

ACCOUNTING MODELS FOR MEASURING GLOBAL SUSTAINABLE DEVELOPMENT

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Abstract

Sustainable development addresses the issues of sustainability in economic growth, environmental protection and social equity. The choice of measurement system for sustainability is difficult, because a perfect system would have to include the various aspects of sustainable development, and be imposed on a global level. Analytical and accounting systems are used in measuring sustainable development, the former more favoured in the past. One of the major advantages of accounting systems as sustainability measurement tools are the possibilities for assigning monetary values to non-monetary aspects, and constructing viable cost-benefit systems for evaluation and monitoring of sustainable development. The lead models in this classification include the core system of United Nations' System of National Accounts (SNA) as the initial accounting measurement system, the System of Environmental-Economic Accounting (SEEA) and the National Accounting Matrix with Environmental Accounts (NAMEA), which is more of a hybrid approach. The underlying problem of these measurement systems is obviously the application of national accounts globally. But since 2012, the implementation of a decade-researched central framework of the SEEA has become a global model. However, the prescription of a central framework, SEEA or other, is not a sign of implementation of the same. More has to be done in order to provide implementation of such a system, and more explicitly incorporation the social component.

Keywords: Sustainable development, accounting systems, sustainability measurement, SEEA.

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1. Introduction

Since 1987, sustainable development has been broadly defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."² Since then, much has been discussed on the subject of sustainable development, its areas, its promotion, preservation and progress. However, it can be agreed that there is yet much to be done in this field.

Usually, sustainable development is defined as a threefold concept, addressing the issues of sustainability in economic growth, environmental protection and social equity³. However, the three issues of sustainability vary immensely, thus needing various implementation and measurement approaches. Therefore, one of the main difficulties when analyzing sustainable development stems from the issue of diverse angles of sustainable development. In this sense, measuring sustainable development in a system is rather complex, since the three aspects of sustainable development require separate measurement approaches. Measuring systems are different; they vary from one interested organization to the other, from nation to nation. It is difficult to choose one system for measuring sustainability, mostly because of the various aspects of sustainable development and the different approaches to "success rates" of each aspect. However, beside analytical measurement systems, accounting systems have been lately adjusted to be used in measuring sustainability. One of the major advantages of accounting systems as sustainability measurement tools are the possibilities of assigning monetary values to non-monetary aspects, and constructing viable cost-benefit systems for evaluation and monitoring of sustainable development. Thus, an accounting system can serve to not only measure, but also monitor sustainable development and provide constructive remarks and suggestions

² World Commission on Environment and Development, Our common future, pp.8, 1987.

³Kee et De Haan, Accounting for Sustainable Development, 2007.

for the future.

However, additional problem occurs with the measurement frame of sustainable development, regardless of the choice of measurement tools and systems. Is sustainability a measurable dimension? And if so, can sustainable development be measured on a global level? Sustainability is not equally approached in the world, which is the first sign of problems in defining sustainability measurement. But sustainable development on local or national level is not the fulfillment of the main purpose of sustainable development. Can the possibility of achieving future generations' needs be measured on a local/national scale?

2. Measuring sustainability

The term "sustainable development" is said to originate from the famously dubbed Brundtland Report (*Our common future*), a 1987 report of the UN World Commission on Environment and Development⁴, although the main idea has been present in many older discourses, especially on the subject of emerging socio-economic disparities in the 1970s. Still, the official and most popular definition of sustainable development is drawn from the well-known report, stating that "sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs."⁵ And under this definition, the goal towards sustainable development has become paramount for developed and developing countries worldwide, for almost three decades now. The measurements of progress towards sustainability have been many, such as the Dow Jones sustainability index, the OECD set of indicators or the EU list of structural indicators, to name but a few. However, the unique measurement system has yet to be discovered. What is more important, the adjustments for

⁴United Nations World Commission on Environment and Development, *Our Common Future (The Brundtland Report)*, 1987.

⁵Ibid, p.8

⁶Bebbington, J., *Sustainable development: A review of the international development, business and accounting literature*, pp.3, 2000.

implementation of such system globally are deemed to be hard to achieve, even if such a system can be made. The two main issues in measuring sustainability are linked to the core concept of sustainable development itself – the three aspects of it, and its global impact. Bebbington states that: “sustainable development is used to motivate various political, legal and economic initiatives which seek to resolve the social, environmental and economic problematique which as occupants of our planet we currently face.”⁶ With this statement, the problems of measuring sustainable development are enclosed, as well as the great importance of yet establishing a viable and successful unified measurement system. The fact that the aspiration towards sustainability is the core of all socio-economic, legal and political changes lately, underlines the uttermost need of using a measurement system which provides correct and usable evaluation and monitoring. The different aspects of sustainable development (social, environmental, economic) point to the problem of constructing a cost-benefit measurement system, which will be able to measure non-monetary aspects, as well as monetary aspects of sustainable development. One of the key issues is the effect of the underlying economic system on the environment and the social aspect. The main problem arises when economic development collides or goes against the other two aspects. All these issues must be revised and resolved in order to achieve an establishment of a unified system used worldwide, with actual and usable results for future generations.

Such systems seem to be unattainable at the moment, but still, there are systems in practice that measure sustainability. Sustainability measurement systems are usually classified as either analytical or accounting systems. Analytical systems presently are used more than accounting systems, mostly because of their simplicity, although both types of systems have their own benefits and disadvantages.

Analytical measurement systems are particularly useful when highlighting the cause-effect relationship between economic and environmental development. One of the most up-to-date issues in sustainable development is the relation between

economic and environmental development, specifically the cost of sacrificing one to the other. This is the main reason analytical systems have been popular in measuring sustainability. One of the primary and basic analytical measurement models is the Pressure-State-Response measurement model (P-S-R), with its commonly used variations model: Driving Force-Pressure-State-Impact-Response (DF-S-I-R) used by the European Union Environment Agency, Driving Force-State-Response (DF-S-R) used by the United Nations Conference on Sustainable Development (UNCSD), and many similar variations of the P-S-R model used by different national and international agencies. Another, more recent measurement tool in the family of analytical measurement models is the Resource-Outcome Indicator, which is close to the accounting measurement systems.

On the other hand, accounting systems for measuring sustainability are recently uncovered in this discipline. The older versions include frameworks for economic statistics, rather than accounting indicators, but the very same are currently replaced by improved accounting models. The lead models in this classification include the core system of United Nations' System of National Accounts (SNA) as the initial accounting measurement system, the System of Environmental-Economic Accounting (SEEA) and the National Accounting Matrix with Environmental Accounts (NAMEA), which is more of a hybrid approach. The underlying problem of these measurement systems is obviously the application of national accounts globally.

It can be instantly observed that even within the same original measurement system, multitudes of variations are used by different agencies, depending on their individual approach. This is the essence of the definition of and need for one, unified measurement system for sustainable development.

3. Accounting models and sustainable development

The essence of accounting models for measuring sustainability has been the

combination of monetary and biophysical accounts⁷, in order to present non-monetary values in monetary terms, and vice versa. It has to be stated that this component is merely vaguely addressed in analytical measurement systems, which makes accounting systems more applicable in the future. The trade-off or monitoring of the biophysical and monetary values applies to almost all aspects of sustainability. Monetary values are measured in terms of wealth and assets vital to an economy, thus satisfying the economic aspect of sustainable development. Biophysical assets, the non-monetary component of accounting systems, represents the natural resources that are the focus of the environmental aspect of sustainable development. At first glance, it seems that the social aspect is omitted in the equation, although some experts argue that the improvement of social development is based on the equal economic-environmental development.

The economic aspect of the accounting models for measuring sustainability is generally concerned with the change in national wealth per capita. It is the only source of *weak sustainability*⁸ monitoring within such systems. The economic aspect seems to be easy to measure, since it deals with easily definable values, at least at first sight. Information on wealth per capita is easily calculated, easy to access and verify. But, deepening the analysis for actually usable results is the goal to most accounting measurement systems. In such terms, national wealth is merely a surface indicator, which needs to be combined with more vital indicators. Net domestic

⁷ Wackernagel, M. et al, Accounting for sustainable development: Complementary monetary and biophysical approaches, OECD Roundtable on Sustainable Development November 2001, 2001

⁸ Strong sustainability is defined as a fundamental examination of the relationship between man, environment, and society, constantly subjected to criticism of the current socio-economic establishments, providing for a new order establishment as to achieve sustainable development in the long run. Weak sustainability philosophy on the contrary, is concerned with the prevention of socio-environmental catastrophe, which would endanger the future existence of humanity. The crucial difference between the philosophies of weak and strong sustainability is that the former sees man as the center of the idea of sustainable development, and strives to adjust just as much as necessary for its existence, whereas the latter sees man as a part of the environment, with the environment's priorities in focus. There are many sources of discourse on these philosophies: Bebbington, J et Thompson, I., Business Conceptions of Sustainability and the Implications for Accountancy, London:ACCA, 1996.; Redclift, M., Sustainable development: exploring the contradictions, London: Methuen, 1987.; Turner, K., Sustainable Environmental Economics and Management: Principles and Practice, London:Belhaven Press, 1993.

savings is more often taken as an economic, monetary indicator. Moving to *strong sustainability* measurement, the economic aspect is measuring the *net effects* of national wealth less net natural resource depletion or environment degradation. But assigning monetary values to the rate of environmental degradation or resources depletion is a difficult issue. A significant problem of the model is the assigning of values to depletable resources. How can one assign monetary value to the ozone layer, and calculate sustainability as such, given its non-recurring, but vital role in the life of this and future generations?

Because of this issue, environmental questions are largely addressed in either non-monetary or combined indicators. However, one of the most important indicators is based on economic theory as much as it is based on environmental issues: the demand and supply indications, present in any accounting model of measuring sustainability. The notable idea is the rate at which demand surpasses supply, since this is the current global situation. This stated, demand in these models is actually human consumption, whereas supply is the Earth's current bio-capacity⁹. A decade ago, the excess consumption over bio-capacity has been 1.3, meaning that for the current population, the environment requires 1.3 years to regenerate and replenish, for a yearly consumption of the human population. Ten years later, the rate is doubled, and increasing. And the most striking problem, which is even excluded from the equation, is the waste of non-renewable resources, by actions such as deforestation, freshwater use-up, carbon dioxide accumulation etc. The demand/supply index is worthwhile for alarming authorities, even without taking these issues into calculation. Therefore, accounting models can yet contribute to the alertness and effectiveness of authorities towards sustainability improvement.

A current trend in the reporting and measuring sustainability seems to be the involvement of accountants in the construction of viable measuring models. Monitoring sustainability is becoming a public agency task worldwide, with public

⁹ Wackernagel, M. et al, Accounting for sustainable development: Complementary monetary and biophysical approaches, OECD Roundtable on Sustainable Development November 2001, pp.3, 2001.

accountants as significant portion of the monitoring teams¹⁰. Therefore, it is understandable that measurement models based on accounting slowly, but surely start to replace analytical measurement models.

The need for accounting-based models and accountants involved in measuring sustainability is by no means new or innovative. Since the early 1990s, this idea has been seen through sustainability experts' opinions¹¹. But the process of introduction and implementation of such systems has been a slow one, continuing even today. The local authorities and governments, nationally assigned to monitoring sustainable development and thus creating effective policies, are the first milestone in introducing accounting models for measuring sustainability. Developed countries are slowly accepting and implementing this approach, on a national or local level, depending on the circumstances. One of the most recent and most rapidly introduced approaches has been the local government sustainability measurement model in Australia, which has been implemented with over 50% success rate¹². The viewpoint of over 63.3% of Australia's local government officers has shown that implementing accounting systems is beneficial. Australian local government is also one of the first places where the key role of accountants in measuring sustainability has been outlined. It is argued that financial understanding and experience will be the essence of the evolution of sustainability measurement models based on accounting systems¹³.

Pioneer of the full implementation of accounting models for the measurement of sustainability are the governmental and business organizations in the United Kingdom. According to a 2005 research in the UK on this topic, accounting systems adjusted for the purpose of measuring sustainability, have been considered beneficial, as long as they could be separately constructed, and deliberately distinguished from

¹⁰ Williams, B. et al, The role of accountants in sustainability reporting – A local government study, 6th APIRA Conference, 2010.

¹¹ In: Deegan, C. et al, A survey of Australian accountants' attitudes on environmental reporting, *Accounting Forum*, 19, 2/3, pp.143-145, 1995. and Bebbington, J. et al, Accountants' attitudes and environmentally sensitive accounting, *Accounting and business research*, 24, 4, pp.109-120, 1994.

¹² Williams, B. et al, The role of accountants in sustainability reporting – A local government study, 6th APIRA Conference, 2010.

¹³ Tarrant, D., Is green the new black?, *In the Black*, 78, 9, pp.36-39, 2008.

regular financial accounting and reporting systems¹⁴. However, opposed to the Australian example, UK's local authorities implementing these types of systems were up to 32% only, at least until 2005¹⁵. Since then, it has been noted that the implementation of accounting models for measuring sustainability, as well as involving accountants in the process, needs to be improved in order to create better monitoring of sustainable development in local government units. However, UK corporations and profit organizations have gone one step further, implementing accounting systems such as full cost accounting, reinvented in order to measure the threefold goals of sustainable development. British Petroleum has been implementing a combination of full costing accounting and SAM since 2006 to align its goals with the general goals of sustainable development¹⁶. It is still perceived by some as a trend towards superficial approach of good corporate governance and social responsibility, but it is amendable that corporations at least begin to implement a system which will eventually contribute to the environment and society as much as it contributes to companies' profits and economic development.

As it can be seen, accounting systems and indicators for measuring sustainability are already being implemented on national level, with significant rate of implementation in developed countries. But the main problem with any measurement and monitoring system is that it fails to show the whole image of the situation – the global impact seems to be omitted.

¹⁴ Ball, A., Environmental accounting and change in UK local government, *Accounting, Auditing and Accountability Journal*, 18, 3, pp.346-373, 2005.

¹⁵ Telford, B. Environmental accounting in UK local authorities: The results of a national survey, *Journal of Finance and Management in Public Services*, 5, 1, 2005.

¹⁶ Bebbington, J. Accounting for sustainable development performance, Research executive summary series, CIMA, London: The Chartered Institute for Management Accountants, 2006.

4. Global sustainability – can a unified accounting system be applied?

Whereas to be successful, sustainable development needs to occur on a global level, it is difficult to measure sustainability worldwide. There are many problems with the global approach. Primarily, sustainable development does not progress equally anywhere in the world. The social, environmental and economic presets vary from country to country, thus making the measurement frames vary as well. However, local sustainability effects hold little meaning in the sustainable development philosophy. Therefore, measurement of sustainability effects on a local level fails to achieve the global goal of sustainable development, at least in the short run.

The reasons for “avoiding” a unification of the system have been previously outlined, but are mainly concerned with the different aspects and approaches to measuring sustainability on a local level. One of the main drawbacks of establishing a global measurement system is the distribution and measurement of wealth, considering that current accounting models identify “national wealth” as a sustainability indicator (economic, monetary). The main foundation of the monetary aspect of measurement and monitoring systems is the national wealth, as a vital component of the economic vitality in a system. Therefore, global measurements in such terms are difficult to tailor.

It is widely argued why a global sustainability measurement system is necessary versus why it is impossible to encompass the big picture. However, lately significant efforts are made towards construction of a global system for measuring and monitoring sustainability and policy recommendations. In 2012, a joint effort of the European Commission, the Food and Agriculture Organization, the International Monetary Fund, OECD, UN and World Bank has come up with a renewed and updated, global, unified SEEA-CF (System of Environmental-Economic Accounting Central Framework)¹⁷, a specific framework for monitoring sustainability progress and recommending future actions. This represents a great step towards the unification of

¹⁷ European Commission, Food and Agriculture Organization, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank, System of Environmental-Economic Accounting Central Framework, UN Statistical Commission, 2012.

monitoring sustainable development, and a significant one as well. It has been the result of nearly a decade of research and adjustments of the SEEA, NAMEA, SNA and national approaches. Now, the SEEA central framework is expected to augment the effectiveness of monitoring sustainability worldwide.

Before even discussing the flaws of a global measurement system for sustainable development, one has to concentrate on the missing value from the system: the social component. It has been previously mentioned that some experts believe the social component is accounted for, by covering all economic and environmental aspects. But if social aspects are looked for in the model, such as population increase, education expenditures (as a part of the net domestic savings indicator, which are not accounted as beneficial, but merely expenditure), quality of life, the social component is not really taken into consideration. Although formally omitted, some of these aspects are appended to the models, in the form of plotting population growth against declining wealth, in order to measure social effects and recommend future policies.¹⁸ However, the next step is incorporating the social component more thoroughly, in order to better measure sustainable development.

Another issue that arises from the implication of any measuring framework, SEEA included, is the position of measuring strong sustainability. Strong sustainability is mainly connected to the measurement of biophysical accounts, especially the rate at which human population leaves mark on renewable and non-renewable resources. It is encompassed in the SEEA system, as the *environmental* portion, but it can be argued that the *strong* issue is still not measured in absolute terms. Yet, it has to be mentioned that the environmental (and non-monetary, to some extent) component is the main advantage towards globalizing an accounting framework for sustainability measurement. The environmental question of sustainability is a global one, surpassing national borders and man-made boundaries. Therefore, as much as this aspect lags in the measurement of strong sustainability, it still contributes largely to the globalization and unification of the measurement model of sustainable

development.

But these are not the only and uttermost setbacks of the new SEEA central framework. The publication of a central accounting framework for measuring sustainable development is only the beginning of the process of effective global monitoring and measurement of sustainable development. The process is more difficult than that – the implementation of the SEEA framework globally is what follows. Although international organizations, such as the UN, European Commission, World Bank and OECD are the primary users of this framework, its output should be used by national authorities for effective policy-making towards sustainable development. The open question is how international organizations, many of which have no legislative power over national authorities, will persuade national authorities worldwide to use the SEEA framework as guidelines for future public policies, which will strive towards a higher percentage of sustainability.

5. Conclusions

In the end, it can be concluded that one unified measurement system for the global rate of sustainable development is difficult to attain. A viable measurement system would have to be able to integrate the three sustainability dimensions: economic, environmental and social, with the recommendation of the most sustainable trade-off between them. Therefore, such a system will have to be based on a sound conceptual foundation. Additionally, the indicators which would be selected would have to be based on thorough worldwide research, and for construction of such a system, a significant amount of observation is needed, which can be a timely process, in a matter where time is of the essence. Indicators involved in the “perfect” measuring system will have to encompass key information in the development (economic, environmental, and social) globally. And most importantly, the system imagined would have the most needed output – viable recommendations

¹⁸ Wackernagel, M. et al, Accounting for sustainable development: Complementary monetary and biophysical approaches, OECD Roundtable on Sustainable Development November 2001, pp.3, 2001.

for policy makers for the future.

Accounting systems are far from the “perfect” definition of sustainability measurement systems presently. However, they evolve with time, and can be easily adjusted, with the evolution of national and international accounting systems. The core requirement of the imagined sustainability measurement system is the introduction of global, instead of segmented measurement of sustainable development. As accounting standards and practices, in general terms, begin to be more internationalized, the idea of a unified global measurement system is not so far, if the system is based on the accounting system to be introduced worldwide. Accounting is a systematic discipline, which will be able to classify both monetary and non-monetary values of sustainable development within a unique framework. Moreover, with the current trend of converging accounting standards, the unification of a sustainability measurement system is not so far-fetched. With the recent SEEA central framework publishing, this idea becomes reality. However, there is more to be done on the subject, given that the globalization of sustainability models is yet at its beginning. The conceptualization of a central measurement and monitoring framework is far from the global implementation of one. Therefore, the global promoters of sustainable development need to take a stand for the implementation of such a framework worldwide, convincing national authorities to start using such a framework. But even with such action the implementation process would be on its start – the commitment to implement a central monitoring framework and the usage of its outputs for policy recommendations for the future is vital. This is not an issue that can or should be enforced upon national authorities, it is a necessity for a better future, which needs to be recognized and acted upon globally.

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