The Green GDP Implementation in Country-Based Environmental Management System: A Review

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Abstract

The economy, environment, and social pillars of sustainability demand the environmental management system (EMS) to improve the cycle system continuously. The result of the evaluation and review stages needs to account for the measurement method that potentially enhances the policy implication. Thus, the green GDP found to be practically suited with current country-based EMS, where it shows by China's green GDP and GDP gap reached 5% in 2016. The objective of this paper is to acknowledge the implementation of green GDP in the country-based environmental management system. This paper is based on a literature review process, which covered around eight references. The result and discussion lead to the implementation of green growth indicator in national and regional green economy strategy of Indonesia, China, and Finland. The challenges of unstandardized indicators and calculation formula prospected to be tackled by reflecting the current indicator with potential global adjusted formula and valuation through international policy enforcement and integrated communication. The conclusion describes that green GDP is potentially integrated with EMS to ensure the improved cycle of sustainability.

Keywords: *economic growth, environmental management, green GDP, sustainability, green growth*

Abstrak

Ekonomi, lingkungan, dan pilar sosial keberlanjutan menuntut sistem manajemen lingkungan (EMS) untuk meningkatkan sistem siklus secara berkelanjutan. Hasil dari tahap evaluasi dan peninjauan perlu memperhitungkan metode pengukuran yang berpotensi meningkatkan implikasi kebijakan. Dengan demikian, PDB hijau secara praktis cocok dengan EMS berbasis negara saat ini, seperti ditunjukkan oleh kesenjangan antara PDB dengan PDB hijau Tiongkok yang mencapai 5% pada 2016. Tujuan artikel ini adalah untuk mengetahui penerapan PDB hijau dalam sistem manajemen lingkungan berbasis negara. Artikel ini didasarkan pada proses tinjauan literatur, yang mencakup delapan referensi. Hasil dan pembahasan mengarah pada implementasi indikator pertumbuhan hijau dalam strategi ekonomi hijau nasional dan regional di Indonesia, China, dan Finlandia. Tantangan indikator dan formula perhitungan yang tidak terstandarisasi kemungkinan dapat ditangani dengan merefleksikan indikator yang ada dengan potensi formula dan valuasi yang disesuaikan secara global melalui penegakan kebijakan internasional dan komunikasi yang terintegrasi. Kesimpulannya menggambarkan bahwa PDB hijau berpotensi terintegrasi dengan EMS untuk memastikan siklus keberlanjutan yang lebih baik.

Kata Kunci: *PDB hijau, manajemen lingkungan, keberlanjutan, pertumbuhan ekonomi, pertumbuhan hijau*

1. Introduction

An old paradigm of overturning the country's system for saving the environment while fulfilling economic needs has been replaced gradually by way of how the system is measured [1]. The common form of measuring the country's success is by measuring its gross domestic products (GDP) [5]. This one side perspective constructed by a mathematical formula of pursuing growth only through economic performance [3]. Other argues that, the wealth increment needs to be proportionally improved along with health and ecosystem sustainability [6]. When the environment no longer being the enemy of economic growth, the strategy that considering these two aspects would develop a wiser definition of a successful country. There are several measurement tools alternatives launched towards it, such as the social progress

index (SPI) [2] and the global green economy index (GGEI) [4]. The GGEI, also known as green GDP, becoming a new measurement tool in the worldwide economy as supported by the sustainable development goals (SDG) which was released in September 2015 [7]. This 2030 agenda for sustainable development has been agreed upon in 193 countries towards 17 programs tied up to three pillars of sustainability: environment, social, and economy [8]. The implementation and impacts of these pillars need to be controlled continuously through the country's management system [9]. Thus, the integration of green GDP in a country-based environmental management system (EMS) is expected to give particular operational value especially as the higher-level of performance evaluation method [10].

The EMS helps the organization to continually review, evaluate, and improve its sustainability target [12]. Thus, the system is not only focusing on nature and the relation with the operation control but also economic reliability and social-ecological implication as the secondary impacts of their performance [11]. Its main stages are commitment and policy, planning, implementation, evaluation, and review [12]. The repeating cycle of continuous improvement in EMS leads to an international standardization named ISO 14001 with its newest report in 2015 [13]. It consists of ten clauses with seven indicators of assessment, which are the context of the organization, leadership, planning, support, operation, performance evaluation, and improvement [14]. The certification is mostly applied in company level [15]. Then, it has been adjusted to other organizations, such as Micro- Small and Medium Enterprises (MSMEs) [16] or even campuses [17]. In the country-based organization level, the EMS covered by national environmental cultures and policy regimes that suited to a specific country's conditions [18]. Thus, the global guide of the method to ensure the sustainability of environmental-related activities index in the country-level is needed [10]. The objectives of this review is to acknowledge the implementation of green GDP or green growth in the country-based environmental management system.

Figure 1. EMS sustainability cycle [12]

2. Material and Methods

The method of the study is a literature review through eight sources analysis in a systematic way to understand the implementation of green GDP in country-based EMS. The reviews are included the study case identification of green GDP look-alike elements application in several countries' EMS, they are Indonesia, China, and Finland. Throughout the implementation analysis, the journal also come out with the challenge and potential recommendation towards green GDP and EMS integrated implementation in the country-level organization.

Green Gross Domestic Products

The green GDP is the adjustment of GDP that breakthrough the environmental reflection where it comprehensively affects the total economy output [10]. Global organizations such as the United Nations (UN) and World Bank have researched its index calculation since the 1970s [19]. Then in 1993, the study by the UN System of Environmental-Economic Accounting (SEEA) launched the first environmental accounting global framework as the green GDP concept development [24]. GDP itself stands for Gross Domestic Product, the index to measure the country's economy in goods and services value produced within a time [20]. The other terms of green GDP are GGEI [4], green growth [21], and green economy [22, 23]. The indicators contained in green GDP is the value from [10]:

- a. The cost of resource depletion, such as coal, natural gas, and oil.
 - Identification of Depleted Natural Resources

- Volume Quantification
- Economic Valuation
- b. The cost of environmental degradation, such as wastewater and emissions.
 - Market price

$$\begin{aligned} NDN &= \sum_{n=1}^i K R \\ R &= TB - (TC + Profit) \end{aligned} \quad (1)$$

NDN = Economic Value of Negative Impact

K = Quantity of amount lost/damaged

R = Economic Rent

TB = Total Benefit

TC = Total Cost

- Loss of income

$$NDN = \sum_{n=1}^i K (\pi_0 - \pi_t) \quad (2)$$

K = Quantity of recipients (people or units) of negative impacts

π_0 = Total income before the occurrence of pollution

π_t = Total income at the time of pollution

- Replacement cost

$$NDN = \sum_{n=1}^i K Cr \quad (3)$$

Cr = Replacement Cost

- Cost of illness

$$\begin{aligned} NDN &= \sum_{n=1}^i K Ci \\ \text{Where} \\ Ci &= \sum_{h=1}^i T C_T \end{aligned} \quad (4)$$

K = Quantity of recipients (people) of negative impact

Ci = Total cost of healing the disease

T = Number of days of treatment

CT = Cost of treatment / healing per day

- c. The improvement of environmental resources, such as afforestation and cultivate forest.

It is constructing the formula of:

Green GDP = Conventional GDP (Consumption + Private investment + Government spending + Net exports) - the cost of resource depletion - the cost of environmental degradation + the improvement of resources and environmental yield [10] (1).

Or another research [24] state in simplified formula as follow:

$$Green\ GDP = GDP - (KtCO_2 \times PCDM) - (Twaste \times 74kWh \times Pelect) - \left(\frac{GNI}{100} \times \%NRD\right) \quad (2)$$

PCDM stands for total Clean Development Mechanism or CDM (average volume-weighted price for carbon (in PPP)) in average rates for *Kt* (CO₂ measurement equivalent). The *Twaste* or days of waste treatment multiplied by the 74 kWh of daily electrical energy consumed towards amount of *Pelect* (expense for 1 kWh of electrical power). Then, the percentage of gross national income (GNI) constructed with a rate of natural resources depletion (NRD).

Figure 2. GDP and green GDP performance in 2016 [25]

Through this index, the result shows differences between GDP and green GDP, as shown in **Figure 2** in the annual perspective and **Figure 3** in years recap. In all of the countries, the green GDP is under GDP; moreover, in 2016, the green GDP in Turkey, Israel, and Chile was given negative value when the GDP in positive one [25]. Chile (8.88%), Norway (6.56%), and China (5.02%) also specified with the worst environmental impact.

Average growth rates in % (2008-2016)	GDP	Green GDP	Difference
Average (all countries)	-0.17	-1.59	1.42
DEVELOPED COUNTRIES			
High income OECD countries	-0.19	-1.14	0.95
IMF advanced economies	-2.58	-1.54	1.04
HDI Index 25 first countries	-0.11	-1.02	0.91
EUROPEAN COUNTRIES			
Ex-Communist EU countries	-1.02	-2.36	1.34
EX-Yugoslavian countries	-1.45	-3.04	1.59
EU 28	-1.45	-2.26	0.81
Euro Area	-1.52	-2.16	0.64
EU 6 Founding countries	-1.25	-1.71	0.46
COUNTRIES BY DEVELOPMENT			
Developed countries	-0.42	-1.34	0.92
Developing countries	0.10	-1.82	1.92
Underdeveloped countries	0.38	-2.45	2.83

Figure 3. GDP and green GDP differences in 2008-2016 [25]

3. Results and Discussion

The green GDP implementation in country-based EMS

A study [27] has found that there are four economic growth scenarios. The first one is green growth where the path of economic growth controlled by a sustainable manner; when the economic growth increases, the emission decreases. The second scenario of post-growth indicates the economic growth is finite like the environmental resources' availability. The third is no growth, where the country would face stable economies without growth in certain time. The last is the scenario of economic contraction by reducing the consumption and production to heal the environment, which called degrowth. The last three scenarios stated that economic growth would face the steady-state condition within the earth's limits. Thus, the implementation of green GDP in country-based EMS complied with the green growth scenario. As stated that stages of evaluation and review in EMS indicators are significant variables since the

continuous review will improve further sustainability performance. It shows by the case of Sweden, where their gap of green GDP and GDP steadily decreasing [25], along the way the country nominated as the highest green GDP in 2016 [26].

GDP vs. Green GDP	2009		2010		2011		2012		2013		2014		2015		2016	
	GDP	Green GDP	GDP	Green GDP	GDP	Green GDP	GDP	Green GDP	GDP	Green GDP	GDP	Green GDP	GDP	Green GDP	GDP	Green GDP
Sweden	-16.40	-17.01	13.67	12.93	15.30	14.65	-3.41	-4.03	6.41	5.79	-0.85	-1.42	-13.23	-13.94	3.32	2.60

Figure 4. Sweden GDP and green GDP performance in 2008-2016 [25]

On the other hand, currently, the data gathered from all national green GDP, still in the no-growth or even degrowth phase, where the green GDP less than GDP, the productivity of capital and operations provide undesirable effects on environmental pollution and degradation [28]. However, the finding published by [26] has stated that the green GDP is the potential to influence the policy implication on environmental management in Bandung with the data of specific sectors that need to be focused.

The implementation in Indonesia

Indonesia has been implemented the green growth to increase GDP while reducing pollution, building clean and resilient infrastructure, using resources more efficiently, and valuing natural assets [29]. Within the harmony of *Nawa Cita*, nine priority agenda of Indonesia's president period 2019 - 2024 focuses in three green growth aspects, which are energy, landscape, and infrastructure. The pilot project conducted in Central and North Kalimantan started by 2014 [30]. The government supports regular public consultations and workshops. They are also developing the supporting policies that can encourage project risk mitigation for investors and green businesses, such as providing incentives, capacity building, best practices, guidelines, support tailored to business needs, and funding opportunities for green companies [29]. In the implementation, they use green GDP as one out of three indicators to plan and evaluate the green economy model by the data from the forestry, agriculture and plantation sectors, mining and energy, also the fisheries sector [30]. As a result, the policy intervention released from the analysis scenario model, as shown in **Figure 5**.

Figure 5. Green growth indicator of green economy model in Center Kalimantan [30]

In other implementation, the green GDP has been reviewed and implemented at the regional level, known as green Gross Regional Domestic Product (green GRDP). In West Bandung district, North Java, it is analyzed that the green GRDP decreased 1.17%, 1.12%, 1.06% in 2015, 2016, and 2017, respectively, due to the value of environmental degradation from water source depletion only. Toward the result, district government begin to aware and execute major strategy in improving water management. It is indicated by the gap reduction between conventional GRDP and green GRDP [31]. Thus, the local policy enforcement has significantly lead to the reduction of environmental depletion level. In another case [23], Bali has put the concern of green growth within tourism sectors. They have also released their 2050 roadmap framework of the green economy, as shown in **Figure 6**. They estimate the environmental depletion by GHG emissions from accommodation (volume x energy use per unit x emissions factor (EF)), land transport (tourism % of fuel consumption x EF), water transport (volume distance x EF), and air transport (volume distance x EF). Where the outcomes suggest the strategy development, continuous monitoring, and evaluation, then review and improve future research.

Figure 6. 2050 green growth roadmap framework of Bali tourism [23]

The implementation in other countries

As one of the highest green GDP in the world, Finland has taken as the international case study due to its advanced environmental regulations, but not forgetting the economic growth within materials and energy conservation [21]. Finnish sustainable development indicators that published in 2000 leads the development of green growth indicator based on Finnish main themes and goals, as shown in **Figure 7** below. The indicators are based on the sustainability domains of environment and economy, while the social aspects expected to give indirect impact. The low-carbon and resources efficient society theme consist of two goals that has correlated indicators with the calculation of environmental degradation sub formula of green GDP. The second theme of ecosystem services consist of four goals with seven key indicators that has correlation with resource depletion sub formula. The third theme of economic possibilities and policy instruments with three goals and six indicators as the effort for environmental improvement. Thus, Finland's green growth has already reflected the indicators needed to calculate the green GDP.

Figure 7. Key indicators of Finnish green growth [23]

On the other hand, China, with its advanced industrial activities, also took serious steps on green growth wherein China's five-year plan, the faster economic growth, has no more prioritized. The government develops green GDP as the country's natural-resource assets audit [32], where it counts to the cost of pollution damage that has charge around 3% of their GDP, also health and dead cost that mostly accounted for by air pollution.

The challenge of the green GDP implementation in country-based EMS

By several study cases, the challenges faced by the green GDP as its implementation in country-based EMS are the method of calculation and its indicators. Up until now, there is still no standardized green GDP formula on the global scale yet [24]. Then, it accounts for the lack of fundamental indicators [23]. Even though there several countries and regions that have developed their own and connect it to their data-based decision of the environmental management system, especially in policy enforcement.

The recommendation of the green GDP implementation in country-based EMS

The recommendation to tackle the previous challenge is through the reflection of several study cases, such as the indicators developed by Finland. The second recommendation is by the utilization of GGEI indicators then calculate it by green GDP formula. The third recommendation is by the additional subtraction formula of the improvement value of environmental resources in measuring green GDP [10], where it was adjusted with the environmental audit as the critical part in EMS. The last is by international communication to develop the integrated ecological accounting system with green GDP by standardized valuation value, then stimulate the policy [24]. The regulation as the impact of green GDP number leads to EMS variables of domino effect in management and evaluation indicator to keep the cycle of sustainability improved. One of the examples is by enforcement of tax regulation and utilized it either going back to the environment or as basic citizen income [27].

4. Conclusion

The implementation of green GDP in the country-based environmental management system is highly potential where the green GDP has taken EMS value partly in review and evaluation stages as green growth numerical result. The green GDP that proportional to sustainability pillars give a significant role in ensuring the sustainability cycle improved its performance. The indicators and formula of green GDP also found to be in lined with EMS clauses. In Indonesia, the green GDP has implemented by the pilot project in the central and north Kalimantan, proven to be a critical data-based to develop regional environmental regulation in Bandung, also give constructive insights on Bali green growth tourism roadmap. Internationally, Finland has the complete 19 indicators that prove the green growth scenario as one of the highest green GDP along with China, and their focus on pollution cost above advance economic growth. The country that just start to implement green GDP in several regions impacted to less-valid national green GDP, because the country takes time for indicators trial and error. Thus, the challenge of green GDP indicators have recommended being reflected by international communities through Finland's green growth that have covered up the environmental degradation, resource depletion, and environmental improvement effort as the three main green GDP sub formula that subtracted the conventional GDP. The additional estimation of improvement value in environmental resources seen to be possible to balance the environmental-related action or program in country-based. The valuation value accounts for the positive domino effect on the regulation in improving the cycle of sustainability.

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