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## **APPLYING „SMART” CRITERIA FOR SELECTING INDICATORS TO MEASURE SUSTAINABLE DEVELOPMENT IN VIETNAM**

### **Zastosowanie kryteriów „SMART” dla wyboru wskaźników do pomiaru zrównoważonego rozwoju w Wietnamie**

**Abstract:** Indicators are the most commonly essential measurement tool of choice for many sustainability projects worldwide. They can be used to assess the progress toward sustainable development and understand the interlinkages within each component and between components of sustainability. The selection of indicators to measure sustainable development is an extremely complex and difficult task. Through an overall assessment and pointing out the limitations of existing sets of indicators for measuring sustainable development in Vietnam, this paper focuses on the way to create indicators that can be used to measure Vietnam’s sustainable development at both the national and subnational (provincial) level. Firstly, a framework of elements for economic, social, and environmental component was established and a list of indicators of 12 national and international agencies in the world was compiled. Then the research applied SMART criteria (SMART is an acronym of Specific, Measurable, Available, Relevant, Time-related) to select a set of relevant core indicators for Vietnam. Finally, 24 indicators which fully satisfy the SMART criteria were constructed with 8 indicators for each component. This indicator system can be applied to measure sustainable development at both national and provincial level of Vietnam.

**Key words:** SMART criteria, indicators, selecting indicators, measurement of sustainable development, Vietnam

## **INTRODUCTION**

The necessity to develop and apply sustainable development indicators stems from the idea that „you can only manage what you can measure” (Hass *et al.* 2002). If the notion of sustainable development was genuinely embraced, we need to know what we’re attempting to accomplish (e.g. what

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sustainable development means, what is the objectives of sustainable development) and we must have measurement tools that tell us whether we are on or off a sustainable development path (OECD 1999). Hence, a tool that incorporates all important elements of sustainability into the evaluation process was required to measure progress toward sustainable development and to understand the interconnections within and between sustainability components (Kaivo-Oja *et al.* 2014; Fredericks 2014).

One of the tools that proposed for measuring sustainability are indicators (Farsari, Prastacos, 2013). They have been chosen as the most commonly used measurement tool for many sustainability projects worldwide (OECD 2000b; Bell, Morse 2003; Roush 2003; Hák, Moldan, Dahl 2007). They are one of the key of sustainability assessment to help to make the concept of sustainable development operational and provide essential tools for measuring sustainability by drawing a picture of current development situation, revealing whether sustainability objectives and targets are met, and especially for understanding the linkages within and between economic, social and environmental subsystems of sustainability (Galopin 1996; Hardi *et al.* 1997; Briassoulis 2001; The Jerusalem Institute 2004; Yigitcanlar, Dur, Dizdaroglu 2015; King 2016).

There is a wide variety of sustainability indicators used by international organizations, different countries around the world and in Vietnam as well. Different scientists use different indicators according to their particular needs, and these have been selected with a use of different methods (Li Yin Shen *et al.* 2011). The worldwide indicator systems for sustainable development cannot be fully implemented in Vietnam's unique situation due to a scarcity of data. Moreover, the existing sets of indicator in Vietnam have many shortcomings and cannot be applied fully for empirical research to measure sustainability as well. Hence, this study aims to apply SMART criteria (SMART – Specific, Measurable, Available, Relevant, Time-related) to select a set of relevant core indicators that can be used to measure practically Vietnam's sustainable development at both the national and subnational (provincial) level.

## EXISTING SETS OF INDICATORS FOR SUSTAINABILITY IN VIETNAM

The first step towards creating the standardized indicators system is understanding national status and trends related to sustainable development indicators. After the Millennium Declaration was approved and the commitment was made to implement the Millennium Development Goals (MDGs) in 2000, Vietnam immediately initiated the implementation process of Vietnam Millennium Development Goals (VDGs) (Dang Tri N. *et al.* 2017). VDGs fully reflected MDGs and took into account Vietnam's own characteristics and national aims. In 2005, VDGs were established with 11 goals and 32 indicators. Some additional sectors were included and stressed in the VDGs such as good governance, reducing gaps between ethnic groups and infrastructure (GSO 2005). The VDGs were integrated widely and effectively into national statistical indicators system to ensure that the collection of data was harmonized and timely. The Vietnamese Prime Minister promulgated legal documents relating to the collection of data on the MDGs such as Decision No. 1755/QĐ-TTg on „Principles and tasks for reporting on the implementation of MDGs” in 2013 and major reforms in the statistical field as stated in the „Strategy for statistical development in Vietnam for 2011–2020 and the vision until 2030”. They created a stepping-stone for comprehensive improvement of the collection of data on the MDGs (Socialist Republic of Vietnam 2015).

Based on the documents of United Nations for „Indicators of Sustainable Development: Guidelines and Methodologies” (United Nations 2007). The UN Development Program (UNDP) has coordinated with the Vietnam Ministry of Planning and Investment to implement the project named „Identification of a sustainable development indicators set and mechanism for building a sustainable development database in Vietnam (Project VIE/01/021 „Implementation of Vietnam Agenda 21”) in

2006. At national scale, the set was composed of 44 indicators: 12 economic, 17 social, 12 environmental–resource, and 3 institutional. While at provincial scale, 29 indicators (7 economic, 14 social, 6 environmental–resource, and 2 institutional) were proposed (UNDP and MPI 2006). But in this project, the authors also confirmed that some indicators are difficult to use due to lack of readily available data. They were just put forward for consideration due to the importance for sustainable development, for example: Human and economic loss due to natural disasters, Number of threatened ecology systems and extinct species, Rate of soil degradation (%), Emissions of greenhouse gases, *etc.*

With the decision No. 432/QĐ-TTg dated 4<sup>th</sup> December 2012, the Vietnamese Prime Minister promulgated on „The Vietnam sustainable development strategy period 2011–2020”. Following the decision, an official set of indicators for monitoring and assessing Vietnam sustainable development period 2011–2020 was the first time approved. It consisted of 3 composite (Green GDP, HDI and Environmental Sustainable Index), 10 economic, 10 social, and 7 environmental–resources indicators (Vietnam Prime Minister 2012).

At the end of 2013, the Vietnam Prime Minister promulgated decision no 2157/QĐ-TTg dated 11<sup>th</sup> November 2013 for a set of indicators for monitoring and evaluating sustainable development in provinces for the period 2013–2020. The indicators were classified into two groups: common and specific regions. The common group included 28 indicators: 1 composite (HDI), 7 economic, 11 social, and 9 environmental–resource indicators. The specific regions group had 15 indicators (1 indicator for mountainous regions, 2 for deltas, 2 for coastal areas, 5 for national cities, and 5 for rural regions). These indicators were established based on the provincial statistic systems, and made sure it closely targeted the development priorities of the Vietnam sustainable development strategy (Vietnam Prime Minister 2013).

The set for monitoring and assessing Vietnam sustainable development period 2011–2020 has no guidelines for calculation and reporting methods. This created barriers for tracking, monitoring, and assessing sustainable development in the provinces. Furthermore, the national and local official sets of sustainable development indicators have faced many difficulties when they have been applied in practice due to a lot of shortcoming related to the lacking available data for some indicators. In the Decision 2012, the target values of some indicators for 2015 and 2020 have not been taken into consideration, such as: „Green GDP”, „Environmental Sustainable Index”, „ratio of protected, biodiversity maintaining areas”; „degraded land areas”; and „ratio of days with harmful substances in the air above standard”. Meanwhile, they set the target value of „sex ratio at birth” (male per 100 female) to increase in future (111% in 2010, 113% in 2015 and 115% in 2020) and this means that they have set a target to increase the number of male children overtime. This is unacceptable because it has the same meaning as supporting for sexual discrimination. In the Decision 2013, there are not any mentions of target values in the set of indicators at a local scale for the period 2013–2020. The lack of target values reflects the fact that there are no considerations of available data in the design of the indicators. This leads to the situation when some of the indicators could not be calculated because no data could be collected. Moreover, in the set of SDIs for the period 2011–2020, The Vietnamese Government proposed to use some composite indicators such as HDI and Environmental Sustainable Index. But the indicators which are used to calculate them are the same with single-indicators in indicators set. Thus, there are partial replications between the composite and other indicators.

Aside from the government’s official list of indicators, some noteworthy studies on the design of local sustainable indicators should be considered. Especially, Hai L.T. and co-authors in the articles „Indicators for Sustainable Development in the Quang Tri Province, Vietnam” (Hai L.T. *et al.* 2009) and „A System of Sustainability Indicators for the Province of Thai Binh, Vietnam” (Hai L.T. *et al.* 2014) have developed the indicators for Quang Tri and Thai Binh province based on a procedure with two rounds: the first round is reviewing and seeking information on existing recommendations about sustainable development indicators from a wide range of sources inherited from Indonesia, Thailand, China, England, Sweden, the United States and the international organizations such as the UN, *etc.*

The second round is using the Delphi method which requires selected experts to rate the proposed indicators based on a 1–5 rating scale (the order of importance) to select relevant indicators. In the research for Quang Tri province, the authors proposed 72 indicators and applied Delphi method with only seven experts. Finally, after two-rounds, they selected 37 indicators, but in which 34 cases have available data. In the study for Thai Binh province, they received responses from 32 experts and after two Delphi rounds, 69 indicators were selected. However, both of the researches only proposed a list of indicators and there was no calculation for each indicator; therefore, the feasibility and applicability had not been approved (Dang Tri N. *et al.* 2017).

In 2014 Van Y T. *et al.* (2014) carried out a research for establishing a sustainable development indicator set including economic, social, and environmental fields in Tay Nguyen (Highland) provinces. In this research, the authors have provided the content, procedure, methodology, and methods to establish the sustainable development indicator set in Tay Nguyen. A list of sustainable development indicators for Tay Nguyen consisting of 77 indicators at regional scale, 70 indicators at provincial scale, and 49 indicators at district scale was proposed. However, this list of indicators also faces a lot of challenges in practice due to the fact that some indicators have no available data for calculation, especially for the provincial scale, such as „Green GDP per capita”, „CO<sub>2</sub> emissions of industry”, „real soil erosion (ton/ha/year)”, „drought index”, „erosion (ton/ha/year)”, „fragmentation of habitats”, *etc.*

From these arguments, one must conclude that the majority of research in Vietnam related to developing indicators for sustainable development just proposed indicators and did not demonstrate how to use them in practice to measure sustainability. They put a lot of effort into developing indicators for the social and environmental aspects. As a result, the number of economic indicators is reduced. Therefore, a new indicators system should be developed, designed based on a clear theoretical framework of sustainable development with a full consideration of data availability and taking into account the local characteristics not only for the entire country, but also for provincial level, and to identify the relationship within and between components of sustainability.

## **BROAD ANALYSIS OF INDICATOR SYSTEMS FOR SUSTAINABILITY**

To ensure that selected indicators are applicable, they must fit with themes of sustainable development considering that some of them are already mentioned in policy documents. Firstly, a framework of elements necessary for sustainable development was developed base on the definition, objectives and policies of sustainability of Vietnam. The research endorsed three dimensions of sustainable development (economic, social, and environmental) and agreed upon the elements necessary to ensure each. There are eight key elements that make up the economic component: economic prosperity, intensive economic activity, level of economic development, efficiency of investment, unemployment, quality of labor, competitiveness, and economy's saving. The social component comprises eight elements: education, housing condition, poverty, inequality, gender equality, sufficient food, health, and safety. And the environmental component embraces eight elements: resource, land use, improved sanitation, safe drinking water, clean household energy, air quality, waste generation, treated waste (see table 1).

Following an exploration of the literature on indicators and indicator systems, the research began with a broad analysis of the 12 identified indicator systems (see table 2) and explored how a standard set of sustainable development indicators for Vietnam could be drawn or adapted from existing systems. Furthermore, sustainability is an operational term to define and the type of indicators to use depends on the purpose and the scale of analysis (e.g. national, regional) (Keiner *et al.* 2004). Hence, the standard set of sustainability indicators does not exist. Since the Rio Summit in 1992, us-

**Table 1.** Elements necessary for Sustainable Development**Tabela 1.** Elementy niezbędne dla zrównoważonego rozwoju

Component	Element	Component	Element	Component	Element
<b>Economic</b>	Economic prosperity	<b>Social</b>	Education	<b>Environmental</b>	Resource
	Intensive economic activity		Housing condition		Land use
	Level of economic development		Poverty		Improved sanitation
	Efficiency of investment		Inequality		Safe drinking water
	Unemployment		Gender equality		Clean household energy
	Quality of labor		Sufficient food		Air quality
	Competitiveness		Health		Waste generation
	Economy's saving		Safety		Treated waste

Source: Author's own elaboration.

Źródło: Opracowanie własne.

ing indicators for monitoring and measuring sustainability started to become widespread, thousands of sustainability indicators and indexes have been developed (Fredericks 2014). Many international organizations as well as national governments have started to made efforts to develop their own set of indicators for sustainability and they became an effective tools for assessing progress toward sustainable development. Nowadays, the development of indicators is still seen as one of the major topics within sustainable development projects and programs.

The research explored standard indicator systems from international through national practices. For international scale, the research briefly examines some of the best known sets of indicators approved by United Nations, such as: the Commission on Sustainable Development Indicators (CSDIs), Millennium Development Goal Indicators (MDGIs), and Sustainable Development Goal Indicators (SDGIs). For national scale, examples for sustainable development indicators (SDIs) have been selected from four Asian countries (Korean, Israel, Malaysia, and Taiwan (Republic of China), two European countries (Poland and United Kingdom), United States, and Australia. Last but not least, the existing sets of indicators in Vietnam will be reviewed also (see table 2).

Overall, 12 identified indicator systems have been explored and assigned to two broad categories: international and national. The systems were instituted over a period of 19 years, beginning with the CSDIs of UN in 1996, and concluding with the UN Sustainable Development Goal Indicators in 2015. Most of them were selected before 2015 – before Agenda 2030 (only SDGIs is after 2015). Throughout the indicator systems, it is so clear to see that there is no standard number of indicators to apply for all countries. This number ranges from 26 in Israel to 232 in UN SDGIs. Even though there were varieties of ways to express the structure of indicator systems, all of the cases of countries emphasized the importance of the traditional three pillars of sustainable development – the economic, environmental, and social, and most stated concrete indicators for each one. Within the „three dimensions” approach, the social dimension is measured by the largest amount of indicators. The environmental dimension appears to get more and more attention in every case. However, environmental dimension faces challenges when applied in practice due to the lack of appropriated environmental data.

**Table 2.** The selected international and national sustainable development indicator sets**Tabela 2.** Wybrane międzynarodowe i krajowe zestawy wskaźników zrównoważonego rozwoju

No	Name	Initiated Year	Number of indicator	Source
1	CSDIs	1996	96	United Nations
2	United Kingdom	1996	35	Department for Environment Food and Rural Affairs
3	United State	1998	40	The US Interagency Working Group on Sustainable Development Indicators
4	Malaysia	1999	68	Economic Planning Unit, Prime Minister's Department
5	Taiwan	2003	88	National Council for Sustainable Development
6	Israel	2004	26	The Israel Central Bureau of Statistics
7	South Korea	2006	77	National Strategy for Sustainable Development
8	MDGIs	2008	60	United Nations
9	Poland	2011	76	Central Statistical Office
10	Australia	2012	48	Australian Government – Sustainable Australia Report
11	Vietnam	2013	43	The Vietnam sustainable development strategy period 2011–2020
12	SDGIs	2015	232	United Nations

Source: Author's own elaboration.

Źródło: Opracowanie własne.

### **„SMART” CRITERIA FOR SELECTING INDICATORS TO MEASURE SUSTAINABLE DEVELOPMENT IN VIETNAM**

Selection of adequate indicators is one of the most difficult methodological choices in construction of indicator set or an index that would be both meaningfully relevant and statistically powerful (Ivanov, Peleah 2017). We are still lacking the consensus in several steps of the creation of sustainable development indicators (SDIs) and facing a lot of difficulties to agree on a single limited set of measurement indicators (Mieila, Toplicianu 2013). The reasons for this stem from unclear definitions of sustainable development and from different selection methods and objectives of sustainability (Georges *et al.* 2010). Secondly, the selection method and objectives for the use of such indicators are different between groups at different spatial scales. The geographical diversity of regions, provinces, cities, towns and countryside means that many groups seeking sustainable development indicators find existing indicator sets inappropriate to their locality, and they have to build their own set of indicators (Mitchell 1996). Finally, existing SDIs are occasionally found to be unsuitable due to poor data availability. On the one hand, very often we do not have indicators to measure things we are interested in. Especially, a number of important issues related to environment component, for which we need indicators to measure the balance of the ecosystem, were omitted because we lack adequate data to measure wetlands protection, the quality of solid and hazardous waste management, exposure to heavy metals and toxics, water quality, biodiversity protection, *etc.*, or as National Sustainability Council (2013) asserted, „we are often unable to access reliable, relevant and nationally consistent information on some of our most important national assets, such as

land use, water quality and biodiversity”. On the other hand, indicators, which are available, sometimes measure things only partially or measure only certain aspects of broader phenomenon (Ivanov, Peleah 2017).

Furthermore, most indicators are available for their use at the international and national level, indicators at subnational levels (down to the community, local, or provincial level indicators) still need to be strongly encouraged (Gallopín 1997). The lack of appropriate data which may result in missing essential information, could further lead to „measuring what is measurable rather than what is important” (Meadows 1998). If indicators are not chosen carefully and as systematically as possible they will carry the wrong message resulting in misleading conclusions or causing over- or under-reactions (Meadows 1998; Farsari, Prastacos 2013).

This research requires that the indicator system must be interconnected, comprehensive and compact (OECD 2001). The number of indicators to be included within a framework also provides some constraint on choice (Bell, Morse 2003). The number of indicators in sets varies so much. My perception for the research is to have a core set with small number of indicators as well as the balanced sets of indicators for dimensions of sustainable development. A core set of indicators is one that provides the most information with the fewest measures (Lynch *et al.* 2011). According to United Nations (2007), core indicators fulfill three criteria. First, they cover common issues that are relevant for sustainable development in most countries. Second, they provide essential information not available from other core indicators. Third, they can be calculated by most countries with data that is either readily available or could be made available within reasonable time and costs.

One way to reconcile the problems of selecting indicators and meet the need of the research is giving criteria to make a good indicator. However, Meadows (1998) affirmed that „it’s easy enough to list the characteristics of ideal indicators, it’s not so easy to find indicators that actually meet these ideal characteristics”. Based upon the literature review, the author decided that indicators should be chosen carefully base on SMART framework. According to the United Nations Statistical Institute for Asia and Pacific in 2007, an indicator must be SMART (Specific, Measurable, Available, Relevant, Time-related) and meet all of criteria as following (Bell, Morse 2003; Kerk, Manuel 2008; Lynch *et al.* 2011):

- **Specific:** The indicator should accurately describe what is intended to be measured, and should not include multiple measurements in one indicator. Indicators represent an element of sustainable development, provide essential information not available from other indicators (United Nations 2007). Indicators have to be independent from each other and must no overlap to avoid duplication of statistical information. However, the choice of indicators was a trade-off between their importance for a research and statistical usefulness.
- **Measurable:** An indicator must be measurable. It implies that indicator must be quantitative, expressed in numerical way (Bell, Morse 2003) which we can judge in terms of either positive or negative effect to sustainable development. A target or reference value can be set, reference value such as thresholds to measure progress, distance to target. Indicators are chosen if it is possible to define values for them that would be desirable, acceptable or unacceptable with respect to human or ecosystem well-being (Prescott-Allen 1997).
- **Available:** Data availability is a very first important criterion for indicator selection (OECD 2013). Data quality and availability is also a concern in determining how many indicators to use. Very often data availability is decisive whether a sustainability index is constructed or not (Kaivo-Oja *et al.* 2014). Data for the indicators must be available at a reasonable cost, reliable from public sources, scientific or official institutional sources and also available for all administrative units of the research, so that you can trust the information the indicator is providing (Brandon, Lombardi 2005). The finally selected indicators referred generally to the provinces, the basic administrative units in Vietnam, but they were also applied to the analysis on national level. Hence, data avail-

ability for all provinces has been taken into account in the research, unlike in some Vietnamese studies that concentrate only on the whole country.

- **Relevant:** An indicator must be relevant for an issue according to the definition used. In this case, indicator must be relevant to the objective of assessing progress towards sustainable development. The research is considerably interested in indicators that better reflect the linkages between the three dimensions of sustainable development and their interactions within each dimension. In some cases, we have indicators which are unquestionably useful as inputs to sustainability indicators. But very often they are not indicators of sustainability (OECD 1999). Moreover, the relevance of an indicator also depends on a particular context in particular time. Therefore indicators need to be selected based on context-specific conditions at appropriate spatial levels (Dewan 1998). For example, in the context of Vietnam, a developing country in the process of urbanization and industrialization, while there is still a lack of investment capital for economic growth, the indicator such as Foreign Direct Investment per GDP (%) can be accepted as an indicator for sustainability, but in some areas depending on the external capital can sometimes cause economic instability.
- **Time-related:** Data must be recent and be regularly updated, show trends over time. Indicators should capture long-term rather than short-term processes. For example, some new indicators without availability of historic data, can be applied to measure sustainable development in recent time, but cannot be used to make a comparison over a period of time. Hence, the research also requires indicators that not only describe a present condition with spatial differentiation but also integrate the dynamics of the whole system to have dynamic comparison over a period of time.

The study explored how a suitable set of sustainable development indicators for Vietnam could be drawn or adapted from existing systems by applying the SMART criteria to the 12 indicator systems. While the majority of the indicators were explicit and quantitative, achievability, relevancy, and timing were also significant concerns. A number of indicators were quantifiable but not feasible, implying that they requested data that could be gathered but would be prohibitively expensive or impossible to get. One of the most common reasons for rejecting indicators was the time-related criterion. Some indicators were measurable and available, but they couldn't be used to track changes in sustainable development over time because they were only available for a year. Examples of indicators that were removed, and the reasoning are presented in Table 3.

**Table 3.** Some examples for the rationale of removed indicators

**Tabela 3.** Kilka przykładów uzasadnienia usuniętych wskaźników

Indicator	SMART?	Rationale
Green GDP per capita	No	Not available for provinces
Number of firefighters per 100,000 population	No	Not relevant
Proportion of people enjoying social insurance (%)	No	Not time-related

Source: Author's own elaboration.

Źródło: Opracowanie własne.

As an example, Appendix 1 will show how to use the SMART framework to choose appropriate indicators from a list of indicators supplied by the Vietnamese government. The majority of them were deleted owing to a lack of data for empirical investigation for provincial level (see Appendix 1).



## NEW SET OF INDICATORS FOR MEASURING SUSTAINABILITY IN VIETNAM

A new set of indicators has been established for Vietnam using a bottom-up approach: SMART framework was applied for international and national indicator systems to have core indicators; and then core indicators were integrated to relevant elements of each component of sustainable development. A collection of 24 indicators spanning a wide range of concerns was developed, with eight indications for each of the sustainability components, as shown in Table 4.

All of the 24 indicators fully satisfy the criteria of SMART framework. They are specific, measurable, available, relevant and time-related for not only at national level but also at the provincial level. Hence, this set of indicators can be applied to measure sustainable development in two ways: the first way is to determine the interdependency, the interconnectedness within and between components of sustainable system as a way of measuring the intrasystem and intersystem equilibrium. The second one is to measure and assess the level of sustainability in all of its aspects in the sense of improvement towards goals of sustainable development in order to access the balance of the development between economic, social well-being and environmental component.

The conducted indicators system embraces both stimulant indicators that reflect positive features, like GDP per capita or life expectancy at birth and destimulant indicators that reflect negative features, like Gini or poverty. In fact, statistical data for social indicators has progressed better than data for other sectors such as the economy and the environment in Vietnam. Due to lacking available statistical data for national and local level, the limitation of the research is missing indicators for some essential aspects of sustainable development, especially for the environmental component, for example: land quality, environmental conservation, preservation of biodiversity, renewable energy. Selecting essential environmental indicators becomes a real challenge for the research.

There are a few key issues of the economic and environmental component that need to be addressed, for example: how to explain the indicator „proportion of employment in agriculture”? what is the meaning of the „agricultural land per person” and „proportion of rural households using solid fuels for cooking”? are they stimulant or destimulant of sustainable development? why using solid fuels is only in rural areas? why using PM2.5 but not PM10?, *etc.* The indicator „proportion of employment in agriculture” can be treated as negative indicator. Sectoral information is particularly useful in identifying broad shifts in employment and stages of development. In the case of economic development, labor flows from agriculture and other labor-intensive primary activities to industry and finally to the services sector. By presenting the structure of using labor in economic sectors, this indicator can reflect productivity, level of industrialization and level of economic development.

In fact, choosing relevant indicators for sustainable development need to be put in specific circumstance in specific time of each territory. In the context of Vietnam, the agricultural land per person seems to be a stimulant. The total population is on the rise, now almost 100 million people, most making a living from agriculture (70% live in rural areas) (GSO 2018). This makes a lot of pressure on environment and land use. There is a big challenge to maintain and expand agricultural area to guarantee food security for nearly 100 million people. That is why in sustainable development strategies and policies, Vietnamese government always give the priorities for maintaining and expanding agricultural land. Proportion of rural households using solid fuels for cooking should be treated as destimulant indicator because the consumption of solid fuels affect strongly environment. Households in rural settlement in Vietnam accounting for more than 70% of population still rely firmly on using solid fuels for cooking (GSO 2018). Meanwhile, in urban areas, electricity and gas are the main sources and using of solid fuels is really smaller.

The annual median concentration of Particulate Matter 2.5 but not PM10 has been chosen for the research to represent for outdoor air pollution, a major environmental health problem affecting everyone. According to WHO, small particulates can penetrate and lodge deep inside the lungs. PM2.5 can enter the blood system, chronic exposure to particles contributes to the risk of developing cardio-

**Table 4.** Indicators for measurement of sustainability in Vietnam**Tabela 4.** Wskaźniki pomiaru zrównoważonego rozwoju w Wietnamie

Component	No	Element	Indicator
Economic	1	Economic prosperity	GDP per capita (PPP current USD)
	2	Intensive economic activity	GDP density (million USD PPP per km <sup>2</sup> )
	3	Level of economic development	Proportion of employment in agriculture (%)
	4	Efficiency of investment	Incremental capital-output ratio (ICOR)
	5	Unemployment	Unemployment rate (% labor force)
	6	Quality of labor	Percentage of trained employed workers (%)
	7	Competitiveness	Competitiveness Index
	8	Economy's saving	Budget surplus as percentage of GDP (%)
Social	9	Education	Adult literacy rate (%)
	10	Housing condition	Proportion of household owning a permanent house (%)
	11	Poverty	Poverty rate (%)
	12	Inequality	Gini index
	13	Gender equality	Female labor force participation rate (% male)
	14	Sufficient food	Prevalence of underweight children, weight for age (% of children under 5)
	15	Health	Average life expectancy at birth (year)
	16	Safety	Proportion of death due to traffic accident (per 100.000 people)
Environmental	17	Resource	Forest cover (% total land area)
	18	Land use	Agricultural land per person (ha)
	19	Improved sanitation	Proportion of household with access to improved sanitation (%)
	20	Safe drinking water	Percentage of household with access to potable water (%)
	21	Clean household energy	Proportion of rural households using solid fuels for cooking (%)
	22	Air quality	Annual median concentration of Particulate Matter 2.5 (µg/m <sup>3</sup> )
	23	Waste generation	Total of collected solid waste per capita (kg/person/day)
	24	Treated waste	Proportion of collected solid waste per day that are treated according to national standards (%)

Source: Author's own elaboration.

Źródło: Opracowanie własne.

vascular and respiratory diseases, as well as of lung cancer. This indicator is also related closely to Sustainable Development Goal 13 which calls for taking urgent action to combat climate change and its impacts.

Moreover, some indicators which reflects the condition of living environment, like proportion of household with access to improved sanitation and percentage of household with access to potable water, can be treated as social or environmental indicators. However, based on the Vietnamese gov-

ernment's policy on living environment for people, and due to the low number of environmental indicators, the study opted to leave these two indicators in the environment component.

## CONCLUSION

The concept of sustainable development has become one of our time's most prevalent and important ideas. Indicators are a crucial instrument for putting the notion of sustainable development into practice. They assist us in constructing a picture of the condition of a complex system, as well as understanding what sustainable development entails and how to achieve it in practice. Appropriate indicators must be chosen. One of the most difficult methodological decisions in the building of an indicator set is choosing appropriate indicators. In the case of Vietnam, the existing sets of indicators proposed by the government and scientists contain numerous flaws and cannot be used to adequately quantify sustainability. A broad investigation of the 12 identified indicator systems from national and international organizations was carried out in order to see how a standard set of sustainable development indicators for Vietnam may be derived or adapted from existing systems. The SMART criteria have been chosen as one of the finest solutions to resolve the issues of picking good indicators that can be used to monitor Vietnam's long-term development at both the national and provincial levels. They can be used to assess the level of sustainability, which is indicated by the varied levels of all indicators of sustainability, and to measure the interrelationships between and within components of sustainable development. However, due to a lack of available data in Vietnam, picking crucial economic and environmental variables becomes a real difficulty for the research. Some areas of sustainable development, particularly those related to the environment, such as land quality, environmental conservation, biodiversity preservation, renewable energy, lack key indicators. To improve the quality of the research, it is vital to update indicators with relevant available data.

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## Appendix 1

An example of using SMART framework to select indicators from „The national set of sustainable development indicators for monitoring and assessing Vietnam sustainable development period 2011–2020”.

Indicator	SMART?	Rationale for not SMART
<b>ECONOMIC</b>		
ICOR	Yes	
Productivity of social labor (USD/employee)	Yes	
Share of total factor productivity in growth rate	No	Not available

Indicator	SMART?	Rationale for not SMART
Reduction of energy consumption to produce one unit of gross domestic product	No	Not available for provinces
Share of renewable energy sources in total energy use (%)	No	Not available for provinces
CPI (% compare to last 12 months)	No	Not available for provinces
Drawing account (bilions USD)	No	Not available for provinces
State budget deficit over GDP (%/GDP)	Yes	
Government dept (%/GDP)	Yes	
Foreign dept (%/GDP)	No	Not available for provinces
<b>SOCIAL</b>		
Proportion of population living below national poverty line (%)	Yes	
Ratio of unemployment to population in working age (%)	Yes	
Proportion of educated employee (%)	Yes	
GINI index	Yes	
Sex ratio at birth (boys/100 girls)	No	Not time-related
Ratio of student per 10000 population	No	Not available for provinces
Internet users per 100 population	No	Not available for provinces
Proportion of people enjoying social insurance, health insurance and unemployment insurance (%)	No	Not time-related
Number of deaths due to traffic accidents per 100,000 population	Yes	
Proportion of communes achieve the standard of new rural criteria (%)	No	Not available for provinces, Not time-related
<b>ENVIRONMENTAL</b>		
Proportion of land area covered by forests (%)	Yes	
Proportion of protected land and maintained biodiversity land	No	Not available for provinces
Area of degradation land (milions ha)	No	Not available for provinces
Use of groundwater and surface water (m <sup>3</sup> /persion/year)	No	Not available for provinces
Ratio of days which pollution concentration in the air exceeds Vietnamese standards in a year (%)	No	Not available for provinces
Ratio of industrial zone, manufacturing area own waste treatment systems that meets Vietnamese standards (%)	No	Not available for provinces
The ratio of solid waste collected and treated meets Vietnamese standard (%)	Yes	

Source / Źródło: Vietnam Prime Minister 2012.