | 0   | 0  | 184   |
| 5. Depreciation  | 0   | 14  | 0   | 0   | 0 | 0   | 5   | 0  |   | -19 | 0  | 0     |
| 6. Redistribution I  | 0   | 0   | 0   | 0   | 0 | 0   | 257 | 0  |   | 0   | 36 | 293   |
| 7. Appropriation of Income                                 | 0   | 0   | 0   | 184 | 0 | 261 | 0   | 0  |   | 0   | 0  | 445   |
| 8. Gross Capital Formation                                 | 0   | 0   | 0   | 0   | 0 | 0   | 0   | 0  |   | 45  | 0  | 45    |
| 9. Redistribution II                                       |     |     |     |     |   |     |     |    |   |     |    |       |
| 10. Equity Financing                                       | 0   | 0   | 0   | 0   | 0 | 0   | 26  | 0  |   | 0   | 0  | 26    |
| 11. Rest of the World                                      | 51  | 0   | 0   | 0   | 0 | 32  | 0   | 0  |   | 0   | 0  | 83    |
| TOTAL  | 455 | 402 | 157 | 184 | 0 | 293 | 445 | 45 |   | 26  | 83 |       |

Source: Stone (1968). Data is totalized by the author.

Considering the circular income flow model for the MPS and its peculiarities to the categories listed above, what are the results that describe the functioning of a national economy? Using the data in Table 4 and considering the 1968 SNA methodology based on a double-entry system, it is possible to reach the results in Table 5.

TABLE 5

| THE NATIONAL ACCOUNT TO MPS |   |
|-----------------------------|---|
| GROSS SOCIAL OUTPUT         |   |
| <b>GSO = 388</b>            | <b>PRODUCTIVE CONSUMPTION = 204</b><br><b>UNPRODUCTIVE CONSUMPTION = 157</b><br><b>PRODUCTIVE ACCUMULATION = 45</b><br><b>EXPORTS = 47</b><br><b>IMPORTS = (- 51)</b> |

|   |   |
|---|---|
|   | DEPRECIATION = (-14)                          |
| <b>NATIONAL INCOME</b>  |   |
| NET VALUE ADDED = 184   | GSO = 388<br>PRODUCTIVE CONSUMPTION = (-204)  |
| <b>FINAL REVENUE</b>  |   |
| FINAL REVENUE = 445   | NET VALUE ADDED = 184<br>REDISTRIBUTION = 261 |
| <b>FINAL REVENUE UTILIZATION</b>  |   |
| CONSUMPTION OF MATERIAL SPHERE<br>GOODS = 157<br>CONSUMPTION OF NON-MATERIAL GOODS =<br>257<br>DEPRECIATION = 5<br>CAPITAL FINANCING = 26 | FINAL REVENUE = 445                           |
| <b>CAPITAL FINANCING</b>  |   |
| GROSS CAPITAL FORMATION = 45  | CAPITAL FINANCING = 26<br>DEPRECIATION = 19   |
| <b>REST OF WORLD</b>  |   |
| EXPORTS = 47  | IMPORTS = 51<br>NET INCOME FROM ABROAD = -4   |

Source: Stone (1968). Data was adapted and calculated by the author.

Finally, it is important to mention the process of pricing-set of material goods and services in the MPS. Considering that the MPS encompasses all products and all income generated in a national economy, such a system is compiled in terms of currency. However, what are the price-set foundations used in the MPS?

The MPS makes a distinction between prices in terms of who buys (purchaser price) and who produces (producer price). The first is used to measure the goods produced and made available by the material sphere through two services that make up the same, that is, all the items that make up the GSO. The producer price are used to measure the prices of goods within the companies that manufacture them. The relationship between them is given as follows:

$$\text{purchaser price} = \text{producer price} + \text{transport services} + \text{exchange margin}$$

Those goods that do not enter the sphere of circulation, including those that are in the production process or are part of some type of stock, are valued at their cost prices.

For the SNA, based on the basic difference that exists between it and the MPS, its circular income flow can be decomposed into the same economic accounting matrix that was done for the MPS, as shown in Table 6, observing the differences between the elements.

TABLE 6

| THE MAIN STRUCTURE OF THE SNA - ECONOMIC ACCOUNTING MATRIX |     |     |     |     |   |     |     |    |    |     |    |       |
|--|-----|-----|-----|-----|---|-----|-----|----|----|-----|----|-------|
|  | 1   | 2   | 3   | 4   | 5 | 6   | 7   | 8  | 9  | 10  | 11 | TOTAL |
| 1. Goods   | 0   | 246 | 166 | 0   | 0 | 0   | 0   | 47 | 0  | 0   | 52 | 511   |
| 2. Activities  | 457 | 0   | 44  | 0   | 0 | 0   | 0   | 0  | 0  | 0   | 0  | 501   |
| 3. Consumption   | 0   | 0   | 0   | 0   | 0 | 0   | 210 | 0  | 0  | 0   | 0  | 210   |
| 4. Net Value Added   | 0   | 236 | 0   | 0   | 0 | 0   | 0   | 0  | 0  | 0   | 0  | 236   |
| 5. Depreciation  | 0   | 19  | 0   | 0   | 0 | 0   | 0   | 0  | 0  | -19 | 0  | 0     |
| 6. Redistribution I  | 0   | 0   | 0   | 0   | 0 | 0   | 102 | 0  | 0  | 0   | 13 | 115   |
| 7. Appropriation of Income                                 | 0   | 0   | 0   | 236 | 0 | 103 | 0   | 0  | 0  | 0   | 0  | 339   |
| 8. Gross Capital Formation                                 | 0   | 0   | 0   | 0   | 0 | 0   | 0   | 0  | 0  | 47  | 0  | 47    |
| 9. Redistribution II                                       | 0   | 0   | 0   | 0   | 0 | 0   | 0   | 0  | 0  | 58  | 18 | 76    |
| 10. Equity Financing                                       | 0   | 0   | 0   | 0   | 0 | 0   | 27  | 0  | 59 | 0   | 0  | 86    |
| 11. Rest of the World                                      | 54  | 0   | 0   | 0   | 0 | 12  | 0   | 0  | 17 | 0   | 0  | 83    |

|       |     |     |     |     |   |     |     |    |    |    |    |  |
|-------|-----|-----|-----|-----|---|-----|-----|----|----|----|----|--|
| TOTAL | 511 | 501 | 210 | 236 | 0 | 115 | 339 | 47 | 76 | 86 | 83 |  |
|-------|-----|-----|-----|-----|---|-----|-----|----|----|----|----|--|

Source: Stone (1968). Data was adapted and calculated by the author.

Considering the model of the circular flow of income and the peculiarities of the SNA to the categories listed above, it is possible to have the results of the functioning of a national economy in Table 7.

TABELA 7

| <b>THE NATIONAL ACCOUNT TO SNA</b>   |   |
|--|---|
| <b>GROSS DOMESTIC PRODUCT</b>  |   |
| <b>GDP = 255</b><br><b>NET VALUE ADDED = 236</b><br><b>DEPRECIATION = 19</b>                             | <b>CONSUMPTION = 210</b><br><b>GROSS CAPITAL FORMATION = 47</b><br><b>EXPORTS = 52</b><br><b>IMPORTS = (- 54)</b> |
| <b>GROSS NATIONAL INCOME</b>   |   |
| <b>CONSUMPTION = 210</b><br><b>CAPITAL FINANCING = 27</b><br><b>DEPRECIATION = 19</b>                    | <b>GNI = 256</b><br><b>GDP = 255</b><br><b>- NET INCOME FROM ABROAD = -1</b>                                      |
| <b>REST OF WORLD</b>   |   |
| <b>EXPORTS = 52</b><br><b>NET INCOME FROM ABROAD = 1</b><br><b>REST OF THE WORLD ACCOUNT BALANCE = 1</b> | <b>IMPORTAÇÃO = 54</b>  |
| <b>CAPITAL FINANCING</b>   |   |
| <b>GROSS CAPITAL FORMATION = 47</b>  | <b>CAPITAL FINANCING = 27</b><br><b>DEPRECIATION = 19</b><br><b>REST OF THE WORLD ACCOUNT BALANCE = 1</b>         |

Fonte: Stone (1968). Dados adaptados pelo autor.

Finally, SNA data are valued at market prices, i.e. they are calculated based on the price at factor cost plus indirect taxes net of subsidies. A deeper understanding of this difference is unnecessary as the respective concepts are duly explored in texts on national accounts.

The definitions in Table 3 would already be sufficient to demonstrate the incompatibility between the SNA and MPS, which derives from the production concept and its limits by MPS, as stated by Stone (1968). However, the author does not explore the consequences of how this difference will affect the results of economic activity.

From the methodology and examples above used by the author, it is possible to set out the main differences between the two systems of national accounts.

In the SNA, the most important aggregate is the GDP, while in the MPS, it is the national income. The difference between the two is the fact that GDP is expressed in gross terms and national income is in net terms. This arises from the different concepts of production, intermediate consumption, and fixed capital included in the definitions. An approximation between the two aggregates, however, lies in the fact that both are expressed in terms of their final prices, i.e. *purchaser price* for the MPS and market prices for the SNA.

In the SNA, intermediate consumption comprises all goods and services used in production in both market and non-market sectors of economic activity. In the MPS, it refers to inputs only from material production and it is limited to that. Non-material services are the subject of redistribution operations and not consumption. The consumption of material goods and services by the non-productive sector is considered non-productive consumption.

Capital consumption is considered the same in both systems, given the definition of production. Capital consumption in the domain of non-material activity is considered to be final consumption (non-productive consumption) and is not deducted from the calculation of national income in the MPS. In the SNA, capital consumption includes both that carried out in the spheres of market and non-market goods and services.

In both the SNA and the MPS, it is necessary to balance resources and the use of goods and services.

This convention is applied to define the elements that make up this equilibrium relationship: final consumption, capital formation, and international exchanges. In MPS, final consumption focuses on material goods and services, whereas in SNA the notion corresponds to the non-material sphere (current services and collective services consumed by administrations).

Capital formation is restricted to material goods, the theoretical differences between the notions of the SNA and the MPS, in this case, are less important. It will be noted, however, that in the SNA the disadvantage is insisted on the notion of gross capital formation, that is, before the deduction of the provision for capital consumption, whereas in the MPS only the net notion of capital is used.

About the rest of the world account, there is no difference between the SNA and the MPS. The methodology for calculating the balance of payments as a whole has been developed by the *International Monetary Fund* since 1964. The documentation consulted in this research work does not mention how MPS incorporated such guidelines.

In both the SNA and the MPS, income analysis begins with productive activities. In both systems, the fundamental concept is that of value-added. The main difference is that in the MPS this is generated only by the material sphere and is quantified in net terms, whereas in the SNA the variable in focus is expressed in gross terms and is part of the services provided by both the government and non-profit institutions.

The redistribution of both value-added and primary income also derives from the concept of production in both the SNA and the MPS. As an example, salaries derived from public administrations are part of the added value in the case of the SNA. In the MPS, on the contrary, this salary category is excluded from the national income. Sales and purchases of non-material services are part of redistribution operations. Salaries derived from non-material operations carried out in the non-productive sector are not considered as income.

As a conclusion to the second part, although the MPS and the SNA can be expressed in the same structure, the elementary foundation of the MPS is reflected in the conceptual differences exposed in Table 3, making it incompatible with the SNA. This incompatibility will also be proven again when applying the concept of net output.

#### ***04. THE NET OUTPUT CONCEPT AND THE INCOMPATIBILITY BETWEEN SNA AND MPS***

As already stated, the MPS production concept is restricted to the sphere of material production. In the SNA, however, as already stressed, this concept is broader because the services

that generate value-added can be provided by the government and non-profit institutions as part of the economic activity. The theoretical basis on which both systems are designed will determine the other differences, as well as the aggregates that will be provided from both national accounts structures.

A second criterion that Stone uses to demonstrate the incompatibility between the SNA and the MPS is the net output.

Stone (1968, p. 203) considers net output as a common concept in both MPS and SNA and can be defined as the excess of product over intermediate inputs, i.e. inputs that are considered as part of the product. The author uses this concept to demonstrate that the national account systems are incompatible due to the basic difference that exists between them, which will lead, in turn, to a difference in the net output.

The methodology that Stone (1968, pp. 205) used to make this demonstration consists of devising a system of accounts where it is possible to compare the two systems as it's possible to see in Table 9. Both SNA and MPS can be put in the form of an input-output matrix divided into three main parts: production, rendering services, and other activities.

TABLE 8

| D \ C               | Material Production | Rendering Services | Other Activities |
|---------------------|---------------------|--------------------|------------------|
| Material Production | $a_{11}$            | $a_{12}$           | $a_{13}$         |
| Rendering Services  | $a_{21}$            | $a_{22}$           | $a_{23}$         |
| Other Activities    | $a_{31}$            | $a_{32}$           | $a_{33}$         |

Source: Stone (1968). Data compiled by the author. D = Destination. C = Cost.

The elements of Table 8 represent: (1) the first row and column are related to material production. The first line concerns the destination of the product: product absorbed by material production ( $a_{11}$ ); (2) material production absorbed by the services sector ( $a_{12}$ ); material production absorbed by services of any nature ( $a_{13}$ ). The first column represents material production costs: intermediate goods ( $a_{11}$ ); services absorbed as intermediate goods, ( $a_{21}$ ); and all other costs, ( $a_{31}$ ). A similar exposition can be given for the elements in the second and third columns.

Thus, the MPS, the net output, consists of the excess value over the material input used in it. In contrast, the SNA constitutes an excess of value over all production including services over the goods that are used as inputs. The net output can be expressed for each system in terms of entries in the following matrix A:

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$$

Denoting the net output in the MPS by  $\alpha$  and the SNA by  $\beta$ , we have:

$$\alpha \equiv a_{21} + a_{31}$$

$$\beta \equiv a_{31} + a_{32}$$

The calculus of net output in both SNA and MPS consists of the application of the production concepts used in both systems in Table 8 by the fundamentals of linear algebra. This

procedure highlights not only the difference between the respective systems but also the incompatibility between them.

For SNA, the first two lines and columns can be regrouped into the same set of activities. Applying the foundations of linear algebra:

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$$

$$G = \begin{bmatrix} 1 & 0 \\ 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\text{system: } G'AG = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$G'AG = \begin{bmatrix} a_{11} + a_{21} + a_{12} + a_{22} & a_{13} + a_{23} \\ a_{31} + a_{32} & a_{33} \end{bmatrix}$$

$$\beta = a_{31} + a_{32}$$

From the matrix G'AG Stone (1968, pp. 205) demonstrates that the concept of production in the SNA is broad in that it incorporates services of all nature, that is, those linked or not to material production. The net output, in turn, represents the excess of material production absorbed by services provided by other spheres outside material production.

TABLE 9

| NET OUTPUT TO SNA |                                       |                                       |   |                         |                                   |  |
|-------------------|---------------------------------------|---------------------------------------|---|-------------------------|-----------------------------------|--|
|                   |                                       | <i>Material Production + Services</i> |   | <i>Other Activities</i> |                                   |  |
| <i>D</i>          | <i>C</i>                              | <i>Material Production + Services</i> |   | <i>Other Activities</i> |                                   |  |
|                   | <i>Material Production + Services</i> |                                       | a <sub>11</sub> + a <sub>21</sub> + a <sub>12</sub> + a <sub>22</sub> |                         | a <sub>13</sub> + a <sub>23</sub> |  |
|                   | <i>Other Activities</i>               |                                       | a <sub>31</sub> + a <sub>32</sub>                                     |                         | a <sub>33</sub>                   |  |

Source: Stone (1968). Data compiled by the author.

Similarly, to MPS the last two rows and columns must be grouped since services linked to non-productive activities are not included in production.

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$$

$$H = \begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 0 & 1 \end{bmatrix}$$

$$H'AH = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 0 & 1 \end{bmatrix}$$

$$H'AH = \begin{bmatrix} a_{11} & a_{12} + a_{13} \\ a_{21} + a_{31} & a_{22} + a_{32} + a_{23} + a_{33} \end{bmatrix}$$

$$\alpha = a_{21} + a_{31}$$

From the H'AH matrix, the fundamental economic activity in the MPS is the material sphere of production given by a<sub>11</sub>. The net output of the material sphere is absorbed by services linked to material production, such as those provided by the non-productive sector of the economy.

TABLE 10

| NET OUTPUT TO MPS              |                                   |   |
|--------------------------------|-----------------------------------|---|
| C \ D                          | Material Production + Services    | Other Activities  |
| Material Production + Services | a <sub>11</sub>                   | a <sub>12</sub> + a <sub>13</sub>                                     |
| Other Activities               | a <sub>21</sub> + a <sub>31</sub> | a <sub>22</sub> + a <sub>32</sub> + a <sub>23</sub> + a <sub>33</sub> |

Source: Stone (1968). Data compiled by the author.

By contrasting the matrices G'AG and H'AH, Stone (1968, pp. 206) demonstrates that the SNA and MPS are systems that cannot be compared even in their reduced forms. However, the author does not explore how this difference will affect the results of economic activity. However, based on the methodology and examples presented in the previous part, it is possible to explore such results.

The distinction between the material sphere and the non-productive sector for MPS will have an impact on the value of the net output. Due to this difference, it is possible to more accurately justify the divergence between national and final income.

The non-productive sector of the economy has as its primary function the redistribution of goods created in the material sphere. In this way, there is a need to allocate not only capital goods but also labor resources which, in turn, appropriate 'income' derived from the respective activities, as shown in the economic accounting matrix for the MSP (line 7, column 6, 261).

In this way, based on the social accounting of the system, it is possible to estimate the net output by the difference that exists between the final income (445) and the national income (184) that results from the income derived from the non-productive sector. At the same time, investment goods, as well as their depreciation, demanded by the activities of the non-productive sector are not part of capital accumulation.

In the SNA, in turn, GDP is measured from all activities that generate gross value-added. From Table 9 for the SNA, this aggregate is given by:  $GDP = GVA(a_{11} + a_{21} + a_{12} + a_{22})$ . According to the data in Table 7, its value represents  $GDP = 236$ . As a consequence, the respective sectors demand both consumer goods and capital goods as in the MPS with the difference that now all sectors contribute to the accumulation of capital in the economy.

Considering, from Table 7 for the SNA, that the net output is given by the set of transfers of capital and income properties, direct taxes, and other benefits paid by the government. Due to the limitations of the data in Table 7 for the SNA, it is not possible to make this measurement.

However, it is possible to get an approximation of the net output from the economic accounting matrix for the SNA. The benefits paid by the government are in line columns 7 and 6 respectively, totaling 103. Capital transfers are in line and columns 10 and 9 respectively, totaling 59. From these data, it can be stated that the net output for the SNA is 162.

Finally, how is it possible to explain the differences in the main aggregates that measure the circular flow of income in both the MPS and the SNA based on the concept of net output?

From the point of view of GDP and National Income, what is for the MPS just an activity of redistributing the result of the material sphere, while the SNA is an activity that integrates the product that can be measured by the value-added that it generates in the case of goods that have no market value.

Thus, when stating that the concept of production is broader in the SNA, Stone (1968, pp. 209) shows that this system incorporates elements that are part of the net output in the MPS. This same reasoning explains the difference in estimates for calculating net output in both systems of national accounts.

In the conclusion of this part, when trying to explore the differences between the MPS and the SNA by applying the concept of net output, Stone (1968, pp. 210) demonstrates that both systems are incompatible.

## ***05. CONCLUSION***

As stated in the introductory part, this essay attempted to explore the foundations of the MPS that made it incompatible with the SNA in Richard Stone's thought, which was presented in 1968 in the paper: *A Comparisons of SNA and the MPS*. The two systems of national account are empirical constructions where it is possible to measure the circular flow of income in a national economy, including its relations with the rest of the world.

As a circular flow of income, both the SNA and the MPS have the conception that production is the primary category of economic activity from which both consumption and accumulation arise. At the same time, the two systems can be written on the same systems of accounting basis, which stresses the relationship that exists between the agents involved.



However, when comparing the MPS with the SNA, Stone concludes that both systems are incompatible. This incompatibility between the two systems came from the division of the economy made by the MPS into a sphere of material production and a non-productive sector. This peculiarity will have repercussions both on the national account structure definitions and on the application of net output.

From a structural point of view, Stone demonstrates that it is possible to compare the two systems of national account because they have the same categories described in Table 3. However, due to the primary property of the MPS, the outcome is a circular flow of income described in the form of a system of accounts which, despite being the same as the SNA, shows completely different results where the main aggregate is the GDP to SNA and National Income to MPS.

The main characteristic of the MPS becomes more emphasized when the concept of net output is applied to both systems of national account.

For the MPS, the net output is absorbed by the non-productive sector of the economy, which conceives it as redistribution activities, *i.e.* it's not part of national income. For the SNA, in turn, redistribution activities make up benefits paid by the government and capital transfers. Most of the net output measured under the MPS, are activities that generate value-added in the SNA.

Thus, the difference between fundamental aggregates such as GDP for the SNA and National Income for the MPS derives both from the structure of both and from the application of the concept of net output which, in turn, are the result of peculiarity of the MPS already emphasized.

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