

Public Goods, Sustainable Development and Business Accountability: Connecting Corporate Performance and Preservation of the Commons

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Received date: Oct 04, 2018; Accepted date: Oct 23, 2018; Published date: Nov 02, 2018

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Abstract

Sustainable Development is about preserving and maintaining public goods. This comes out both from the intra- and intergenerational aspect of the Brundtland definition ("meeting the needs of the present without compromising the ability of future generations to meet their own needs"; World Commission on Environment and Development). In consequence, whoever uses public goods is liable for their preservation, for their maintenance and, where they are underdeveloped, for their built-up and expansion. "Paying" for the usage of public goods is taken care of by taxes and excise, and, more recently, by duties like those levied on emission. However, the magnitude of public goods usage is rarely measured on either national or regional or local levels (The phenomenon of global public goods is only briefly mentioned in the paper as it mainly studies the "macro-micro- linkage" between a national economy and business), let alone in monetary terms. Yet monetary valuation is the language of business, and when statistical indicators are set up to measure progress of sustainable development, there are almost none that link the macro-sphere to the business level.

While the objective of national accounts is to serve for decision-making by government authorities in the first place, businesses and individuals do as well base their decisions on information gleaned from national accounts. Businesses are often reproached for using public goods for free. Therefore they might want to demonstrate that they earn a return on the capital invested in public goods they use; they might be interested to know the value of those goods, and they would wish to show that the taxes they pay are at least on par with the "return" on what is invested in public goods. The paper shows how this could be achieved, exhibiting the theoretical and practical issues and pointing to the obstacles that are blocking a fast solution.

Keywords: Business; Public goods; Sustainable development; Political regime

The Main Arguments and the Organization of the Paper

Quite a few methodologies have been developed to quantify the value of natural resources. There are the contingency and the willingness to pay method for isolated cases, there are rent-based methodologies and there are techniques to present aggregated values in national accounts. A brief explanation of this will be given first. One concern is that the application of those valuation methods to social resources is rather scarce. But social resources are the major basis for a society to perform well and developing social/institutional resources is a major issue especially in the developing world and in a substantial number of regions of developed countries as well. Hence measuring their value should be a concern to policy makers.

The paper begins with an overview of what has been accomplished by national and supra-national entities and statistical offices in measuring public goods and social resources. It explores the possibilities of extending the public goods valuation methodology to encompass all types of infrastructure in an economy and of apportioning public goods usage to business firms. The next part covers the business perspective and the macro-micro linkage. A first section explores externality costing, and the next section deals with

deals with the concept of multiple capitals as adopted by the International Integrated Reporting Council (IIRC), with financial capital, manufactured capital, intellectual capital, human capital, social and relationship capital, and natural capital representing the stores of value that are the basis of an organization's value creation [1]. Examples will be given of implementation and of best practice.

The concluding part exhibits implications for policy as well as recommendations for statistical offices and business firms.

Accessing the Public Goods Phenomenon from Diverse Angles

Connecting public goods to sustainable development is a relatively new approach to the issue of public goods. Historically, the access to the phenomenon originated in the legal debate over property: Western jurists have for a long time held up that the concept of property was founded in ancient times denominating a single proprietor and his family occupying a piece of land [2]. However, in 1861, the English jurist H. S. Maine, drawing on his own extensive research and on what was found by Maurer [3] on the primitive Germanic village communities (the "Mark"), concluded that "it is more than likely that joint ownership, and not separate ownership, is the really archaic institution". This had much more than academic importance, as a major political debate came off over the status of the many diverse forms of common property in Europe in the 19th century and in the

early 20th century. But what really is the meaning of private property versus common property has remained contested. An example is the famous article by Hardin on 'The Tragedy of the Commons' [4]. Along the same lines, there are economists who believe that common-property institutions have a longer history than private property [5]. But most economists consider private property to be an essential ingredient in economic development [6].

A different approach to public goods comes from P. Samuelson. He reproached conventional economists for having neglected the topic of public expenditure and instead merely concentrating on the theory of taxation. In this context, he made an explicit distinction between ordinary private consumption goods which can be parceled out among different individuals and collective-consumption goods which all individuals enjoy in the sense that each individual's consumption of such a good does not lead to no subtraction from any other individual's consumption of that good [7]. The characteristics, thus, of public goods are accessibility (non-excludability and jointness (or non-rivalry) in consumption. This definition is narrower than that of common goods where rival consumption as well occurs (like an irrigation system) and to which access may be limited (like a toll road). And, as remarked, among others, by Buchanan [8], this is a highly restrictive definition and, strictly speaking, no good or service fits the extreme definition of "pure" public goods. Buchanan suggested a model that would include goods embodying various degrees of "publicness", and he points out that "jointness" occurs both in consumption and in production of a public good, and it is in both that external economies, or "externalities"¹, arise: Because of the many interdependencies within an economy the behavior of one user can adversely or positively affect the consumption of a certain public good (e.g. public access to water) by another user - an external effect to both of them.

Combining the perspectives of property (and property rights), of accessibility/non-rivalry and of external economies/externalities leads to political considerations: If accessibility and non-rival consumption of a public good are desirable from a policy standpoint, like general education and health services, they should be "owned" by the state; if the goods are provided by nature, like clean air and fresh water, the state should control them, i.e. protect them from depletion with specific governance arrangements. However, both theoretically and for practical reasons, one may argue that there is no need for the state to secure the provision of public goods or commons and those they can also be provided by communal organizations and private actors. This would also solve the issue of externalities, but there are stringent prerequisites to this, as stated by E. Ostrom in her famous book "Governing the commons: The evolution of institutions for collective action" [9], of which stable supply, credibility and strict monitoring by all stakeholders are the foremost. The book and the argumentation have aroused wide discussion about the role of private actors both in the provision of public services and in how to co-regulate them together with private actors [10]. The critics reach from strict rejection of any privatization of public goods that are deemed to be "vital services" like health [11] and education [12], to demanding international frameworks for regulating private public private partnerships [13-15]. The framework policy is further pursued by the United Nations Economic Commission of Europe's (UNECE) International Public-Private Partnerships Centre of Excellence as per

the 6th session of the UNECE Team of Specialist on Public-Private Partnerships held in Geneva in June 2014 [16].

Broad criticism is raised by quite a few political scientists against the negative consequences on public affairs of what they call "neoliberalism" [17-19]. On the other end of the spectrum, the advocates of public-private partnerships clearly state that the debate over whether a more market-oriented approach is acceptable in dealing with public goods is "settled" [20]. The most salient issues which remain are accountability and inclusiveness: How can public-private partnerships improve the performance of public institutions, and at the same time guarantee widespread public access, equity of stakeholders and reasonable quality standards [21]? For many governments, public-private partnerships have become a strategic choice, and it is the role of both the governments and the private investors to involve all stakeholders - early on [22]: The "public" is not just public authorities but all constituencies that are affected by the privatization of a public service.

Private public private partnerships is where the question of valuation comes in more or less automatically, because the business partners expect a stream of cost and of income and these can easily be capitalized. It takes wonder why the private sector has not called on national statistical bureaus for a more comprehensive treatment of public goods in the national accounts. There is significant statistical work around on how to join public goods issues with sustainable development. The topic is analyzed in many international and national settings, and a growing body of experience is gradually becoming available. The next section gives some examples. Still, the valuation and measurement problems are not treated in a uniform way throughout all the institutions which handle the topic. The dilemma of public goods valuation will be dealt with further down.

Public Goods in Public Statistics

The effort of making more information on public goods available in national accounts is motivated by the fact that this subject now dominates policy agendas. One example is the report "Policies to Enhance Sustainable Development" of the OECD [23], where a framework is outlined for better integrating economic, environmental and social objectives. The nexus between measurement and policy may be seen from what the OECD has elaborated on the two objectives of measuring frameworks, making a distinction is made between analytical frameworks and accounting frameworks: An analytical framework would be, e.g., the "Resource-Outcome Indicator Approach" developed by OECD [24]. With this approach, two types of measures are built: One is on how well we are preserving our assets (resource indicators) and the other one on how well we are satisfying current needs (outcome indicators). With regard to accounting frameworks, the basic foundation is the core System of National Accounts [25], which is meant to unify economic statistics worldwide. It is broadly accepted, it is credible, it is internally consistent, and it has a long established theoretical structure that imposes a systematic discipline to the organization of statistics. An expansion of the SNA is the National Accounting Matrix which includes Environmental Accounts (NAMEA). It was developed by Statistics Netherlands to describe the flows of material through the economy through an input-output matrix [26]. All European Union member states participate in the European Commission's NAMEA project. Another expansion is

¹ The term was created by Arthur C. Pigou ("The Economics of Welfare", London 1920), and the modern operability of the concept was first discussed by Ronald Coase ("The Problem of Social Cost", *Journal of Law and Economics*, 1960, pp. 1-44).

the Social Accounting Matrices (“SAMs”) [27]. SAMs incorporate detailed information on labor and households into the system of national accounts. Specific data are provided on income generation with labor inputs differentiated by sex, level of education, and type of profession with an additional sub-division of the household sector. Still, what SAMs do not measure is social capital/social resources.

The social resources perspective seems to be underserved in most frameworks. The contemporary use of the term “social capital” is most often attributed to Bourdieu [28], Coleman and Putnam [29,30]. Putnam views it as a set of horizontal associations between people - social networks and associated norms that have an effect on the productivity of the community. A broader definition is given by Coleman [29], who defines social capital as “a variety of different entities, with two elements in common: they all consist of some aspect of social structure, and they facilitate certain actions of actors - whether personal or corporate actors - within the structure” [29]. The most encompassing view refers to the overall social and political environment that enables norms to develop and shapes social structure [31]. From a measurement view, the broader concept seems to be more receptive to monetary valuation because looking at government, the political regime, the rule of law, the court system etc. offers input/output relations as well as cost and benefit perceptions. This contrast to the World Bank approach which is restricted to a networking perception (see below). The controversy circulates around the role of the state: One argument is that viewing at social networks legitimizes orthodox development policies, whereas the counter-argumentation accuses that this concept neglects the pivotal role of formal state institutions in influencing development at the local level [32]. From there it becomes understandable why statisticians have shunned quantifications of the concept in numerical and monetary terms. Nevertheless, new measurement instruments are being discussed, at least in UN, EU and OECD policy documents [33]. Also, if one wishes to link the narrower concept of social capital (the one that only comprises “networks”), to sustainable development, this can only be done on the level of smaller communities (for groups to thrive, networks, trust, collective action, social inclusion and communication are needed). In recognition of this, various frameworks have been set up to monitor this notion of social capital, e.g. in the U.K. [34]. If the outcome provides any quantitative results, this would certainly have to become one step for evaluating the inventory of “social resources.

Notwithstanding the discussion on measurement methods, there appears to be a gap between theoretical conceptions and “numerical” application throughout the whole spectrum of research on public goods. One good example is the renowned Max Planck Institute for Research on Collective Goods in Bonn, Germany, which was founded in 1997 as a temporary project group “Common Goods: Law, Politics and Economics” and transformed into a permanent institute in 2003. The institute counts on a highly qualified team of scholars and has published numerous important books. Its foremost application perspective is on the highly significant topic of concrete proposals for the design of institutions for the provision of collective goods. But one might wonder why the economists in this group do not connect to the statistical dimension of the issue. Likewise, in the U.S., the National Bureau of Economic Research’s (NBER) Public Economics Program mainly studies the effects of taxation and government expenditure programs at the federal, state, and local levels. It looks like that nothing has changed very much since Samuelson’s reproach that economists should also focus on the supply side of public goods. So, at this stage, before continuing with the question of public goods valuation, our

considerations will take up what the business level has taken on with respect to its responsibility towards the commons.

Public Goods and the Business Environment

Parallel to the developments on the macro-economic level, companies have broadened their reporting from merely accounting for economic performance to exhibiting information on corporate social responsibility (CSR) and sustainability performance, and various frameworks have been developed for mensurating the effects of CSR activities [35,36]. A consolidation of this is the Global Reporting Initiative [37]. Each of GRI’s indicators measures a clearly determined set of facts. However, there are two major discussion points: One is how the indicators properly connect to the information used by management for running the business on a day-to-day basis, whether they really reflect the link to economic value, and if there is a nexus to the cost of public goods usage. The other discussion is how the GRI indicators are connected to macro-economic indicators for sustainable development. The need for this connection stems from the UN Global Compact [38]. The Global Compact was one of the driving forces to build the GRI. It has called for globally responsible leadership in governments and businesses, and a close relation has also been established between the Global Compact and the UN’s Millennium goals [38]. The Millennium goals, on first sight, were about fighting global poverty; however as the means encompass education, gender equality, health and environmental sustainability, they reach beyond the level of macro- data down to the level of business as well. Business has been considered to be an essential player in the Millennium efforts; so, this is a micro-macro link at least on a broad scale. One notable attempt to go further in detail has been made in Italy [39], and there is more work under way as GRI is connecting to the UN Post-2015 Sustainable Development Goals [37].

On another end, corporate accounting and governance have always been focused on the imperative to improve effectiveness, creativity, and innovation in organizations. A new challenge for corporations is to develop opportunities which take account of the relationships between businesses and society as these are becoming more and more connected. Corporate management is being challenged on how the resources outside the firm should be included into not only measuring corporate performance, but how they can enhance corporate performance and competitive advantage. Although there is no question that adjustments can be made in a firm’s financial statement to accommodate the additional measures, this is met with several complications and obstacles. First, if individual firms are engaged in these activities, and if competitors do not, do these firms suffer a competitive disadvantage? Second - and much more technical: Existing approaches have to be enhanced and new ones to be developed to measure the value of public goods. Finally, top executives will ask if all this results in improved corporate performance and competitive advantage.

Six capitals and the triple bottom line

Triple bottom line reporting discloses social, environmental and economic performance. More recently, corporate governance and process management were added. The reports may differ from industry to industry, but they all use the robust set of indicators that has been elaborated in the ongoing cooperation of international stakeholder engagement which built the Global Reporting Initiative [37]. While GRI is about performance, another move has drawn attention to value created and the capital base for value creation. Five types of capital -

natural, social, human, manufactured and financial capital - were identified by, among others, the Organizational Stakeholders Group, a collaboration of large companies, banks, accountancies, certain think tanks and a few NGOs such as Forum for the Future. The five types compose the “sustainable capital from where we derive the goods and services we need to improve the quality of our lives” [40]. The five types had also been set up for the Sigma Project of the British Standards Institution [41]. The SIGMA Guiding Principles have two core elements: One is “the holistic management of five different types of capital that reflect an organisation’s overall impact and wealth (in the broadest sense)”, the other one is the “exercise of accountability, by being transparent and responsive to stakeholders and complying with relevant rules and standards” [41]. Here we have a “toolkit” for managers, and the tools have been applied in a large number of companies. But the concept has met with criticism by social science. One such criticism goes back to the disapproval of the term “human capital” [42], which manifests one of the divisions between academia and practice. There is fear that economic hegemony captures people and nature [17,28,43]. One characteristic of this is that the Social Capital Initiative of the World Bank has restricted the term to the effectiveness of networking [44], another one is “strong sustainability argument” which opposes what it labels the “commoditization” of natural (and social) capital.

The many disagreements between social science and business are a roadblock on the way that would lead to a consensus on the contribution of the private sector to overall value creation. Many companies talk about public goods, about giving back to the community, about sustainability and corporate social responsibility, and some companies have incorporated and implemented socially responsible behavior into their business practices. And quite a few firms actually change their entire business model in order to respond to what may be called “social needs”. While ten years ago were very few, we are now increasingly finding firms that have a greater consciousness to being socially responsible and recognizing the advantage of being socially responsible and the return on investment for doing good. This change is being reflected in the literature and how companies are doing business. Michael Porter and Mark Kramer for example have written extensively about the importance of creating shared values in corporations and the connection between societal and economic progress [45]. In addition, they have documented numerous examples of the link between companies' strategies that promote socially responsible behavior and competitive advantage [46].

John Mackey, the founder of Whole Foods has gone so far to say: “The business model that Whole Foods has embraced could represent a new form of capitalism, one that more consciously works for the common good instead of depending solely on the ‘invisible hand’ to generate positive results for society” [47]. Mackey's book: “Conscious Capitalism and his vision and strategy for his corporation [48], has led many corporations worldwide to adopting an increased focus on not only social responsibility and the concept of doing social good and giving back to the community, but to one where organizations are focused on sustainable production and the promotion of sustainable development. Most companies, even those that do not pursue a path toward sustainability, widely accept that the concept of business today and in the future needs to pursue sustainable development [49]. We are finding that academia and practice have contributed to this way of thinking and operating by thoroughly revising the traditional processes, products and, more widely, business models with a new view towards honoring the total investment in the different forms of capital available to a firm. Raj Sisodia, David Wolfe, and Jag Sheth recently

published the second edition of their book: “Firms of Endearment” [50]. According to the authors, Firms of Endearment “(FoEs”) are firms that are fueled by passion and purpose instead of cash, and who view society and their workers as the ultimate stakeholders. All other stakeholders - be it customers, suppliers, business partners, investors or members of the communities affected by the firms’ business, will then develop an affectionate connection to these “humanistic companies”. The companies eventually maximize not shareholder value but value to society as a whole. Although some might ask how this passionate commitment translates to profits, results reported in Sisodia et al. show amazing results. Table 1, below, shows how FoEs compare to companies that were rated “Good to Great” in Jim Collin’s pivotal research on corporate performance and to the S&P 500s over a 15, 10, 5, and 3 years respectively [51]. As can be seen, FoEs dramatically outperformed these companies over the last 10 and 15 years.

Cumulative Performance	15 Years	10 Years	5 Years	3 Years
US FoEs	1681.11%	409.66%	151.34%	83.37%
International FoEs	1180.17%	512.04%	153.83%	47.00%
Good to Great Companies	262.91%	175.80%	158.45%	221.81%
S&P 500	117.64%	107.03%	60.87%	57.00%

Source: Sisodia, Wolfe and Sheth (2014), pp. 114

Table 1: FoE's Financial Performance (2014).

The performance measure used here is share-value. But with share-value we are still limited to the capital invested in the firm. However, the perspective must be widened. With financial capital, manufactured capital, intellectual capital, human capital, social and relationship capital, and natural capital representing the basis of an organization's value creation, a nexus must be made between performance and the usage of each of these types of capital. This will be explored later.

Public Goods and Externalities

Public goods usage and appropriation of externalities are two sides of one coin: Whichever activity is performed by a business, it uses some type/many types of public goods, which would be physical environment, infrastructure, social institutions, i.e., labor markets or the legal system, etc. Businesses pay directly for this only in part, however, taxes, excise duties or other charges will not suffice to maintain or improve the public goods they use. Still, their activity contributes to preserve and enhance a big part of those goods. In addition, their employees pay income tax, payroll taxes (in some states), and their tangible and intangible investments produce income which in turn generate taxes, etc. However, there is public good usage from which the corporation benefits and does not (directly) pay for, and this would be “negative externalities”. There are also “positive externalities”, i.e. the effects on public goods through corporate activities, like enhancement of a location in which a renowned corporation sets up its quarters. There is, yet, no “visible” measure of the corporate sector's overall contribution to public goods conservation. One good example is re-naturalization and re-cultivation in quarries and mining sites through landfill and other measures. This might be “visible”, but naturalist pressure groups will argue that no de-naturalization should have been committed in the first place and

landfills do not serve the preservation of the environment. With this, they argue in the same manner as the advocates of “strong sustainability” who do not tolerate that natural capital be replaced by man-made capital. From there, we need to reflect on the debate on environmental costs and monetary valuation of public goods and the various methods that are discussed in praxis and in academic public discourse (and mostly rejected). This would lead to briefly exhibiting the attempts of statisticians to inventorying public goods with the corresponding nexus to the topic of public space and social governance. One related question is how to deal with social capital, which raises the issue of the so-called throughput economy and its link to measuring economic, ecological and social sustainable development. Measuring and publicizing corporation's social performance could ultimately be a motivator to influence corporate behavior. However, the criteria used to measure performance vary widely. For example, the Dow Jones Sustainability Index includes properties of economic performance in its evaluation; however, it for example weighs customer service almost 50% more heavily than corporate citizenship [46]. The FTSE and Russell Indexes contain no measures of this at all. Due to this dearth of reliable measures, we see a possible avenue for connecting effects and undertakings on the macro-level with those pursued on the micro-level: A business- oriented approach to the public goods debate will be able to respond to new ideas on capitalism, social responsibility and business ethics and to develop a balanced culture of impact evaluation.

In macro-economics, we find a long history of the externalities debate. There is a commonly used definition of externalities which is about “situations when the effect of production or consumption of goods and services imposes costs or benefits on others which are not reflected in the prices charged for the goods and services being provided” [52]. This points towards the primordial attribute of externalities, i.e. that an action of one specific subject (e.g., a production facility sending effluents into a river) directly or indirectly affects other subjects (the neighbors of that facility). This would be a negative externality. There are positive externalities as well, e.g., the consequences which may follow from the construction of a road. Housing, commercial development, tourism, etc. might be improved. From there the question arises how to burden the entity which causes a negative effect (or how to provide benefits when an entity causes a positive effect). But often, there are property issues: When a property right cannot be clearly assigned (for instance, the ownership of a river), how can the externality be priced in a way that benefits those that are affected?

There has been extensive research on externality valuation and externality pricing. Major funding was provided by the European Union through its ExternE series [53]. The issues that are studied relate to air pollution, global warming, catastrophic situations and road congestion. They all affect the conditions of life. But the framework is not exhaustive: Some externalities are accounted for, others are not: Community severance, alternative uses of land, visual intrusion, etc., are left out of the picture, and apart from the topics of climate change and of carbon dioxide emission, there is no harmonization on an international level. The prevailing technique seems to be directly “punishing” businesses that cause damages. In consequence, the cost for specific, but isolated, externalities gets “internalized”. A better way would be to value aggregate externalities and then allocate their cost to businesses proportionately [54]. What we get so far, in principle, is the monetary value of the effects caused by a definite externality. The methodology supports governments or supranational bodies in determining which policies and technologies to choose in specific

fields of impact, with the primary example being low-carbon investment [55]. But there is still a long way to go towards setting up aggregate externalities valuation.

Traditionally, the valuation exercises estimate prices based on people's willingness to pay or their willingness to accept compensation (“stated preference methods”). The first case is about benefits, like ecological improvement: the second case would be about nuisance. The most prominent of these is “contingency valuation” or “contingent valuation” (see below in the section: The dilemma of public goods valuation). The disadvantage is that the method relies on surveys. Attempts to outperform this technique comprise Input/Output Accounting and Strategic Assessment [56,57]. This would be closer to the methods applied in the world of business.

So, how would a business-level approach look like?

In business accounting, the capital value of an item can be inferred to from its cost – provided an appropriate rate of interest can be applied (with “interest” not just being what needs to be paid for a loan, but the weighted cost of capital, including return on equity). Transferring this to the cost of externalities, a good approximation could be made for their value. One approach that has been used in this context is the benchmark-concept on “sustainability capital”/ “sustainable value” devised by Figge and Hahn [58]. It is based on the notion that the average value created by any form of capital can be viewed as its opportunity cost. The opportunity costs of the various forms of capital thus correspond to the efficiency of their use. On the national level, all capital used ends up in the net domestic product (NDP). Then, the difference between the use of capital in the overall economy and its alternative use in a business “Value-Spread” (VS) can be determined as [58]:

$$VS = \frac{NVA}{C_i} - \frac{NDP}{C_i}$$

In this equation, NDP, Net Domestic Product, is net value added achieved from the – external – use of capital C_i in the overall economy, and NVA is Net Value Added achieved from the use of this in a business (firm “i”). The macro-level return on investment (NDP: C_i) may be interpreted as the cost-rate of externalities, reflecting the outcome of capital use that is alternative to the use in a business.

The micro-level return is the firm's profit-rate. “Alternative use” would be capital tied up in an economy's ecological and social resources. Figge and Hahn first did a study on British Petroleum and the U.K. economy [58]. The externalities they chose were nonfinancial assets, work accidents and the emission substances CO₂, CH₄, SO₂, NO_x, CO, and PM₁₀ (PM₁₀ is “Particulate Matter”). This gave them a value of the externalities caused by those elements, and their first approach to value aggregate externalities has brought considerable progress over what was attempted by predecessors like Huizing and Dekker's [59] “net value added” and Atkinson's “Green Value Added”, which are conceptually based on impact assessments alone. But, so far, no attempt has been made to extend the concept to include all or at least the most representative ecological and social resources [60].

The universal conjecture (“all resources”) is definitely aiming too high. The few indices developed up to now use “proxies”, but their composition and deployment is often viewed as highly problematic. Hence, several initiatives are under way to achieve a kind of standardization. One example is the UNCTAD Manual [55]. It was not devised to set up a uniform set of rules; rather its objective is to assist government entities or business associations in producing internally

consistent environmental and financial information for preparing eco-efficiency indicators.

There are various frameworks around that have produced composite indicators. But almost all of them reveal some degree of arbitrariness with regard to normalization, weights and aggregation [61]. Table 2 gives a list of indicators that were researched by Böhringer and Jochem, and it is exhibited here because their findings on variables selection, weighting etc. might serve as a starting point to remedy the deficiencies [61].

Index	Reference	Countries	Variables
Living Planet Index (LPI)	WWF [62]	n.a. ¹	1100
Ecological Footprint (EF)	Wackernagel and Rees [63]	148	arbitrary
City Development Index (CDI)	UNCHS [64]	1252	11
Human Development Index (HDI)	UNDP [65]	177	4
Environmental Sustainability Index (ESI)	Esty et al. [66]	146	76
Environmental Performance Index (EPI)	Esty et al. [67]	133	16
Environmental Vulnerability Index (EVI)	SOPAC [68]	235	50
Index of Sustainable Economic Welfare (ISEW) ³	Cobb [69]	6	25
Well Being Index (WI)	Prescott-Allen [70]	180	87
Genuine Savings Index (GS)	Hamilton et al. [71]	104	5
Environmentally Adjusted Domestic Product (EDP)	Hanley [72]	n.a. ⁴	(many)

¹LPI measures the number of individuals of specific species in a certain population (beyond national borders).
²CDI has been applied to cities, regions, and countries.
³Identical with the Genuine Progress Index (GPI).
⁴EDP is calculated through implementing SEEA (System of Integrated Environmental and Economic Accounting), and the number of countries that apply this has been rapidly growing during the last years.

Table 2: Characteristics/Sources of Sustainable Development Indices [61].

None of the indicators of the list exhibited in Table 2 has an ingredient that relates to public goods. An index that would link economic value added of an economy and of businesses to the cost of capital employed in ecological and social resources would have to unite all feasible efforts to become widely applicable. The author of this paper, having worked in accountancy for many years, would think that the new IIRC initiative would provide a most suitable forum for this. It may possess the intellectual and persuasive power to overcome the dilemma that is inherent in public goods valuation.

The dilemma of public goods valuation

The dilemma begins with “value” comprising not just one, but several related concepts. One first concept is that natural environment and social resources have “intrinsic” value - a value in their own right. Another concept is about the contribution of a good/a resource to human welfare relative what other assets contribute - which is the concept of value employed by policy-makers. Even though many types of resources which provide a substantial part of human welfare cannot be traded in markets, they have an “economic value”. Environmental resources (such as clean air) and ecosystem services (such as water filtration and flood prevention) are good examples of such “non-market” goods and services that can be allocated to the production of goods and services, and therefore monetary terms are needed to assign a value to those inputs.

From another end, economists since A.C. Pigou have advocated to place taxes on emissions of air and water pollutants based on the damages they cause (another monetary term). Monetary assessments for those damages are made - and they destroy value. From that end, we get to a path which measures the value that needs to be protected from being destroyed. Similarly, the development and management of large river systems involves choosing among alternative combinations of hydroelectric power, water supply, and commercial and recreational fishing. There are also proposals to remove existing dams from many rivers. Are the ecological and recreational benefits of removing a dam greater than the costs in the form of reduced power generation and water storage? Here, the path towards valuation is even more evident. This path, however, must encompass a holistic perspective on the resources in question. It has been suggested early on that we “view the environment as an asset or a kind of non-reproducible capital good that produces a stream of various services for man. Services are tangible - such as flows of water or minerals), or functional - such as the removal, dispersion, storage, and degradation of wastes or residuals), or intangible - such as a scenic view” [73].

A long-standing technique for arriving at monetary terms which include the holistic perspective is to determine individuals' preferences for changes in the state of the environment (“contingency valuation”); another attempt is to determine a cost for what the natural environment contributes to agricultural production, a third one is to value the effects of environmental amenity on property price [74]. The first of these methods (“contingency valuation”) may serve to investigate the factors that influence the choices people make, e.g., between different recreational sites and between the effects different choices make on the environment (cost-benefit- and cost-effectiveness-analyses). The relevance or irrelevance of cost benefit will be discussed below. For now, a brief description will be given for the two most prominent valuation techniques, the contingent valuation method and the rent-capitalization method.

Contingent valuation (CV)

Contingent valuation (CV) is survey-based - which makes it to some extent a relatively arbitrary method. The most frequent use is to define the monetary value of environmental goods and services for which there is no “market”. It introduces passive use into economic analysis, and the practice has met with considerable controversy.

A CV survey builds scenarios that put up a range of actions which a government might choose. The participants of the survey are asked to rank their preferences concerning those actions. The choices they make are then analyzed in a way that resembles the choices which consumers

make when they buy or sell goods in real markets. Thus, the survey creates a hypothetical market and attaches an economic value to those choices. The most commonly used question format of a CV gives the respondents two ways of dealing, one being the environmental policy that is presently applied (like charging a fee on plastic bottles) and an alternative policy that derives a cost which is higher than that of the status quo (like establishing a system where consumers can return bottles to the seller). The survey participants are told that the cost (e.g., higher prices associated with the alternative policy or regulation) will be charged to the public if the alternative is furnished. What the respondents provide is a “favor/not favor” answer with respect to the alternative policy (versus the status quo). The consequences of the alternative policy, how it will be regulated, and how much it will cost must be very clearly specified².

If the respondents set a preference for a policy that incurs higher cost, the survey traces out their “willingness to pay” (WTP) for that policy (for that “environmental good”). In most instances, the WTP distribution will have a parametric functional form, and therefore, estimates can be drawn for summary statistics such as mean and median WTP. Notwithstanding the critics, WTP can be deemed to be the appropriate measure in situations where a potential user wants to acquire a good. The opposite measure is “Willingness to Accept Compensation” (WTA). It is an appropriate indicator in a situation where owners of a good are asked to voluntarily give up their claim to that good. So, the property right to the good determines whether WTP or WTA is the correct measure. Consumers or businesses, normally do not own environmental goods and rarely have a legal entitlement to them, as, e.g., in the case of a river. For these situations, the correct measure is WTP. If a business or a consumer has a legal entitlement to an environmental good (e.g. the permission to introduce sewage into a river) and is asked to give up that entitlement, then the correct denominator is WTA.

The contingent valuation method came forward when economist Robert K. Davis used questionnaires in the 1960s to estimate the benefits of outdoor recreation [75]. His results favorably compared to earlier studies which had used travel cost, unit day value and property value models [76]. Richard T. Carson, who played a leading role in promulgating the method, claimed that over 50 countries have conducted CV studies through government agencies and international organizations [77,78]; he also said that CV is the principal method employed by EVRI. EVRI is a large online database that was assembled for policy making purposes by very prominent agencies like the U.S. EPA, Environment Canada, the European Union, the environmental protection agencies of Chile and Mexico, the World Bank, and the Economy and Environment Program for South East Asia [77]. So it should be producing highly reliable outcomes. Newer publications, though, temper this optimism with realism [79,80].

The recent criticism mainly refers to the hypothetical response bias that would lead CV to overstatements of value, especially for the willingness to pay. It has also shown that there are often very large differences between willingness to accept and willingness to pay. A third issue is that the scope embedded in the surveys mostly is too narrow [79]. But the CV has been criticized from its beginning. E.g. Kahneman and Knetsch [81], who give an overview, argue that WTP for a good varies depending on whether it is evaluated on its own or as part of a more inclusive category and it is more about the moral satisfaction of contributing a personal share to public goods, not the

economic value of the goods. Similarly, recently critics have pointed that the main deficiencies of CV lie with WTP being elicited in a way which gives preference to non-economic motivations and thus cannot be considered to represent monetary value [43,82]. Throsby [83], while acknowledging that CVM techniques have been refined to overcome distortions through effects of free-riding, starting-point bias and mixed-good bias, articulates that the issue of information provided to respondents in CV remains, and there exist categories of value which an individual may recognize but cannot express in terms of WTP. One alternative is reported by Levinson [84]: He devised a pattern for distinct levels of “happiness,” or “subjective well-being” by combining what individuals responded in surveys on, e.g., their WTP for improved air quality and weather information with their demographic characteristics and incomes and the specific air quality and weather information at the date and place they were surveyed. This gives a function which can be used to calculate a marginal WTP, or compensating differential, for air quality and weather information. This differential equals the average marginal rate of substitution between annual household income and current air quality for achieving a status that would leave respondents equally happy. Levinson gives practical cases and concludes that it would seem “only natural to use this happiness approach to evaluate the economic benefits of the environment”. This conclusion may be appropriate for determining a benefit in a particular case, but we are still left with the question of overall value.

One important issue that has been brought forward with regard to public goods provision is “productivity” [85]: As with any other investment, if the effort required to increase the output of a public good is greater than the value of the extra output gained, then the effort is worthless. Assuming that a government has produced all the different goods on the extensive menu of consumption available in a modern society in the “right” amounts, and that the problems of equity and consumer satisfaction have been approached [86], the question of “more effect with less expenses” becomes apparent. Now, as expenses are expressed in monetary terms, the services rendered will also be expressed in monetary terms. The publicly provided services which are typically covered in the applied literature include educational benefits, health care, social housing, food stamps and child care. On average across OECD countries, the first two are estimated to add up to about 13% of GDP, ranging from 8% in Turkey up to 20% in Denmark and Sweden [87].

The services are valued at their production cost for the government, one aim of the methodology being to allocate the value of the service to the beneficiaries and adding this to the disposable income of the household to obtain its extended income. “Extended Income” is a measure to indicate income distribution properly because the inclusion of publicly provided services reduces income inequality. So, one of the objectives of providing public goods, which is to increase human well-being, can very well be monitored through monetary valuation. This does not contradict the view of welfare economics which looks at the contribution of a good to human well-being and posits that then it has “economic value” [88]: The contingent valuation method expressly measures economic value in monetary terms. Likewise, an economic value may also be arrived at from production cost. If production cost is not available, as with natural resources, monetary values can be obtained through a methodology which uses rent-capitalization.

² Carson RT (2000). Contingent Valuation: A User's Guide. *Environmental Science & Technology*, Vol. 34 (8), pp. 1413-1418.

Rent-capitalization

Arriving at values for, e.g. a forest could be based on cash equivalents for all the services it provides, from materials such as wood and fiber to amenities like hiking and wildlife observation, and from the regulation of stream flow and control of erosion to the absorption of atmospheric carbon dioxide. The economic value of a resource-environmental system as an asset is the total of the discounted present values of the flows of all environmental services. Many of these service flows are not bought or sold in markets. Freeman, Herriges and Cling give the example of a wetland, where an acre might trade in the market for land on the basis of its value for commercial or residential development [89]; but this value could be quite different from the value of its services as wildlife habitat and as means of controlling floods and recharging groundwater. So, there are different "rents" obtained from different uses. With regard to land rent, public finance theory has stated that the total of land-rents in a community equals the public revenue which provides for the collective good of an optimally-sized community. The topic has become known as the "Henry George Theorem". Henry George proposed a single tax: If a land-rent tax is properly dimensioned, it will suffice to finance all public goods [90]. Public economists have come a long way since Henry George, and while the revenue issue has developed into other directions, the idea of rent capitalization has been widely recognized, and it has gained more relevance through the increase in market provision of public services [91,92].

Rent capitalization and contingent valuation have changed over time: one of the seminal publications of 1989, "Survey of Methodologies for Valuing Externalities and Public Goods" [93] widely refers to systems analysis and social fabric matrices while these marks are not mentioned at all in the more recent reports prepared, among others, in the U.K. Department for Environment, Food and Rural Affairs [94]. The overall message arising from this report would be that valuation methods are highly influenced by the intended use of the value evidence and that their main purposes remain policy appraisal. They do not provide "inventory" information on either national levels or in a cross-border perspective. Another deficiency is the ambiguity in selecting the variables. As sustainability requirements are viewed differently across countries, variable selected in one country might be different from those chosen by others. Still, there is some kind of "state of the art" in national resource accounting - less so, however, for social resources. Social and environmental accounting started as a promising topic in the 1970s, but, in the end, heavy opposition came up as this was deemed to be a "neo-liberal" issue [95]. The topic was not pursued further, even though the inventory concept was maintained in the U.S. [96].

One of the criticisms towards any attempt monetarization of public goods comes from the advocates of what has been called "strong sustainability". Strong sustainability requires that the resource structure must remain unchanged [97]. This view is opposed to "weak sustainability" which holds that argue that natural capital is to some substitutable [98]. The advocates of weak sustainability use a systems theory approach which distinguishes between qualitative and quantitative changes in how natural resources are used: If our technological advances may be applied to raise the standard of living while maintaining the throughput of resources, natural capital will not be depleted upheld. We can maintain a constant stock of natural capital

(including the renewable resource base and the environment), and we only live off the "interest" on this capital stock and do not draw it down³. If we consume a part of this capital stock, substitute capital must come in. This is the main postulate of sustainability economics, and it seems to be a relatively simple rule for ensuring sustainability. The main proponent is Solow [99]. For some critics, the view is too simplistic [100], as it would indicate that the elements of the capital stock may be easily substituted by each other. But this happens all the time: The most common example is mining, through which, all over the world, environmental degradation is taking place. The mining industry, when following the laws that request re-cultivation, offsets this loss by man-made capital. By contrast, "strong sustainability" views nature as a heritage that is indivisible and rejects what it calls "commodification" of the environment. Hence "strong sustainability" also negates that the value of the environment can be expressed in monetary terms. Going even further, the notion has been stated that the market functions as a "collective action against sustainability", and that extraction/production of resources adapts nature to human technology while it should be the other way round [101].

One may reasonably argue that some patterns of substituting natural capital by man-made capital are moral or at all necessary, but it would outright immoral if use of the technological advances which mankind is continuously adopting would not be made. Technical progress improves quality of life, and the challenge lies with managing natural capital and man-made capital at optimal levels [102]. It has also been argued that there is no such thing as "man-made capital" because whatever man touches has come from nature in some way [103]. But there certainly is room for what may be called complements or substitutes. Daly is often quoted with his example of bigger fishing nets [102]. While they cannot substitute a greater, there is a complementary relation: Bigger fishing nets are less harmful to nature because they may be sized in a way that small fish are not getting caught at all. The same is valid for improvements in mining: Better equipment will reduce the depletion of the stock of phosphate or copper. Basic economic logic would require that, if a stock is limited, investments are made to tackle the limiting factors. This should even translate into the growth of natural capital: When finance (financial capital) is brought in for projects that increase the end-use efficiency of natural products, pressure on natural capital stock is relieved. Primary extraction of, e.g. copper, and end-use of copper must be viewed at separately [104].

The other criticism towards monetarization of environmental assets argues that all valuation techniques fundamentally simulate the existence of a market for an asset, for which an actual market does not exist. For ecological assets, Arrow et al. [105] have listed three additional uncertainties which are also deemed to be fundamental:

- Scientific uncertainties, like technical relationships between, e.g., greenhouse gas emissions and climate feedbacks;
- Socio-ecologic uncertainties regarding relationships between human societies and nature, e.g., diseases that stem from agriculture, water use and pollution;
- Socio-economic uncertainties, like the human welfare effects of climate change.

But any projection into the future, not just that of climate-change effects, is affected by uncertainties: No valuation whatsoever set up in business, whether marketing prognoses or calculating the return of an investment, can do without assumptions on future developments, be

³ One well-aimed notion of the proposition that the current generation must leave to its descendants a stock of capital no less than is currently available, is the term "Transient Caretakers" created by Mervyn King (King 2009).

they technical or socio-economic. So, it is hoped, that dealing with the aforementioned uncertainties will, in the long run, not be an obstacle to assess monetary quantification.

The primordial question is whether the physical and immaterial items which constitute public goods are too heterogeneous for quantifiable aggregation [100]. There are many demonstrations to the contrary: The System for Integrated Environmental and Economic Accounting of the United Nations (SEEA) uses an “inventory” approach which certainly builds on monetary valuation, at least in part. The SEEA comprises [106]:

- Flow accounts for pollution, energy and materials; these provide information at the industry level about the use of energy and materials as inputs to production and the generation of pollutants and solid waste;
- Environmental protection and resource management expenditure accounts, which identify expenditures incurred by industry, government and households to protect the environment or to manage natural resources, based, in part, on existing elements of standard national accounts;
- Natural resource asset accounts which record stocks and changes in stocks of natural resources such as land, fish, forest, water and minerals.
- What are not accounted for in SEEA are social resources. Statistical analysis in this field has been restricted to the narrow concept of the World Bank's definition of social capital, which mainly is a qualitative concept. The definition is “... the institutions, relationships, and norms that shape the quality and quantity of a society's social interactions” [107]. It comprises five key aspects of social capital:
 - Groups and networks - collections of individuals that promote and protect personal relationships which improve welfare;
 - Trust and solidarity - elements of interpersonal behavior which fosters greater cohesion and more robust collective action;
 - Collective action and cooperation - ability of people to work together toward resolving communal issues;
 - Social cohesion and inclusion - mitigating the risk of conflict and promotes equitable access to benefits of development by enhancing participation of the marginalized; and;
 - Information and communication - eliminating negative social capital and enabling positive social capital by improving access to information.

A wider approach to “social capital” would be to expand the definition beyond the qualitative denominators to incorporate quantifiable concepts. This would lead to what could be referred to as “social resources”. It would encompass measuring the value of a society's social institutional infrastructure. Other terms that also comprehend this wider interpretation of social capital are: “Social value”, “Social Resources”, “Institutional (Social) Capital”, and “Governmental Social capital” [108]. From a measurement standpoint, this requires that at first some type of value must be assigned to the political, legal and institutional environments, because it is these assets that “produce” or “condition” the social capital. Thus, social capital is viewed in this approach as a dependent variable whereas the networks approaches as per the “narrow” definition largely treat social capital as an independent variable [109,110]. The UN post-2105 agenda should

be used to open a new discussion on how to assign monetary values to social infrastructure. Otherwise, there remains the question about the usefulness of measuring the five key aspects that compose the narrow definition of social capital: well working networks need well working formal institutions, but the definition does not allow attributing a value to the formal institutions. When in many developing countries these institutions need to be brought to a higher level of efficiency and effectiveness, it would be a worthy undertaking to develop a system that measures this progress. That would require a “catalogue” of social resources.

A catalogue which also accounts for social resources items has not been developed on a supra-national level so far. There is one example on a national level, which is the Swiss “National Commons Product” (NCP)⁴, and whose structure is shown in Table 3.

Weight	Class of Goods	Metric/Database
25% natural resources	40% renewable energies 20% water 20% land, sea 20% capacity of renewable energies (coal, etc.)	Capacity in GW/year Capacity in m ³ /year sq km of usable land/inhabitant world market prices
32% social resources	20% security and peace 20% health 20% education 10% information 10% law and order 5% public transport	Ranking in Global Peace Index percentage of population having free access. sqm/inhabitant (% of all land)
15% volunteering and unpaid community services
7% religion
7% happiness/life satisfaction	...	World Database of Happiness
7% families with children
7% span of life	...	Life expectancy

Table 3: The Swiss National Commons [111].

This suggestion of measuring public goods is limited to the confinement of national borders, and, if statisticians would want to make a start, it could certainly be here. The much wider topic of global public goods, at least at present, seems to defy valuation at all. What has started as a consideration of “traffic rules” between countries and border issues has evolved into a vast agenda of concerns that are becoming the subject of international debate and of policy coordination and harmonization [112], such as disease control, pollution reduction, crisis prevention, access to information and harmonized norms/standards. It is commonly understood that what matters here are concrete outcomes and targets [113,114]. And thus, criteria for measurement exist, and, taking the example of emissions trading, monetary values are in place as well. Also, cross-border taxation has been suggested in this respect [115]. The discussion of global public goods, however, lies outside the scope of this paper.

⁴ Dill, Alexander: “Wealth beyond GDP - Composing a National Commons Product”. Basel 2009. English version: <http://commons.ch/english>

Coming back to the national confinements, monetary values for the Swiss “National Commons Product” have yet to be further developed, but one might think that the magnitude of this work is less extensive, given the relatively small size of Switzerland. If ever robust results were built, the structure might serve as a model for similar endeavors on an international scale. At least this type of “National Commons” is a structure which would allow allocation of commons to businesses which use them and it “sums up” elements of both natural and social capital. While numerical quantification has not yet been fully made, at least it shows how the valuation might be structured. Statistical offices in many countries do not provide any support for this: In Germany, for instance, the Federal Statistical Office [116] has a set of 19 indicators on sustainable development. Some of them can be disaggregated [116], but there is no intention officially of compounding these into an aggregate index. In Italy, a law-project calls for each county to establish a set of environmental indicators, because it was found that innovative concepts and better achievement will much easier grow in a multi-tier effort encompassing the local, provincial, regional and national levels. There are results already from some towns that have developed their specific metrics, like Rome, Torino, Modena and the Lombardy region. There is, e.g., the Modena sustainability report. It was one of the first that were prepared, and it has 30 indicators [117]. In the U.S., the “Interagency Working Group on Sustainable Development Indicators” created a structure of 13 economic, 16 environmental and 11 social indicators. This was published in 1998 (U.S. Interagency Working Group on Sustainable Development Indicators) [118]. Some of the variables are highly aggregated, while others represent comparatively small numbers (e.g., “children living in households with one parent present”). But an effort to assign numerical values that could be summed up was never made. After this first publication, no federal project has been planned in the U.S. for creating aggregated environmental accounts. Due to budget restrictions, the National Academy of Sciences’ National Research Council needed to suspend what it was up to after its last report went public in 1999 [96]. So far, no funding has been appropriated by Congress as of to date.

Valuation and cost-benefit analysis

One major issue in regard to the valuation problem is the cost-benefit perspective. Publicness implies the loosening of the nexus between individual contribution and benefits. When a good is wholly private, the user “gets what he pays for”. When it is good is public, the beneficiary mostly contributes nothing towards its reproduction in exchange for the benefit. At least this is valid for what Buchanan [8] has called “pure public goods. However, for one, there are intermediate stages between “pure public” and “private”, and this affects the consumptive attitudes of users who are either private citizens or private enterprises. Only where the public good is fully non-excludable and non-depletable, no one can be prevented from making use of the good, and consumption by one use does not diminish the use that others can make of the good. But there are so many interdependencies within an economy that the behavior of one user can adversely or positively affect the consumption of a certain public good (e.g. public access to water) by another user - the classical case of externalities - which might per se not be socially desirable. But some are undesirable and should be promoted or counteracted by public policy measures. Those measures would also require some reference to a monetary value. If we take, e.g. water management, benefit-cost analysis was the basis for making decisions about water resources for many years. However, since the 1950s when the techniques of conventional benefit-cost analysis were being developed and refined, there have been significant

changes in the nature of the problems being dealt with and the analytical tools that have become available. One of the changes, as noted by Freeman, Herriges and Cling [89], who have worked on the topic for more than 40 years is the expanding range of resource and environmental management problems being subjected to economic analysis: “What were once considered unquantifiable and perhaps relatively unimportant intangibles, such as improved recreation and visual amenities, are now recognized as significant sources of value. Also, consequences that were once unrecognized (for example, small changes in the risk of cancer) or were thought to lie outside the realm of economic analysis (say, loss of biodiversity and the preservation of endangered species and unique ecological systems), are often central issues in the analysis of policy choices today” [89].

The debate on value and on whether cost-benefit is a proper criterion circles around a more fundamental issue as it concerns the boundaries between the public and the private spheres and between economic and social values and the question of what to expect from beneficiaries of public goods offerings [119]. This has been analyzed from the view of market economy, collectivism and communitarianism, but the answer is still open [120,121].

Cost-focused and value-focused perspectives: Businesses using public goods

Relating to businesses, the general view is that they need to “internalize” the cost of the externalities associated with the (environmental) resources they use for their activities. From that end, the majority of methodologies for assessing sustainable performance is burden-oriented: they focus on how costly or how bad the use of a resource is. The first value-orientated approach is by Figge and Hahn [122]. Instead of pondering on the burden caused by the use of an environmental resource, their interest lies with the value that is created by the use of a resource: They measure corporate contributions to sustainability. For this, they determine which inputs a business uses beyond labor and economic capital; these inputs represent a value, and their base is a capital (“sustainability capital”) which has a cost. The cost can be ascertained by measuring what would have to be expensed for alternative inputs (opportunity cost). The overall result would be the efficiency of capital use by a company (micro level). Then this indicator is compared to the efficiency of a benchmark (macro level). Here is the underlying logic: A company contributes more to sustainable development when its use of the various forms of capital is more efficient than that of another company or the overall economy. At the macro level, the sustainable value created by a company contributes an excess value to the economy.

“Sustainability capital” and sustainable value as presented by Figge and Hahn therefore measure sustainability monetarily. But the use of opportunity cost and the reference to an explicit benchmark strongly tie the measure to the environmental impact of an explicit single issue, like emission of carbon dioxide or similar. The individual measures cannot be aggregated to a composite indicator that would compare to a “return on investment” generated through an alternative investment of all capital. On the other hand, the method can assess multiple impact situations, and the environmental impacts can be complemented by social impact issues (e.g. work-related accidents). So, while the analysis cannot measure the overall value added by a firm to the community of public goods stakeholders, it can definitely compute its contribution to a concerted effort, like reducing emissions or avoiding toxic waste. The work of Figge and Hahn is a substantial contribution to measuring environmental performances in specific areas. While they did not

intend to measure aggregate performance, their approach has been applied in several projects and case studies on specific areas of environmental impact. Some controversy has come up recently which challenges the validity of the approach for creating a prescriptive tool that would help to set up reallocation schemes, as was the purpose of several studies financed by the European Union which applied the methodology to policy making [123,124]. But the search for comprehensive, composite measures must go on. They would have to be based on a monetary value for the whole of public goods available to businesses. Costanza [125] puts it this way: "... real economic efficiency implies including all resources that affect sustainable human well-being in the allocation system, not just marketed goods and services [...] and a new sustainable ecological economic model would measure and include the contributions of natural and social capital".

Whichever avenue is taken to find the monetary value of public goods, the methodology will have to rest on the concept that they are resources which are available to the society, and hence, to businesses as well. Resources are the central focus in the accounting firm Deloitte and Touche's definition of sustainability: "Sustainability is equal to adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining and enhancing the human and natural resources that will be needed in the future" [126]. Elaborating on this, Dyllick and Hockerts [127], identified three key concepts which are applicable to the macro- and the micro levels:

- Sustainability is about integrating economic, environmental and social aspects.
- Sustainability is about integrating short-term and long-term aspects.
- Sustainability is about consuming the income and not the capital (maintaining the capital).

Capital maintenance is a foremost concern in business. From a social or environmental perspective the main implication is that "for the natural capital to remain intact ..., the source and sink functions of the environment should not be degraded... the extraction of renewable resources should not exceed the rate at which they are renewed, and the absorptive capacity of the environment to assimilate waste, should not be exceeded." [128].

From a business standpoint, capital maintenance, when linked to the two other key concepts (integration of economic, environmental and social issues and of short-term and long-term aspects) has to look both inward and outward a business firm. Capital is what brings resources and what stimulates activities. There are resources within a firm (and which the firm has acquired for sole possession) as well as resources that are available to the firm outside its realm and which it cannot purchase, while they are available for use in the firm, i.e., public goods. There are intangible ones, like the public systems of law and order, education, and tangible ones, like waterways, clean air, and access to roads. All these are needed by businesses. With regard to the inward perspective, business employ resources which they use for a longer term, fixed assets like machinery, and those which they consume on short term, like goods which are processed in manufacturing. For a business to deploy ongoing activities, it needs to maintain a stock of fixed assets as well of consumable resources. This is the physical side of the capital maintenance concept. The accountant reflects the concept in the books of the firm in monetary terms. Embedded in the accounting system is a long-standing principle which states that earnings can occur only when an organization maintains its capital at a predetermined level. So, what in the economics of

sustainability has been called the constant capital rule, will find its equivalent in firm-level accounting.

The constant capital rule would also call for businesses to make sure that public goods provision is maintained at or/and heightened up to a level that is sufficient to guarantee well-being in a society [129]. This commitment must be encompassed in corporate social responsibility. One feature, here, is, that businesses take on to provide public services where a government is not capable to do it and where well-structured private-public partnerships can be set up. Another feature is that businesses need to be in a position to show which ecological and social capital they use and what they give back to those commons.

On the first feature, there is substantial research about how corporate social responsibility reaches out to public goods [130]. Businesses are assuming social and political responsibilities, and their initiatives often are reaching way beyond legal requirements. A large number of both academic writers and journalists have published on a politicized concept of corporate social responsibility. The suggestions range from increasing self-regulation for overcoming global deficiencies in legal regulation [131], to stepping up engagement in public health, education and protection of human rights. They exhibit which actions international firms (should) take when operating in countries with failed state agencies [132], they address social problems such as AIDS, malnutrition, homelessness, and illiteracy [133], and they give advice on ethics codes [134] and on how businesses should contribute to better protect the natural environment [135]. There is a strong nexus to the decisions of businesses to comply with the UN Global Compact [136]. With considerable variation across industries and countries, firms, acting on behalf of the Compact, have started to participate in a global version of "the private provision of public goods" [137]. Barkemeyer presents an empirical analysis of 416 descriptive case studies published by corporate members of the UN Global Compact that illustrate which kinds of projects are deemed appropriate as best practice examples among Compact members [138]. What emerges from there is an "institutionalized arena of discourse, contestation and action organized around the production of (global) public goods" which has been called the New Public Domain [139].

There is a reverse scheme as pointed out by a World Bank report [140]: The argument is that public sector agencies have played vital roles in providing an enabling environment for corporate social responsibility by, e.g., setting and ensuring compliance with general standards, promoting stakeholder engagement and representation, certification and assessments as well as multilateral processes, guidelines, and conventions. In consequence, the private sector has started to engage more directly in public policy processes associated with delivery of public goods. The report refers to commonly developed sustainable development or poverty reduction strategies on national levels: tangible outcomes are capacity building for community development, market access for subsistence farmers, sustainable tourism etc. [140].

Adding Public Goods Usage to the Concept of Economic Value Added

Extending the view on capital maintenance beyond the corporation might be achieved through expanding the concept of "economic value added": Economic Value Added or EVA⁵ is based on the fact that return from the capital employed in a corporation must be higher than the cost of that capital in order to produce shareholder value. Otherwise, there is no gain for shareholders. Enlarging this to

comprise all other capital and all other stakeholders would lead to the following: All stakeholders gain when the value created by a business firm exceeds the cost of all capital it employs - be it within the firm or outside, represented by whichever commonly available resources the firm is using. Accounting for the cost of these resources is would be equivalent to internalizing externalities. Any business that consumes public goods for producing value for its customers (and making a profit) would bear the cost of using these goods. Creating private value would consequently have to produce public value as well.

Enlarging the concept of Value Added beyond the use of financial capital/"economic resources" will lead to "Sustainable Value Added"⁶. While economic resources are those provided to the firm by the financial community (and disclosed in financial reporting), the other assets available and needed for the firm to pursue its business are provided by the public at large. They would be categorized into "social resources" and "ecological resources". Then [141],

Sustainable Value Added=Profit minus cost of capital employed in economic resources (property, plant and equipment, intangible assets, inventory, receivables, etc.) minus cost of capital employed in ecological resources minus cost of capital employed in social resources.

Ecological resources would be access to water, to (clean) air, to minerals, feasibilities to discharge effluents into public waters and gas emissions into the air, etc. Social resources would be the availability of legal and of education systems, of a properly working labor market, of traffic infrastructure, of civil infrastructure in cities and other communities etc. [141].

Social resources as specified above are what the accountant calls "intangible assets". The concept is wider than that of social capital, which is a sociological construct, of which a relatively recent definition is given by Fukuyama, as "shared norms or values that promote social cooperation, instantiated in actual social relationships" [142]. This, at first sight, evades monetary measurement. But there is no doubt that social capital is a component of wealth. Studies on OECD countries have found that social capital indicators play a significant role in macro-level-analyses using growth functions [52]. This type of analysis expands a well-known analytical instrument, the growth function, by adding new variables. A similar intent is what this paper attempts with regard to expanding EVA, transferring the construct to the micro-level.

Accounting for public goods use in corporate reporting engrains both a business case as well as a moral case. If a corporation would choose to apply the Sustainable Value Added concept it could demonstrate what it gives back to society in exchange for using public goods. So far, however, the big obstacle is that monetary values need to be found for public goods first. While some research was done and is carried out on this, as has been laid out above, the issue has not yet achieved generally accepted applicability. But some new initiatives are around, like the work of the International Integrated Reporting Committee (IIRC) which was founded among others, by GRI [37]. The IIRC reaches out to accountants, statisticians and economists to achieve what has been called the "micro-macro-link". From its inception, the IIRC is trying to bridge a gap that has both a theoretical

and a practical notion: While sustainability measures exist and are monitored in business firms at site level, division level, regional level and corporate level, sustainable development is mainly a "macro-level concept at the global level" [143]. In connecting macro- and micro-perspectives, the focus, so far, has been on environmental cost, and, in some cases, on the socio-economic benefits of corporate environmental management [144]. The aspects of social sustainability are lagging behind, and valuation has much less been introduced into the micro-macro-link [145,146]. The discussion often is reduced to ecological issues and the burden of externalities on society.

Apart from the need to have as many firms applying the indicator, another challenge lies with allocating monetary values of ecological and social resources to businesses which use them. In the long run, if the cost for consuming public goods is not shifted from society to private businesses for all of these goods, sustainable development will never reach optimum levels [147]. It will not suffice to deploy partial solutions like burdening some industries with fees for carbon-dioxide emissions etc., because then "free rides" on any other of the societal commons will subsist. On this background, it is in the foremost interest of policy makers, businesses and civil society organizations that a commonly acceptable method is implemented that is viable and logic. Sustainable Value Added (SVA) might serve this purpose. A first approximation is reflected in the following equation:

$$SVA_i = EVA_i - (WACC_i + EVA_i / NDP) \times (Revenue_i / NDP) \times NCP$$

where EVA_i , $WACC_i$ (weighted average cost of capital) and $Revenue_i$ refer to a specific company ("i") headquartered in a given country, and NDP and NCP refer to that country's Net Domestic Product and "National Commons Product" (estimates for which could be drawn up following the lines set forth above) [148,149]. The term " EVA_i / NDP " would reflect the spread of this company's use of common resources over the macroeconomic return, and the term " $Revenue_i / NDP$ " would denote the company's share of NDP in its homeland.

From that first approximation, the index could be improved by Bardy and Massaro [141]:

- disaggregating NCP into its ecological and its social components;
- disaggregating the company's revenue into where it was produced (home and foreign locations);
- incorporating the $NCPs$ (if available) for the locations beyond the homeland of the company.

Similarly to what is done for determining EVA, adjustments have to be made to the accounting information to avoid "double counts", eliminating cost items that represent what the firm has already expensed for use of (some) public goods". This would be taxes, excise, tolls, fees levied on the firm for discharging effluents etc. and other imposts [150]. Then there are issues of (dis-)aggregation - for example, not all business units of a firm discharge effluent; so for breaking SVA down to the level of business units, pertinent allocations need to be made. And, since it is the lower management that can make decisions that directly affect sustainability (e.g., avoiding excess waste, averting

⁵ The concept of "Economic Value Added" was created by Joel Stern and G. Bennet Stewart (Stern, Stewart and Chew 1995). EVA® is a registered trademark.

⁶ The author of this paper acknowledges that the term "Sustainable Value Added" has been applied before by Figge and Hahn in "Sustainable Value Added. Measuring Corporate Contributions to Sustainability Beyond Eco-Efficiency", *Ecological Economics* 2004, Vol. 48, pp. 173-187. Still, the author has taken the liberty to use the term in parallel to Economic Value Added as per the definitions made above. He has conversed with Figge about this.

grounds for work-relating accidents), the data that build the SVA information must be traceable to day-today decision making.

Managers and employees of a firm are stakeholders like customers, suppliers, the communities surrounding production sites, and all others that are affected by the firm's activities and who contribute to them - like the providers of public goods, i.e. society at large, educational institutions, government and other public authorities. The firm creates value for all stakeholders - but for this to happen, the outcome of its activities will have to cover the cost of capital that is tied up in economic, ecological and social resources. Covering this cost contributes to capital maintenance and therefore stimulates sustainable development: it incites enrichment of resources instead of depleting them [151-153].

The concept only works with a comprehensive stock-taking and valuation of public goods as lay out above. The initiatives of IIRC and GRI are pointing into this direction. If supported by major business associations they could compel the world's statistical bureaus to re-address the public goods valuation issue, with the OECD Statistics Directorate and the United Nations Statistics Division taking the lead. The outcome would provide the base for a macro-micro link from which businesses and politicians get much higher benefits than from purely micro-economic disclosure or from studies that only attend isolated environmental, social and governance issues. It would set the stage for a societal consensus that sees businesses as the agents not just of their shareholders but of a wider group of stakeholders. It would help to bridge a rift in society: When businesses demonstrate that they internalize the cost of public goods and when they exhibit how much they contribute to preserve and expand the societal commons, agitation from pressure groups will be avoided. Business representatives, when advocating for quantifiable parameters, will have a firm stance in the discussion on sustainability topics that is taking place between civil society groups, governments, standard-setters and regulators. Otherwise, they risk that they are left standing by.

Conclusion

On a more optimistic end, the rise of collaborative arrangements between public and private institutions is creating novel ways for enhancing the provision of public goods. The pertinent arrangements will only work if both private and governmental organizations deploy willingness and ability to participate in such arrangements and if they include all constituencies of the "public domain". They altogether have a societal mandate to create private economic gain and public welfare. And there is no doubt that the best way to prove how this mandate is pursued than by implementing performance measures.

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