MINISTRY OF EDUCATION
"1st DECEMBER 1918" UNIVERSITY OF ALBA IULIA
ACCOUNTING DOCTORAL SCHOOL

SUMMARY OF THE DOCTORAL THESIS

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THE USE OF THE INFORMATIONAL SYSTEM OF NATIONAL ACCOUNTING IN THE ANALYSIS OF THE STRUCTURE OF ECONOMIC GROWTH THROUGH THE CONTRIBUTION OF THE ROMANIAN ECONOMY BRANCHES

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CONTENT

Key words: national accounting, informational system, national accounts system, main production factors, economic growth, quantitative, qualitative and mixt component of the economic growth, influences, weights, labour force, fix capital, circulant capital.

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INTRODUCTION

GENERAL CONTEXT OF THE RESEARCH

„Integrating accounting in knowledge economy" (Dimitriu M., 2007) aims at a better capitalization of its information valences (it is considered that if its basic principles are correctly applied it is not a question of increasing these valences, but of their better capitalization). Among the current concerns in this direction the aggregation of accounting information is obtained at the level of entities and their impact on national accounts, which is an indication of the economic development of a nation.

Why this aspect is important? One explanation could be that a nation's level of well-being depends on the ability to accurately measure the effects of economic transactions. Accounting truth also involves measuring the effects beyond the sphere of action of the microeconomic actors.

Through this research we aim to enhance the role of national accounting, as a basic component of the information system, to substantiate economic decisions and follow their implications at the macroeconomic level.

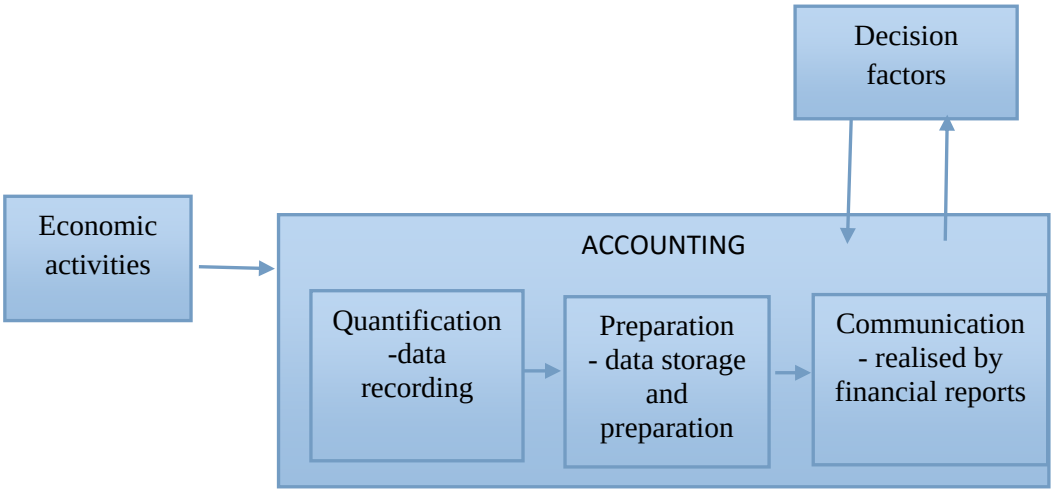

Fig no. 1. Accounting as an informațion system for economic decisions[1]

[1] M. Berheci, 2010, *Valuing financial reports. Accounting Syntheses: theory, analyses, case studies*, Publishing House CECCAR, Bucharest, p. 26.

The provision of accounting information depends on various factors of an economic, social, political nature, on the conceptualization and normalization of accounting, but also on advancement in information technology that contribute to optimizing the time spent on data processing and its allocation for analysis or decision making support services.

At the same time, the supply of accounting information is the effect of spreading the call for professional reasoning in accounting, the concern to identify the causes that negatively influence the communication process and ways to avoid malfunctions in providing them, requiring an approach by analyzing the user's reactions, but also the macroeconomic implications, through the national accounting indicators.

There are controversies regarding the affiliation of national accounting to economic sciences or techniques, to the science of accounting, to statistics. Most economists consider national accounting to be an independent economic science using procedures and methods taken from other economic sciences and exact sciences, with a strong interdisciplinary character. The object of study for macro-accounting is the state and movement of the patrimony, similar to micro-accounting, but at a much higher level of representation, at the level of branches, sectors and at the global level of the national economy.

The position vis-à-vis the different points of view is supported by exposing elements of comparison between national accounting and micro-accounting, by extrapolating the application of principles, accounting procedures specific to micro-accounting: account and balance sheet, but also common procedures of national accounting with other sciences, including the common techniques of statistics.

The complexity of the economic mechanism corroborated with the need to facilitate the fulfillment of the macro-accounting objective, that of reporting the activities generating economic relations and patrimonial changes, is also reflected in the way the national accounting divides the economy into several components, as homogeneous as possible, of functionality (economic branches), as well as in terms of economic behavior (institutional sectors).

In order to be able to reflect the economic processes in accordance with the macroeconomic theory, the System of National Accounts was elaborated, which provides a classification, structures and various rules. Each account seeks to synthesize a set of homogeneous operations through its balance, equivalent to a very important aggregate of results in macroeconomic analysis, describing the function of production, the function of

distribution (distribution and redistribution of income from the national economy), the function of consumption and the accumulation function.

Macroeconomic accounts, also called the national economy barometer, are process accounts (or flow) and status (equity) accounts, which are intended to reflect the economic processes carried out during a financial year and the state of the national economy at the end of the year.

The system of National Accounts, based on the theory of production factors, delivers macroeconomic indicators of output to numerically highlight economic growth as a result of the use and combination of direct factors of production: labor, fixed capital and consumption of material assets. This implies the possibility that some of the information provided by the national accounts can be used in the analysis of the correlations of the growth rates of these factors and the growth rate.

The reliability of macroeconomic information provided in an accounting framework by the National Accounts System remains a very important objective, so it appears necessary to "clean up" macro-accounting information from the effects of inflation, in order to ensure the relevance of macroeconomic analysis. For this, macroeconomic indicators need to be expressed in comparable prices (constant or real) that have the ability to quantify price changes over a longer period of time.

The System of National Accounts contains, in addition to accounts, a series of tables, which are the main databases used in economic analysis and in the elaboration of national macroeconomic policies.

The presentation of the information in the overall economic picture allows to know the situation of the national economy in relation to the rest of the world, describing in a concise way the achievement of the annual balance within the economy. The balances of the overall economic picture are aggregates or synthetic indicators for all resident institutional sectors (the most important: gross domestic product, national income, capacity or need to finance the economy), being the starting points for obtaining specific rates for some institutional sectors, but and for the whole economy. An important advantage offered by the table is, on the one hand, that it immediately reflects which sectors have deficits, why they have them, from which sectors the excess expenditures are financed and through

which financial instruments, and on the other hand, by drawing up the table ensures the internal coherence of the macroeconomic analysis[2].

The input-output chart shows a detailed picture of how industries interact to provide inputs and use each other's output to produce the nation's GDP[3].

The information contained in the input-output table is the basis for the analysis of the interdependence relations between the activity branches of the economy and allows a detailed and complete characterization of the structure of the national economy.

The input-output table provides important information that allows, on the one hand, the measurement and economic analysis of the efficiency of using the economic potential, by calculating synthetic indicators that express the efficiency of the use of production factors and, on the other hand, quantifying the participation of these factors, obtaining the result of the economic activity.

The result of the use and combination of primary and secondary factors of production related to the activities carried out within the branches is materialized by the individual economic growth at the level of each branch, and by aggregation up to the level of the national economy.

The results of the analysis indicate a link at the branch level between the primary factors of production, as exogenous variables, and the gross value added, as an explained variable, the result may be extended at the global level of the national economy.

Macroeconometric modeling aims to highlight the empirical behavior of a real economic system. Such models are designed as interconnected equations estimated on the basis of dynamic series using statistical or econometric techniques.[4]

MOTIVATION AND IMPORTANCE OF THE RESEARCH

It is known to promote the role of accounting information in substantiating user decisions, but less emphasis is placed on how it is generated and capitalized through national accounts, which is an indication of the economic development of a nation. Why is

[2] T. Ramanauskas, S. Matkenaite, V. Rutkauskas, 2018, *Credit and money creation from the integrated accounts perspective,* p. 9, https://www.lb.lt/en/publications/no-5-tomas-ramanauskas-skirmante-matkenaite-virgilijus-rutkauskas-credit-and-money-creation-from-the-integrated-accounts-perspective-1.

[3] A.M. Lawson, B.C. Moyer, S. Okubo, M.A. Planting, 2005, *Integrating Industry and National Economic Accounts: First Steps and Future Improvements,* p. 8, https://www.nber.org/system/files/working_papers/w11187/w11187.pdf.

[4] C. Anghelache, A. Petre (Olteanu), C. Olteanu, 2019, Unele concepte şi modele econometrice de analiză a performanţei macroeconomice, *Revista Română de Statistică,* Supliment nr. 4 / 2019, pp. 3-11, https://www.revistadestatistica.ro/supliment/wp-content/uploads/2019/05/rrss_04_2019_A1_ro.pdf.

this important? One of the explanations could be given by the fact that in order to obtain performance there must be control over the economic activity, but this control is dependent on the possibility of concrete measurement of facts, transactions, economic results. Accounting truth also involves measuring the effects beyond the sphere of action of microeconomic actors, respectively through national accounts.

Internationalization also leads to an increase in the demand for macro-accounting information. The system of National Accounts is the main tool for macroeconomic records and analysis used in international statistics by almost all the countries in the world, with a market economy. Moreover, "in the European Union, part of the financial contribution of each member (the EU's fourth own resource) is estimated taking into account the results of national accounts"[5].

However, the community of researchers in the field at the national level is reduced to a very small number of university specialists from the National Institute of Statistics and the[6].

TOPICALITY OF THE THEME AND THE KNOWLEDGE STAGE

If in the field of entities's accounting, micro-accounting, the literature is generous, including addressing issues related to the quality and efficient use of accounting information, things are not the same with the accounting panoply of national accounts. True, the subject has a broad approach to macroeconomics and statistical and econometric modeling of economic growth, but less to the side of branch analysis in order to determine the mechanism of formation of global gross value added of the national economy.

The use of accounting principles and procedures for a scientific approach seems trivial, somewhat obsolete in the context of a world in a continuous transformation due to multiple factors: economic internationalization, increasing competition in technology, increasing competitiveness, labor market flexibility, etc.

On the other hand, the extrapolation of accounting principles and procedures operating at the microeconomic level towards the macroeconomic level has not been the subject of many approaches by the specialized literature, at least at the national level.

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[5] C.M. Drăgan, *Conturile Naționale*, 2011, https://www.9am.ro/comunitate/forum/view_topic/26787/CONTURILE-NATIONALE.html.

[6] M. Ursuț Ilca, *National Accounts in the information economic system*, Doctoral thesis, 2014, University Babeș - Bolyai, Faculty of Economic Sciences and Business Management, Cluj-Napoca.

Among the concerns of the international literature for macro-accounting we mention[7]:

- the existence of an accounting framework appropriate to each complete macroeconomic"[8], developing the general balance oriented towards an accounting model that represents macro-statistical systems by aggregating data (journal entry) from micro-accounting[9], the need for "engineering accounting" by integrating sustainability issues at macroeconomic and microeconomic level[10];

- the contribution of aggregated national accounts to measuring differences in well-being, both over time and across economies, and to indicate whether development is sustainable[11];

- definition issues, classification and measurement in the national accounts, including the argument that the basic units to be classified in national accounts are economic objects (real and financial) rather than transactions[12];

- reviewing and to some extent the further development of a national accounting methodology that meets the needs of governments when engaging in sustainable development and policy analysis issues[13];

- how the assessment of ecosystem services and ecosystem assets can be carried out in an integrated national accounting framework[14], a method for assessing the reliability of

[7] C. Cenar, I. Cenar, 2021, Microaccounting and Macroaccounting: Characteristics and Interferences, Microaccounting and macroaccounting: characteristics and interferences, *Ovidius University Annals, Economic Sciences Series*, vol. 0(2), pp. 710-718, https://stec.univ-ovidius.ro/html/anale/RO/2021/Section%205/5.pdf.

[8] Pyatt, G., 1991. SAMs, The SNA and national accounting capabilities, Review of Income and Wealth Series 37, No. 2, June 1991, pp. 177-198, http://www.roiw.org/1991/177.pdf, 10.01.2021.

[9] K. Nshi, 2017. Macro Accounting and General Equilibrium, SSRN: https://ssrn.com/abstract=2905052, http://dx.doi.org/10.2139/ssrn.2905052, 1 February 2021.

[10] J. Tingey-Holyoak, R.Burritt, J. Pisaniello, 2013, *Integration of Macro and Micro Sustainability Issues: The Need for 'Engineering Accounting'*. 10th International Symposium on Environmental Software Systems (ISESS), Neusiedl am See, Austria. pp.500-507, ff10.1007/978-3-642- 41151-9_46ff. ffhal-01457480f https://hal.inria.fr/hal-01457480/document, 5 February 2021.

[11] G. Asheim, 2003, Green national accounting for welfare and sustainability: a taxonomy of assumptions and results, *Scottish Journal of Political Economy*, Vol. 50, No. 2, p. 113-130, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=367462, 8.01.2021.

[12] O. Aukrust, 2008, An axiomatic approach to national accounting: an outline, *Review of Income and Wealth Serie*s 54, Number 4, pp. 703-713/703, DOI:10.1111/j.1475-4991.2008.00297.x., 11.01.2021;

[13] Dasgupta, P., 2015. Disregarded capitals: what national accounting ignores, *Accounting and Business Research*, 45:4, p. 447-464, DOI: 10.1080/00014788.2015.1033851.

[14] C. Obst, L. Hein, B. Edens, 2016, National Accounting and the Valuation of Ecosystem Assets and Their Services, *Environmental & Resource Economics*, Springer;European Association of Environmental and Resource Economists, vol. 64(1), p 1-23.

the statistics for the national accounts[15], the focus on sustainability and green national accounting[16,17,18];

Carl Obst and Michael Vardon argue that incorporating environmental asset information into standard accounting frameworks is an essential element in integrating environmental information and expanding the evidence base for economic decisions and assessing sustainability[19];

- traditional estimates of gross domestic product (GDP) fail to take explicit and full account of natural capital in the system of national accounts (SNA). Accounting and integration of natural capital into the system of national accounts are necessary to avoid some misleading signals, as economic growth could be detrimental to the depletion of natural capital, with a negative impact on sustainability[20];

- uses of the System of National Accounts (SNA), for macroeconomic analysis, inter-temporal comparisons, international comparisons[21];

- the relevance of the macro-accounting system (European System of Accounts - ESA), respectively its use for several purposes: as a system for informing and analysing the economic and financial context, for the prevention of the fiscal crisis and as a circumstance to make possible the national and supranational governance and regulation. National and international governance strategies must be guided by the concern that all sectors are too big to fall[22];

[15] F. Bos, 2009, The Art and Craft of Compiling National Accounts Statistics and their Implications for Reliability. *Review of Income and Wealth*, Vol. 55, Issue 4, p. 930-958, SSRN: https://ssrn.com/abstract=1505738 sau http://dx.doi.org/10.1111/j.1475-4991.2009.00353.x, 8.01.2021.

[16] G. Asheim, 2003, Green national accounting for welfare and sustainability: a taxonomy of assumptions and results, *Scottish Journal of Political Economy*, Vol. 50, No. 2, p. 113-130, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=367462, 8.01.2021.

[17] R.V. Ionescu, M.L. Zlati, V.M. Antohi, S. Stanciu, 2020, Modelling EU agriculture's regional disparities under the national accounting system's approach. The impact of the new economic and environmental challenges, *Economic Research - Ekonomska Istraživanja*, DOI: 10.1080/1331677X.2020.1805347.

[18] M. Clarke, S. Islam, 2006, National account measures and sustainability objectives: present approaches and future prospects, *Sustainable Developmen*t, John Wiley & Sons, Ltd., vol. 14(4), p. 219-233.

[19] C. Obst, M. Vardon, 2014, Recording environmental assets in the national accounts, *Oxford Review of Economic Policy*, Volume 30, Number 1, pp. 126–144, DOI 10.1093/oxrep/gru003.

[20] T.O. Ochuodho, J. R.R. Alavalapati, 2016, Integrating natural capital into system of national accounts for policy analysis: An application of a computable general equilibrium model, *Forest Policy and Economics*, p. 99-105.

[21] A. Ouanes, S.M. Thakur, 1997, *Macroeconomic accounting and analysis in transition economies*, International Monetary Fund, https://www.elibrary.imf.org/view/books/071/04362-9781557756282-en/04362-9781557756282-en-book.xml.

[22] V.G. Costa e Sousa. 2017, From the financial crisis to the Balance Sheet recession: an empirical analysis based on the National Account , *RC&C -Revista Contabilidade e Controladoria*, Curitiba, v. 9, n. 3, p. 8-27, doi: 10.5380/rcc.v9i3.51434, https://revistas.ufpr.br/rcc/article/view/51434/34501

- the relationship between national accounts and economic theory is usually misunderstood both by economics theorists and by national accountants. Valuation in national accounts is not prospective and is not based on a notion of perfect competition. Similarly, the concept of income from national accounts is not the measure of net return on wealth or wealth and does not intend to show income as a reward for certain specific factors of production. The concepts of value and income from national accounts can only be well understood in the light of the specific accounting framework to which they belong[23]:

- possibilities for an improvement of the national accounts[24] etc.

Last but not least, Peter Van de Ven supports the need for a more transparent design of economic statistics from business registers to national accounts. It is intended to create a better understanding of the links between different data sets that lead to increased possibilities for users to link microdata to macrodata.[25].

The affiliation of macro-accounting to the science of accounting and the comparative approach of the two accounting segments are not new ideas in the international literature, they have been exploited since 1966 by Yu[26].

National accounts are a macroeconomic accounting system that is compiled on the basis of a globally harmonized accounting standard[27].

E. Lande analyzes the relationship between macro-accounting and micro-accounting in France and considers national accounting a macro-accounting process, while its components are micro-accounting processes because they are concerned with a set of transactions carried out within the legal limits of the analyzed entity: public local administration authorities, companies, households etc[28].

[23] F. Bos, 1997, Value and income in the national accounts and economic theory, *Review of Income and Wealth***,** Series 43, Number 2, p.173-190, http://www.roiw.org/1997/173.pdf.
[24] K. Hansson, 2006, Improving national accounts, *Kybernetes*, Vol. 35 No. 1/2, pp. 45-64, https://doi.org/10.1108/03684920610640227.
[25] P. Van De Ven, 2017, Present and Future Challenges to the System of National Accounts: Linking Micro and Macro. *Review of Income and Wealth*, Vol. 63, p. S266-S286, 2017, SSRN: https://ssrn.com/abstract=3079949 or http://dx.doi.org/10.1111/roiw.12331, 29.01.2021.
[26] S.C. Yu, 1966, Microaccounting and Macroaccounting, *The Accounting Review*, pp. 8-20, https://www.jstor.org/stable/242517.
[27] S. Keuning, D. van Tongeren, 2004, *The relationship between government accounts and national accounts, with special reference to the netherlands. Review of Income and Wealth, 50(2), 167–179.* doi:10.1111/j.0034-6586.2004.00119.x 167.
[28] E. Lande, 2000, Macro-accounting and micro-accounting relationships in France, *Financial Accountability & Management*, 16(2), pp. 151-165.

„National accounts shall constitute an overall, detailed and quantified representation of the national economy in an accounting framework”[29].

Romania has taken the first steps in developing the System of National Accounts with the technical assistance and support of French specialists in the field of National Accounting. Romania's yearbook 1990 contains for the first time figures on the Gross Domestic Product between 1980 and 1989, detailed by branches, incomes and expenses, as well as aggregated entry-exit figures[30].

Among the aspects related to national accounting that have been the subject of scientific concerns at national level and which have N. Camp as their main artisan are identified: the national balance sheet[31], institutional structure of national accounts[32], accounts of institutional sectors[33], national patrimony accounts[34], the overall economic picture and indicators of the national accounting system[35],accounts for operations and directions for the development of national accounts (peripheral accounts, intermediate systems, social accounts and indicators, natural environment and cultural heritage accounts[36], normalisation of national accounts[37].

Ionașcu presents the chronology and conceptualization of the national accounting, its individualization through own concepts and notions, specific contents and operations, development trends. The conceptualization coordinates also include the contribution of the author C. Ivan-Ungureanu[38] which also deals with issues relating to the methodologies for compiling national accounts and how they are applied.

Gisberto Chițu captures evolutionary, conceptual aspects, methods and principles of macrocontability, real transactions, distribution operations and financial aspects. Moreover,

[29] N. Tabără, Contabilitate națională. Concepte, sisteme, modele, Editura Tipo Moldova, Iași, 2008.
[30] V. Dumitrescu, C. Giurescu, S. Mateescu, 1994, Experience in Implementing the System of National Accounts (SNA) in Romania, *Review of income and wealth*, p. 111-119, http://www.roiw.org/1994/111.pdf.
[31] N. Tabără, 1992, Contabilitatea și bilanțul național, *Revista Tribuna economică*, nr. 14/1992.
[32] N. Tabără, C. Istrate, 1995, Structura instituțională a contabilității naționale, *Revista Finanțe, credit, contabilitate,* nr. 4/1995.
[33] N. Tabără, C. Istrate, 1995, Conturile sectoarelor instituționale, *Revista Finanțe, credit, contabilitate*, nr. 5/1995.
[34] N. Tabără, E. Horomnea, 1997, Conturile patrimoniului național, *Revista Română de statistică*, nr. 6/1997.
[35] N. Tabără, C. Istrate, 1995, Tabloul economic de ansamblu și indicatorii sistemului de contabilitate națională, *Revista Română de statistică*, nr. 11/1995.
[36] N. Tabără, 2008, *Contabilitate națională. Concepte, sisteme, modele*, Editura Tipo Moldova, Iași.
[37] N. Tabără, M. Ungureanu, 2012, *Considerations about the Normalization of National Accounting*, EuroEconomica, vol. 31, nr. 2,
http://journals.univ-danubius.ro/index.php/euroeconomica/article/view/1212/1141.
[38] C. Ivan – Ungureanu, 2003, *Contabilitatea națională. Concepțe, metodologii și aplicații*. Casa de Editură IRECSON, București.

the author emphasizes the link between micro-accounting and macro-accounting, the way of aggregating accounting information from microeconomic to macroeconomic level[39];

Ghizdeanu, Stănică and Ristea analyzed aspects related to the use of balance sheets in macroeconomic analysis and forecasting[40]. New economic and environmental challenges have determined the modelling of regional disparities (in agriculture) through the prism of the national accounting system[41].

The system of national accounts has also been analysed as a method of recording and calculating macroeconomics[42].

C. Anghelache and his collaborators can be assigned numerous scientific contributions in the area of national accounts. Some of these can be found in other authors (conceptualization, chronology, exposure of institutional sectors, presentation of sector accounts), others, support the accounting side by exposing the principles of the system of national accounts and specific procedures, relating to statistics (known as a component of economic records within the economic information system), some ways of using macroeconomic indicators in economic analyses[43].

It also outlines the role of national accounts in the economic information system, derived from the need to highlight the rationality of economic activity (at the microeconomic, mesoeconomic level and at the level of the national economy) and to determine the efficiency of the use of factors of production. The macroeconomic results support the future decisions of the economic agents regarding the activity on which they carry out and establish the place of each country in the hierarchy of the world economy[44].

Undoubtedly, the issue of the information system of national accounts is a complex one and requires an interdisciplinary approach, without cantonment in rigid patterns. Obtaining and properly capitalizing the information from the national accounts is a

[39] A. Gisberto-Chițu, 2003, *Contabilitatea micro și macroeconomică*, Ediția a II – a, Editura CECCAR, București.
[40] I. Ghizdeanu, C. Stănică, C. Ristea, 2007, *Utilizarea bilanțurilor contabile în analiza și prognoza macroeconomică*, p. 5-20, ftp://www.ipe.ro/RePEc/WorkingPapers/cs14-1.pdf.
[41] R.V. Ionescu, M.L. Zlati, V.M., Antohi, S.Stanciu, 2020, Modelling EU agriculture's regional disparities under the national accounting system's approach. The impact of the new economic and environmental challenges, *Economic Research - Ekonomska Istraživanja*, DOI: 10.1080/1331677X.2020.1805347.
[42] F. Lilea, M. Sfetcu, A.I. Marinescu, 2018, Noțiuni teoretice privind sistemul conturilor naționale – metodă de evidență și calcul macroeconomic, *Revista Română de Statistică*, Supliment, nr. 9/2018, București, https://insse.ro/cms/sites/default/files/field/publicatii/revista_romana_statistica_supliment_09_2018.pdf, pp. 23-33.
[43] C. Anghelache, 2013, *Statistică macroeconomică. Sistemul conturilor naționale*, Editura Economică, București.
[44] G. Aghelache, C. Anghelache, C.M. Răduț, 2020, Conturile naționale în sistemul informațional, *Revista Română de Statistică* - Supliment nr. 11 / 2020, pp. 3-13, https://www.revistadestatistica.ro/supliment/wp-content/uploads/2020/12/rrss_11_2020_A1_ro.pdf.

desideratum that must be put, through statistical instruments, in the service of a sustainable economic development.

OBJECTIVES AND HYPOTHESES AIMED BY THE RESEARCH

The main objective of this scientific approach is to identify the contribution of the qualitative and quantitative factors to the measurement of economic growth by using data from national accounts, and on this basis, making forecasts on economic growth, specifically a better valuation of data from national accounts, obtained by aggregating data from micro-accounting, in the direction of economic development.

In order to achieve this objective, we propose the following derived objectives and working hypotheses:

- shaping an overview of the system of national accounts and its information power;
- identification of possibilities through which the overall economic picture and the input-output picture can contribute to the realization of the macroeconomic analysis up to the level of the institutional sectors, respectively of the branches of activity in the economy;
- the construction of arguments for the affiliation of national accounting, at least in part, to the science of accounting, as well as the identification of common and specific elements of the two forms of accounting, derived from the reference to accounting principles and methods;
- demonstration of the theory of economic growth based only on the primary factors of capital production (fixed and circulating) and labor force, starting from the fact that the production factors theory is the foundation of national accounting;
- the identification of a relationnship by which it expresses the link between economic growth and primary factors of production, over a period of time, which should be the basis for estimating economic growth for the immediate future.

In order to demonstrate the theory of economic growth determined only on primary factors of production, going so far as to obtain an equation that expresses this connection, we chose certain indicators considered as representative as possible for the studied concepts related to branches of activity (then by aggregation at the statistical units appropriate for analysis).

The scientific approach was carried out through an empirical study at the level of the period 2008 - 2018, in which the necessary information support was the table of inputs and outputs provided in the data found on the TEMPO Online - INSSE sites and the statistical Romanian yearbooks.

The starting point for the quantitative expression of the link between the rate of economic growth and the rate of primary production factors was achieved through a method specific to statistics, that of correlation.

In order to reflect the dynamic evolution of some economic phenomena and processes, the index method was used with regard to obtain indicators expressed in constant prices and in constant volume, using a system of chained indices (using the previous year as base year), as well as the factorial method (in which the analyzed factor has a certain evolution over time while the rest of the factors remain constant).

METHODOLOGY OF SCIENTIFIC RESEARCH

The research methodology represents a ”study of the methods used throughout the research, which give relevance and validity to the knowledge development process”[45].

„It is true that nothing comes naturally (only exceptionally), all achievements, especially in the scientific field, are determined by a need: the need to understand the mechanisms of processes, the need to make certain products, technologies that meet the requirements of the moment”[46].

The predominant research current used during this research is the positivist one, so we aim to explain the different theoretical and practical aspects of the issue of accounting truth reflected in national accounting.

Of the four vital elements of a modern scientific research in economy [47](concepts and variabiles, an investigation method, an original theory, a specific or a distinctive model), we used concepts and variables that synthetically characterize the investigated economic reality - the national economy, respectively the overall economic picture, the

[45] M. Niculescu, N. Vasile, 2011, *Epistemiologie, Perspectivă interdisciplinară*, Editura Bibliotheca, Târgoviște, 2011, p. 108.
[46] http://www.agir.ro/buletine/894.pdf.
[47] G. Săvoiu, Principles, guiding marks and stages of the scientific research in the economy, finalized by articles published in prestigious magazines, *Economic Amphitheatre Review*, https://amfiteatrueconomic.ro/RepereAleCercetarii/Principii,repere%20ale%20cercetarii%20economice.pdf, 18.01.2021.

input-output picture, which provides information supports which are necessary for the analysis of economic activity in terms of efficient use of production factors, the contribution of each segment development of the national economy.

The research intention is to reach a model with predictive valences based on data from national accounts by deepening the knowledge of economic reality, quantitative and qualitative variables that affect economic growth.

The concrete study methods were the following:

- *The descriptive method* used in the review of the literature on how to express accounting truth at the macroeconomic level. Our approach is deductive, because it goes from general to particular; respectively from the specific concepts of national accounting (GDP; PIN; GNP, GNP, NV, etc.) to the analysis of the concrete effects generated by the economic activity;

- *the empirical method* used to construct the case study on the use of information from national accounts in measuring the contributions of primary production factors (labor force, fixed capital and working capital) to economic growth reflected by gross value added at a branch level. Regarding the documentation of the empirical analysis, in order to establish this connection, the data found on the TEMPO Online - INSSE sites and the statistical Romania yearbooks from 2012 - 2019 were used;

- *the participative observation method* used in interpreting the empirical research, expressing opinions during the research.

Also, for the realization of this scientific approach, we resorted to reasoning, analysis, synthesis, interpretation. The reasoning was used during the documentation and theoretical constructions, but also for the analysis and interpretation of the data used in the study of the connection between some indicators provided by the national accounts. Obviously our approach is likely to be affected by subjectivism, as everyone "perceives reality through the distorted lenses of their own attitudes and values" (D. Goleman[48]).

It is known that ideas do not appear by chance and at the same time they cannot arise from anything, because they have an origin, they come from a source and are intelligibly linked to it.[49].

Research is a process of producing evidence and knowledge about the world, based on scientific methods, which in turn are supported by philosophical principles about the

[48] http://stagiipractica.roger-univ.ro/wp-content/uploads/Ghid%20cariera/1-ghid-cariera-hortensia-gorski.pdf.
[49] C. Enăchescu, 2005, *Treaty regarding the theory of scientific research*, Polirom Publisghing House, Iași, p. 223.

nature of knowledge and how we develop that knowledge[50]. In this sense, knowledge is needed to enable the scientific approach to the analysis of macroeconomic indicators obtained on the basis of information provided by national accounts.

Scientific research is one of the most complex and subtle activities that usually remain unformulated in the minds of those who practice it[51] and which allows for the continuous renewal of the existing body of knowledge.

Given that any research activity starts from a fixed point of view on an object chosen to be researched, so in this research on the issue of macroeconomic indicators in national accounting, we propose an analysis of the National Accounts System, which makes our research a descriptive narrative type, exploratory, with critical-evaluative insertions.

The transdisciplinary and multidisciplinary approach is specific to contemporary society, and the issue of national accounts could not be missing in the context of the analysis of the state and movement of the national economic heritage.

The documentation regarding the issue of macroeconomic indicators was based on the study of the literature in the fields of accounting, economics, statistics, the overall analysis of the information obtained, which allowed the contextual positioning of macro-accounting.

In the methodological approach we used especially the comparison between the fundamentals of micro-accounting and those of macro-accounting, represented by principles, techniques and methods, which we extrapolated from micro-accounting to macro-accounting. Also by the method of comparison, in the analysis undertaken, the absolute and relative differences (indices, rates) of the studied macroeconomic indicators were determined, in relation to the basic levels of the same indicators.

Regarding the analysis of the relationship between the growth rate of gross value added and the growth rates of the labor force, the fixed capital and the working capital, we started from the study of the indicators of the branch to the overall level of the national economy, using techniques spesific to statistics, to provide the data collection, the processing, the presentation, the correlation and the regression.

Operationalization, as a research method, was chosen to identify correlations, connections, or methods that allow the correlation of theoretical aspects with reality, but

[50] Y. McGivern, 2009, *The Practice of Marketing Research: An Introduction*, Pearson Education, USA, p. 4.
[51] N. Coman (Andrei-Coman), 1968, *Contributions regarding optimizing the accounting –taxation relation and the impact on the performance of the company – Doctoral thesis,* Târgovişte, 2011, apud Beveridge, p. 8.

also the choice of certain indicators considered as representative as possible for the studied concepts.

The participatory, structured observation, the analysis, the synthesis were used to substantiate some opinions depending on the results obtained. .

Knowledge, in order to be possible, must have an "origin", a "root cause" that the researcher identifies from reality[52]. Thus, the scientific approach as a whole was oriented towards three main research directions:

- normative research, through the study of regulations at national, community and international level regarding the definition of some concepts, classifications of operations, institutional sectors, branches etc.

- the doctrinal research, supposes the analysis of the literatures or of the specialized studies, respectively of the investigations that have been undertaken on the segment of knowledge of the information system of the national accounting and of its contribution to the modeling of the economic development;

- practical research, by analyzing the publications made by the National Institute of Statistics (INS).

In other words, the sources of information that formed the basis of the research were specialized books of Romanian and foreign authors, articles published in national and international journals, INS publications.

The formulated ideas substituted the methodological principle of the unity between quantitative and qualitative, but also of the unity between theoretical and empirical.

The first principle determines our research to be qualitative but also quantitative. Thus, the association of the notion of fixed capital, working capital and labor force with certain indicators from national accounting, included in the input-output table, was made by interpretive methods of the qualitative research, as well as the study of activity branches to establish appropriate statistical units for analysis by understanding the role they play in the national economy as a whole. Instead, quantitative research involves the measurement, quantification and numerical expression of economic phenomena or processes through indicators, indices, equations in order to achieve the scientific approach.

The second principle of unity between theoretical and empirical means that reasoning based on theoretical knowledge has guided the direct, observational research, and this has given a value of truth to the theoretical intuition[53].

[52] A. L. Ristea, V. Ioan-Franc, 2009, *Metodică în cercetarea științifică*, Expert Publishing House, București, p. 21.

The collection, the systematization, the data processing is a very important and complex stage of the scientific approach, involving the organization and then systematization of the collected data, the most appropriate methods of calculation and analysis are established and the hypotheses are imposed.

In carrying out the scientific approach, the operationalization method was used in order to establish some indicators considered as representative as possible for the studied concepts, as well as to identify some correlations, using methods from classical statistics, in order to highlight links between data referring to the evolving economic phenomena.

The analysis method breaks down phenomena and results into simpler components and then analyzes them individually for the purpose of a more in-depth investigation of the reality. The method is used in national accounting by analyzing macroeconomic indicators over time, by sectors and branches of activity and their influences on the overall indicators related to the national economy.

The reversed analysis process is the synthesis, which brings together all the elements decomposed by analysis, and then their study in their global unit of origin. The synthesis continues after the analysis with which the process of knowledge begins and leads it to a point, and the synthesis continues the process until the final phase, from the point of view of the functionality of the whole.

Respecting the sequence of analysis, synthesis derives from the point of view of methodology, which assumes that any scientific research begins with the study of the simple, clear, obvious things, moving later, to those that involve a high degree of difficulty and complexity.

The index method was used to reflect the dynamic evolution of economic phenomena and processes, materialized by using Paasche and Laspeyres indices in order to obtain indicators expressed in constant prices and constant volume, using a system of chained indices (using the previous year as the base year).

In order to meet the objectives of the scientific approach, the factor analysis played an important role, considering that only the analyzed factor has a certain evolution over time while the rest of the factors remain constant (at the level of the base period for unanalyzed factors or at the current period for those already analyzed).

[53] S. Chelcea, 2007, *The Methodology of sociologic research. Quantitative and qualitative methods*, Economic Publishing House, Bucharest, 2007, p.73.

THE SYNTHESIS OF THE MAIN PARTS OF THE DOCTORAL THESIS

Structurally, the paper was organized on five chapters.

The first chapter, entitled **The National Accounting Information System**, outlines an overview of the concept, role and characteristics of national accounting, a ”power accounting”, as well as its fundamental element of the National Accounts System.

National accounting numerically measures economic activity at the national level, being the main source of information for substantiating macroeconomic decisions, but also a response to one of the requirements of internationalization; allows the analysis of the productive process of goods and services, the formation and distribution of income, the use of income for consumption, the increase of wealth by using savings in order to accumulate economic goods. At the same time, it is the effect of spreading the call for professional reasoning in accounting that demands the relevance of information and the uniqueness of monetary relations as economic relations.

The analysis and characterization of the economic activity of a nation is possible by determining the size, the structure and the dynamics of material goods and services provided, but also by the results. This is done through the synthetic indicators from the national accounts, of the macroeconomic aggregates (gross domestic product-GDP, net domestic product -NDP, gross national product - GNP, net national product - NNP, national income -NI, disposable national income -DNI, - personal household income - PHI, disposable household income - DHI) for which certain requirements and principles must be observed when used in national and international economic analyses.

This chapter also deals with issues related to the preparation of regional accounts (necessary steps, difficulties in drawing up, highlighting the methods of regionalization of gross domestic product), as well as the analysis of the link between gross domestic product and macroeconomic indicators by correlation, the analysis necessary to determine the contribution of primary factors of production to economic development.

The next chapter, entitled **Micro-accounting and macro-accounting**. **Common principles, techniques and procedures of the national accounting and other sciences** have the following aspects:

- the positions of the specialized literature on the membership of national accounting in the field of accounting, respectively in the field of statistics, arguments to tip the balance in the field of accounting;

- characteristics and interferences between the accounting of the entities and the accounting of the "national economy", using as elements of comparison the patrimony (even if it is considered an obsolete concept due to the prevalence of the economy), general principles of financial reporting and principles of the accounting method, found in all sciences, but also processes common to the economic field);

- the accounting and the balance sheet as specific accounting procedures have been compared separately;

- techniques specific to the statistics used to process data from national accounts when presenting and analyzing macroeconomic indicators.

The third chapter addresses the issue of the components of the national economy, grouped according to the institutional and functional criteria, considered **"actors" of the national accounting**, which share the national patrimony. These components generate data taken over by the National Accounts System, through a system of interconnected accounts, found in **current operations accounts**, **accumulation accounts** and in the **patrimony accounts**. It is important **to eliminate the distortions** contained in the information provided by the national accounts, which are distorted by the general change in prices.

The positioning of the national economy compared to the rest of the world is possible due to the **overall economic picture**, and **through the input-output chart** it is possible to perform, among other things, the analysis of the interdependence between the branches of activity of the economy.

In order to achieve the objective of identifying the possibilities through which the overall economic picture and the input-output picture can contribute to the macroeconomic analysis up to the level of institutional sectors, respectively branches of activity in the economy, we considered opportune to present the following aspects in the fourth chapter, the research undertaken:

- the coordinates of the overall economic picture in terms of aspects such as utility, structure, recorded operations, restrictions on the data recorded in the table, the functions of the goods and services account, receivables in the table, the sequence of financial accounts and the sequence of non-financial accounts;

- a panoply image of the input-output table that synthesizes the operations with goods and services and contributes to the analysis of the production processes, distribution and use of the final products, but also for the forecast macroeconomic growth. This image is constructed by presenting the contents of the five tables that make up the array of inputs - outputs, respectively: the table of intermediate inputs; the table of production and

operating accounts of the branches; the transition table from actual production to distributed production; product resource table; the final usage table.

The last chapter, the fifth, addresses the issue of **capitalizing on information in national accounts regarding the analysis of the contributions of primary production factors to economic growth.** The national economy operates as a complex cyber system, with multiple connections generated by information flows, material flows, financial flows and labor flows. There is also the possibility to conduct a qualitative, but also structural, quantitative analysis of the factors that act in combination and generate results at the level of industries.

The case study in this chapter helped to identify a way to measure the contributions of the factors of production to economic growth by using and processing data from national accounts.

GENERAL CONCLUSIONS, OWN CONTRIBUTIONS LIMITS AND PERSPECTIVES OF THE RESEARCH

GENERAL CONCLUSIONS

National accounting, through its fundamental element, the National Accounts System, makes a great contribution to the macroeconomic information system, achieving an extension of the accounting knowledge from the microeconomic level to the macroeconomic level. The information provided is used for the purpose of calculations, macroeconomic statistical analyses, widely used in the statistics world, which requires the normalized nature of national accounts.

Although information is sometimes provided quite late and despite the use of disciplines such as statistics and macroeconomic analysis, national accounts do not have the capacity to individually quantify the effect of administrative measures on the economy and it is still a powerful tool used in making accurate macroeconomic planning, economic policies and forecasts.

On the basis of national accounts, in particular due to the multiple aggregation and synthesis of information from accounts compiled by economic entities, by sectors and branches of activity, they make it possible to obtain from their balances the result indicators used in economic calculations and analyses by international bodies: gross global product, gross domestic product, net domestic product, gross national product, net national

product and national income. Of these, gross domestic product is the most representative macroeconomic indicator, and one of the main aggregates of national accounting, it is used to characterize the economic status of a nation and to make comparisons between countries.

In order for the regional development policy to be successfully implemented, it is necessary to draw up regional accounts, in the form of regional versions of national accounts, in relation to regions compliant with the Nomenclature of Statistical Territorial Units (NUTS) and treated as separate economic entities.

The regionalization of the gross domestic product results in the regional gross domestic product, valued at market prices, being an indicator of the productive activity of the respective region, being a useful tool used to measure and compare the economic level of development.

It is considered that, following numerous debates, both at national and regional level and for each branch, there are three basic correlations, between gross domestic product on the one hand and the volume of the work consumed, the volume of fixed funds, the volume of material resources consumed, on the other hand, as well as a multitude of correlations with factors that have a secondary influence on economic growth.

In modeling the economic growth we selected the essential factors with systematic action on the gross domestic product and which avoids the multicollinearity between them.

National accounting is a model for presenting information based on accounting rules, which reflects all economic operations carried out by resident economic entities. By the way of presenting and interpreting the essential mechanisms of the national economic life, using statistical techniques it generates contrary opinions regarding the affiliation of national accounting to economic sciences, to a field of accounting using accounting principles, procedures and techniques, but also own techniques of statistics. In conclusion, it can be stated about the national accounting that it is a model to present information, even of a statistical nature, according to accounting rules, on the economic operations carried out by the resident economic agents during a year.

In order to adequately characterize the macroeconomic flows related to the formation, distribution of income and wealth, but also the flows corresponding to the production process, the national accounts group the economic agents into institutional sectors. Given that economic operators carry out specialized activities, based on the social division of labor and the fact that production flows cannot be adequately distributed on

products or activities, it is necessary to group economic agents, whose main function is production, in economic branches.

The fundamental element of national accounting is the System of National Accounts, which comprises a multitude of interconnected accounts, grouped into three broad categories: current account accounts, accumulation accounts and equity accounts. In relation to the location of the information provided in time, the National Accounts System leads to the practice of two types of national accounting: flow accounting that allows obtaining macroeconomic indicators related to an accounting period and stock accounting which results in the provision of macroeconomic information on the national economic patrimony at the end of the accounting period.

There are important correlations between the increase in the size of the results of the national economy and the factors of production used at the branch and national economy level, determining an extensive development by increasing the volume of the three factors and an intensive development by more efficient use of resources.

In the future there is the intention to carry out the study with the analysis of the evolution of this structure over time and how this structure influences the volume and quality of economic growth. I will try to identify any other factors that have a significant influence (secondary factors related to entrepreneurial capacity, the fiscal environment, etc.) on the rate of economic growth and to incorporate them into the structure of the model. In order to quantify as accurately as possible the individual influence of all exogenous factors on gross value added (variable considered endogenous), it is important to avoid the multicollinearity of these factors, which plays a key role in correctly modeling later of the gross added value. Avoiding multicollinearity is necessary in order to identify the influence of each factor on the gross added value. The elimination of multicollinearity means the elimination of those "factorial variables that can be deduced based on other factorial variables." [54].

Practically avoiding multicollinearity and obtaining a model that best reflects reality, will be achieved by selecting the factors, which correspond to the elements in the correlation matrix, those factors that on the one hand will maximize the correlation ratios with the domestic product. gross, and on the other hand will minimize correlation ratios with other factors. So, from the multitude of factors subject to selection, the essential

[54] N. Breaz, M. Jaradat, 2009, *Descriptive statistics, theory and application*, Risoprint Publishing House, Cluj-Napoca, pp. 142.

factors with systematic action on the gross domestic product will be chosen. The essential factors are selected because all the influencing factors are difficult to exhaust.

The total avoidance of collinearity between factors cannot be achieved in practice, because it is very difficult to identify completely uncorrelated factors, but those with a low correlation between them are accepted.

In order to be able to actually compare several values recorded at different times, in order to perform relevant macroeconomic analyses, the deflation method can be used, by bringing the value of the data measured in the current prices of the analyzed period to the prices of the base period. price, or by the method of extrapolation, which means the transfer of the value of the data from the prices for the reference period to the actual prices for the period analyzed using volume indices.

The overall economic picture and the input-output picture are important tools of macroeconomic analysis, the differentiation between the pictures being the reference. If the overall economic picture provides data from the national economy as a whole to the level of institutional sectors, the input-output picture is useful for macroeconomic analysis up to the level of activity branch as homogeneous components of the economy. The two tables together with the macroeconomic accounts constitute a coherent whole, being synthetic components of the National Accounts System.

If the input-output table reflects in detail the operations with goods and services and the operations of primary distribution of income, from production and operating accounts for the branches, the overall economic picture shows all economic operations carried out in the economy at sectoral level, being essentially a review of all flow accounts of the national accounting.

Economic growth is the effect of the efficient use and combination of primary and secondary factors of production. The analysis of economic growth at the level of economy can be done by economic analysis of branches of activity, similar to economic entities, based on the information provided by the input-output table. For this purpose, a qualitative, structural and quantitative analysis of the primary production factors can be performed, used directly in the production process (labor and capital), involved in obtaining the result of the branch of activity.

The starting point of the analysis consists in the study of the correlation of the economic growth rate with the growth rates of the primary factors of production, having as final result the obtaining of the weights of the primary factors in the economic growth. The results of the analysis indicate an average link at the branch level between the primary

factors of production, as exogenous variables, and the gross value added, as an explained variable, the result being able to be extended to the global level of the national economy. It is found in the hypothesis of simultaneous variation in volume of the primary production factors, the rate of the gross value added depends largely on the relative change in the working capital followed by that of the labor force and to a lesser extent on the rate of fixed capital.

OWN CONTRIBUTIONS

Many economists have tried to explain the very complex mechanism of economic growth, to identify the factors underlying it, at present there is no theory of unitary economic growth. In the specialized literature there are a multitude of factors analyzed with significant influence on economic growth.

In the paper we tried to determine how close to reality, for the Romanian economy, the idea promoted by Adam Smith according to which the sources of economic growth are the stock of capital and labor, as well as the efficiency with which they are used. To carry out this approach in the analysis we used as sources the public databases of the National Institute of Statistics. The data collected are from the input-output table, for the indicators of gross value added and intermediate consumption from the national production accounts related to the branches, the employed population from the statistics of the National Institute of Statistics and the tangible assets from the Statistical Yearbooks of Romania 2012-2019.

In order to perform the empirical analysis, for reasons related to the availability of data, we used for the concept of labor force as an indicator the employed population in enterprises, for fixed capital the indicator of fixed assets, for working capital the indicator of intermediate consumption, and for economic growth the gross added value indicator. Subsequently, we processed the collected data, transforming them into variation rates, so to a form useful for the empirical analysis.

The originality of the analysis consists in the study of the correlations of the rates of variation related to the branches and groups of branches (grouped in statistical units similar to some economic entities) of these indicators, with the rate of economic growth. The correlations obtained were transformed into annual weights, which express the percentage of transformation of the rates of the primary factors of production into the rates of annual economic growth. As a result of these operations, we determined the causal structure of the economic growth, on the one hand the contribution of the primary factors of production to

economic growth, and on the other hand the quantitative and qualitative structure that estimates the value of economic growth.

Economic growth means the increase in volume of annual production and services, being different from economic development, economic growth being a narrower concept than economic development.

Economic development is sustainable and requires greater technological advancement, in addition to economic growth and, a higher standard of living and environmental protection. Therefore, economic growth that can be short-termed or long-termed, ensures the premises of economic development that can only be long-termed.

It is therefore preferable to have an intensive, qualitative economic growth that is more tenable and more sustainable than a quantitative, extensive one that involves a consumption of limited resources.

The results of the addition of the three components of annual economic growth, determined by the primary factors of production and calculated from the analysis, and compared with the rate of total measured economic growth of statistical units, show a close proximity of the two growths calculated and measured over 2008 - 2018. This indicates the confirmation of the theory of economic growth promoted by Adam Smith.

Knowing the average structure of economic growth over the analyzed period, a short-term forecast of economic growth can be made for the year following the analyzed period. Thus, knowing the equation:

$$R\ VAB_{total\ med.} = 0{,}202 \times R\ CF + 0{,}346 \times R\ FM + 0{,}426 \times R\ CC + 0{,}281 \times R\ W_{CF} + 0{,}409 \times R\ W_{FM} + 0{,}3 \times R\ W_{CC};$$

which expresses the link between the rate of economic growth and the rates of growth in volume and efficiency for each primary factor of production, using the average weights calculated at the level of 2008-2018, economic growth can calculated for the periods following the analyzed period. In this way, the formula can be an alternative method to estimate the rates of economic growth when the rates of the primary factors and labor productivity are known. Fixed and working capital productivity can be determined from the formula:

$$W_{CF} = W_{FM} \times FM / CF \text{ respectively:}$$

$$W_{CC} = W_{FM} \times FM / CC / CC$$

LIMITS AND PERSPECTIVES OF THE RESEARCH

Taking into account the fact that science is a continuous process, repeated each time at a higher level than the previous one, the present approach, presents certain limits, which we present below.

There are differences between the calculated and measured growth rate due to a number of factors:

- errors arising from the choice of indicators (tangible assets, employed population, intermediate consumption), due to data availability reasons, the behavior of which only partially covers the behavior of the concept of primary factor of production (fixed capital, labor respectively working capital). However, by using the rates of change instead of absolute quantities or absolute variations, for these indicators including the gross added value indicator, these errors are considerably reduced. The use of rates also gives the advantage of obtaining dimensionless quantities related to the indicators.

- errors arising from the correspondence of the concept of working capital stock with the flow indicator for intermediate consumption (representing the total productive consumption of a statistical unit necessary to achieve its production for one year). Considering that the number of rotations of fixed capital for one year does not change significantly between two consecutive years, cumulated and with the advantage of using the rates of change of intermediate consumption makes this substitution possible with minimal errors.

- errors arising from the affiliation of public entities and non-profit entities in the service of households, in certain branches or statistical units, entities that produce non-commodity goods and services, not having as main purpose profit maximization and thus leading to altered analysis results.

- calculation errors inherent in determining the magnitude of statistical correlations between the rates of annual economic growth and the rates of primary factors of production.

- errors induced by the hypothesis of equality, between the price index of tangible assets and the price index of gross fixed capital formation, for reasons related to the availability of data.

The analysis of the growth rates can be deepened by taking into account other secondary factors of production that may influence one or more primary factors of production, by choosing indicators that cover as closely as possible the respective secondary factors, as well as avoiding their multicollinearityby studying the correlation matrix whose determinant should be as far from zero as possible. Among the most important secondary production factors we mention: technical progress, corporate governance, human capital, research - innovation expenses, energy consumption, etc.

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APPENDICES LIST