

Abstract

Indicators are commonly used as tools to identify and highlight socio-economic and ecological trends and to assess progress towards sustainability. Different quality criteria can be considered for indicators. This paper focuses on the timeliness of indicators used in the evaluation of sustainable development strategies. The analysis is based on indicators included in four assessment reports of the sustainable development strategy of the European Union and three assessment reports of the national strategy of Finland. Furthermore, a web-based national level indicator portal is analysed. The results show that the timeliness of indicators has generally not improved during the past decade and that indicators used in strategy evaluations have a time lag of approximately two years. It is suggested that more attention should be given to efforts to improve the timeliness of indicators in order to increase the effectiveness of the evaluations. More generally, it is suggested that greater emphasis should be put on the empirical research on actual use of indicators.

Keywords: European Union; Finland; indicators; sustainable development strategies; timeliness.

1. Introduction

Sustainable development (SD) strategies have gained considerable popularity since the mid-1990s. National level SD strategies have been formulated in over 100 countries (UNDESA, 2010). In addition to the national level, some cross-national initiatives to implement SD strategies have been established, for example in the European Union (CEU, 2006) and in the Nordic countries (NCM, 2009). The UN local Agenda 21 has inspired and guided municipalities and cities on all continents to develop local level strategies. Sector-based strategies have been produced especially in sectors causing heavy environmental impact, such as agriculture, fisheries, industry, mining, tourism and transport. Furthermore, different kinds of SD strategies are formulated by various private and public organizations under various voluntary and statutory standards, programmes and initiatives.

Generally, SD strategies aim to integrate different policies and targets into a coherent and holistic package. A sustainable development strategy can be defined as a coordinated, participatory and iterative process of thoughts and actions to achieve economic, environmental and social objectives in a balanced and integrative manner (UNDESA, 2002). SD strategies can serve different kinds of purposes, such as outlining long-term goals, highlighting current key issues or offering a participatory system to develop concrete targets. According to Stevens (2007), the essence of national level SD strategies is to integrate government decision-making in economic, social and ecological spheres and to consider longer term implications of all policies.

Mechanisms for monitoring, evaluation and feedback are key features of SD strategies, since without continuous and critical re-assessment, the strategy faces a danger of becoming outdated and obsolete. Indicators are considered key tools to monitor and evaluate the SD strategies (Dalal-Clayton and Bass, 2002; UNDESA, 2002). Indicators can be quantitative or qualitative. They should provide credible and reliable information on changing environmental, social and economic conditions, pressures and responses in relation to strategy objectives. The indicators chosen for the assessment should also identify trends, detect change, track progress and, if possible, anticipate future development (Hardi and Zdan, 1997).

This paper focuses on the use of indicators in the evaluation of national and supranational level SD strategies. Previous research on SD indicators has mainly concentrated on how to identify and produce valid, reliable and accurate indicators (Moldan et al., 1997; Hák et al., 2007; Spangenberg, 2009). Compared to the research and development concentrated on the production of the SD indicators, the actual use — or misuse — of indicators has attracted less attention (Rosenström, 2009; Lyytimäki et al., 2011; Bauler, 2012). There exists a substantial body of literature on SD strategies, and the role of indicators is touched upon in many of these studies (e.g., George and Kirkpatrick, 2006; Steurer and Martinuzzi, 2007; Steurer et al., 2010). However, studies specifically focusing on the use of indicators as tools of SD strategy evaluation appear to be missing.

More specifically, the focus is on the timeliness of indicators. Timeliness is one of the key criteria for usefulness of indicators in sectors such as financial and corporate reporting (e.g., Conover et al., 2008) and medical care (e.g., Dailey et al., 2007). The need for up-to-date information is evident in these sectors. On the other hand, sustainable development is a long-term issue characterized by gradual and slow changes (Kates et al., 2005). Therefore, it may be tempting to consider that the timeliness of SD indicators is not a crucial issue. However, even when the changes are generally slow, they can substantially accelerate if certain “tipping points” or critical thresholds of the social-ecological system are crossed (Scheffer et al., 2001). Up-to-date indicators may help in detecting and managing these abrupt changes (Lyytimäki and Hildén, 2011). Furthermore, there is a clear need for timely information when indicators are used to evaluate the implementation and outcomes of specific policies such as SD strategies. Timely indicators are needed to show in a policy relevant way whether the policy objectives are reached or not.

In the following sections the material used is introduced and the study method described. This is followed by a presentation of the key results and a discussion of the implications of the results. Finally, conclusions are drawn up in order to suggest key areas for future research and development.

2. Study background and description of the material

The development of the timeliness of indicators used in SD strategy assessments is analysed on the basis of seven evaluation reports and an online indicator portal published during 2003-2011. The reports represent both supranational (European Union) and national levels. Finland is selected for a case representing national level. Finland has a relatively long history of developing national level SD indicators (Lyytimäki and Rosenström, 2008; Rosenström, 2009). Finland was also one of the first nations that achieved the target set in 1997 by the United Nations General Assembly that all countries should have SD strategies by 2002.

2.1. Finnish assessments

The first Finnish Government Programme for Sustainable Development was officially approved in June 1998. This strategy was adopted as a Decision-in-principle by the Council of State (MoE, 1998). The strategy reflected a comprehensive and holistic interpretation of sustainable development. An external evaluation of the strategy was carried out in 2002-2003. The report “Evaluation of sustainable development in Finland” was published in 2003 in Finnish (YM, 2003). A summary of the evaluation was published in English (MoE, 2003). The assessment was based on reports and self-evaluations by the ministries and other parties, and it was supplemented with insights gained from experts and stakeholders during the evaluation process. The evaluation was based on a framework of 11 key theme areas, and 23 quantitative indicators were used to illustrate the progress.

The national SD strategy was revised in 2005-2006 through a process that employed the existing SD indicators in identifying key issues and challenges. The new national strategy titled “Towards sustainable choices: A nationally and globally sustainable Finland” was officially adopted by the Council of State in December 2006 (PMO, 2006). During the renewal process it was agreed that the national strategy would be assessed every two years, and that the assessment would be linked to the EU SD strategy assessment process.

Finland’s first progress report on the implementation of the EU SD strategy was delivered to the EU Commission in June 2007. Partly based on that report, a more extensive progress report of the implementation of national SD strategy was compiled and published in December 2007 (KKTV, 2007). Both of these were internal assessments compiled by the Ministry of the Environment and the Finnish National Commission for Sustainable Development. Both the strategy and the evaluation incorporated the national set of SD indicators. The evaluation presented 36 indicators under a framework of national SD strategy.

The 2009 evaluation of the national SD strategy was an external assessment. It was published in December 2009 (Ramboll, 2009). The evaluation was based on interviews of key stakeholders and included updated indicators selected from the national SD indicator set and from elsewhere. Altogether 22 quantitative indicators were presented. No evaluation was performed in 2011. Based on the 2009 assessment, a new strategy process was planned and initiated in 2012.

In addition to SD strategy evaluation reports, comparative material is gathered from a national level online indicator portal aiming to provide reliable and up-to-date information. This “Findicator” portal (<http://findikaattori.fi>) was launched by the Prime Minister’s Office and Statistics Finland in 2009. The portal includes approximately 100 indicators for social, economic wellbeing and environmental issues. Indicators are continuously updated and modified, taking into account user requests. Indicators include direct links to a database providing further details on the indicators and allowing the user to limit the examination both by variable and time scale.

2.2. EU assessments

The European Union was one of the first international institutions to take SD issues into its agenda. Sustainable development was first introduced as an official objective of the European Community in the Single European Act (1987). The first EU sustainable development strategy was launched in June 2001. The strategy was based on a proposal from the European Commission (CEC, 2001) and it was complemented by an external dimension in 2002 by the European Council (CEC, 2002). The external dimension was added in order to address the topics of the World Summit on Sustainable Development in Johannesburg in 2002. Together, these two documents represent the first EU SD strategy. The strategy required the Commission to develop indicators at the appropriate level of detail. In order to monitor the implementation of the strategy and to develop suitable indicators, a special Eurostat task force was founded in 2002.

A renewed strategy was approved by the European Council meeting of June 2006 (CEU, 2006). It built on the previous strategy and aimed to include new challenges and to take account of progress made and tackle the shortcomings identified. It included a commitment for the Commission to submit a progress report on implementation of SD strategies in the EU and member states every two years. The monitoring was planned to be based mainly on already existing SD indicators.

The first review report based on sustainable development indicators had already been published by Eurostat in December 2005 (Eurostat, 2005). The second review report was published in October 2007 (Eurostat, 2007). In addition to the extensive indicator reports, more concise progress documents have been published by the European Commission. The first progress report by the Commission was issued in 2007 (CEC, 2007) and was based on national reports on implementation of the EU SD strategy and on the preliminary results of the Eurostat (2007) review.

In July 2009 the European Commission published a communication on mainstreaming sustainable development into EU policies (CEC, 2009). It was complemented by Eurostat's third review report on sustainable development which was published on 29 November 2009 in electronic format and later in printed format (Eurostat, 2009). The fourth review was released on 23 November 2011 (Eurostat, 2011).

All four Eurostat reports follow the same approach: based on the analysis of more than 100 indicators, they analyse the progress made towards the objectives and targets set in the SD strategies. Their main aim is to provide a quantitative analysis of trends in the different sustainable development themes. The emphasis is on visualization of trends (graphs and figures) rather than tables of data or long texts explaining the development.

The reports are based on the framework of ten themes, reflecting the seven key challenges of the EU SD strategy, as well as the objective of economic prosperity, and guiding principles related to good governance. The indicators are organized according to the hierarchical theme framework. Distinction between the three levels of indicators reflects the structure of the SD strategy (overall objectives, operational objectives, actions). Different levels of indicators aim also to respond to different user needs. Level I headline (key) indicators are considered to have the highest communication value. The three levels are complemented with contextual indicators, which provide background information but which do not monitor directly the strategy's objectives.

The 2005 report identified 155 indicators specifically geared towards monitoring the EU SD strategy (Eurostat, 2005). However, 34 indicators were not yet feasible because of data limitations and 11 other indicators were replaced by proxy indicators. After the 2006 renewal of the EU SD strategy, the list of indicators was revised. The total number of indicators was reduced to 122, plus 11 contextual indicators. Indicators included 11 headline indicators, 33 level II indicators and 78 level III indicators (Eurostat, 2007). The 2009 assessment presented data on over 100 indicators, including 11 headline indicators, 28 level II indicators and 66 level III indicators (Eurostat, 2009). The 2011 report included 11 headline indicators, 31 level II indicators and 69 level III indicators (Eurostat 2011).

2.3. Method

The following section presents key findings from the analysis of the indicators included in three national level assessments (YM, 2003; KKTV, 2007; Ramboll, 2009), Findicator online portal and four EU SD strategy assessments (Eurostat 2005; 2007; 2009; 2011). Data describing the use of the indicators is collected on the basis of the visual appearance of the indicators presented in the documents. Altogether, 613 such indicators were identified. The Eurostat reports and the Findicator portal have a relatively straightforward structure and naming practices for indicators. The structure of the Finnish reports is more variable. In Finnish reports, most graphs presented under the same subtitles were interpreted as separate indicators. Only quantitative indicators with graphic presentations (graph, pie, bars, etc.) were included.

In most cases, the interpretation of the temporal focus of the indicators was unambiguous. However, several indicators contained variables with different time spans and, in some cases, defining the temporal focus was open to interpretation because of the use of multiple variables with different time frames. The varying time spans of the variables were typically related to limited data availability from certain countries or sectors of society. Furthermore, assessments contained some indicators that included variables with unclear start or termination years. In these cases the start or end year was determined by careful visual judgement or from the textual information provided by the report.

The following results are based on the earliest and the latest data points of the variables describing the core issue illustrated by the indicator. Timeliness is calculated based on the time lag between the year of the publication and the latest data point. Data from the Findicator portal is based on the time lag between indicator update/publication and the latest data point (checked April-May 2011). In some cases, most recent or earliest years presented by the variables are excluded because these variables do not focus on the issue that the indicator principally aims to describe. For example, an indicator describing environmental performance can include up-to-date information on GDP but less timely information on the environmental or social issue. Variables with missing years in the middle of the data series are included in the analysis.

3. Results

3.1. Finnish assessments

Indicators presented in the Finnish SD strategy assessments had an average time lag of about two years between the year of the latest data presented and the release year of the report (Figure 1). The time lag was 2.4 years for the 2003 assessment, 1.8 years for the 2007 assessment and 2.0 years for the 2009 assessment. Notably, the 2009 assessment presented six indicators with short (zero years) time lags. These indicators illustrated alleviation of poverty, citizen activity and employment. The 2009 report also included several indicators with rather old data. The oldest data was from the year 2000 and it described the status of biodiversity, but this indicator also included a projection to the year 2010.

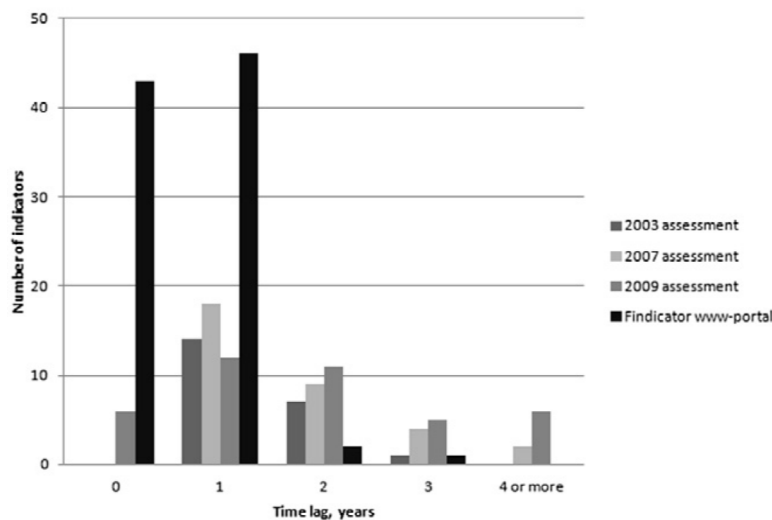


Figure 1. The timeliness of the indicators used in Finnish SD strategy assessments and online indicator portal.

It could be assumed that indicators describing economic and social issues should be more up to date than environmental indicators due to the more simple and well established practices for gathering and managing the data. However, all of the indicators in the 2003 assessment with a time lag of four years or more were related to social and economic issues. The 2007 assessment contains 16 indicators with a time lag of two years or more. All except one of these describe social or economic issues. In the 2009 assessment, indicators with very old (four years or older) data described social and economic issues, except for the indicator illustrating the status of biodiversity.

Many of the changes related to SD are slow and gradual if compared with the decision-making and policy cycles of society. Therefore, it is important that indicators are able to capture long enough time frames. The indicators presented in the 2003 assessment had an average time series of 22 years, spanning usually from about 1980 to 2001. Indicators presented in the 2007 assessment had an average time series of 28 years, spanning usually from about 1980 to 2005. However, the indicator describing life expectancy at birth

had an exceptionally early starting year (1755). If this indicator is excluded, the average length of time series decreases to 20 years. The 2009 reports had time series of 22 years on average, spanning usually from about 1986 to 2007.

The fundamental purpose of the evaluation is to compare the development with qualitative or quantitative targets. However, the assessments presented relatively few indicators with concrete targets. The 2003 assessment included no indicators with targets. The 2007 assessment contained three indicators that presented target values: Finland's greenhouse gas emissions; the maximum limit of public debt; and the level of appropriation funds for public development and cooperation. The 2009 report contained only one indicator (greenhouse gas emissions) with a target value.

Projections and scenarios of the development can be used to anticipate and evaluate possible outcomes of current and past practices. Indicators published in the 2003 report did not include future projections. The 2007 assessment contained two indicators that present scenarios: endangered species by habitat and demographic changes. The 2009 report presented future projections in four indicators.

Almost a half of the indicators presented in the Findicator online portal had a time lag of less than one year and only three indicators had a time lag of over two years. However, it should be noted that time lag was calculated on a basis of the publication date of individual indicators instead of a fixed date for all indicators. Nevertheless, the results clearly suggest that on national level the online application can be useful tool to produce timely indicators.

3.2. EU assessments

Indicators presented in the 2005 assessment of the EU SD strategy had an average time series of about 10 (10.3) years starting from the year 1993 and ending around 2003. Thus, the average time lag between the most recent data and the year of publication was over two (2.2) years (Figure 2). The most up-to-date data was presented by an indicator describing the level of population confidence in EU institutions. This indicator showed data from an opinion poll describing the situation in 2005. Another timely indicator is electricity consumption by households. The data on GDP and electricity prices is from the year 2005. However, the latest data describing electricity consumption is from 2003 and it is stated that the data from 2002 and 2003 is provisional. The indicator describing cancer incidence rate had the longest time lag (seven years). Four indicators had a time lag of five years: Suicide death rate; population suffering from noise and from pollution; nitrogen surplus; and groundwater abstraction. A target value was presented for 18 indicators. A forecast or projection of the near future development was presented for three indicators. Forecasts were related to the indicators describing growth rate of GDP and old-age dependency and replacement ratios.

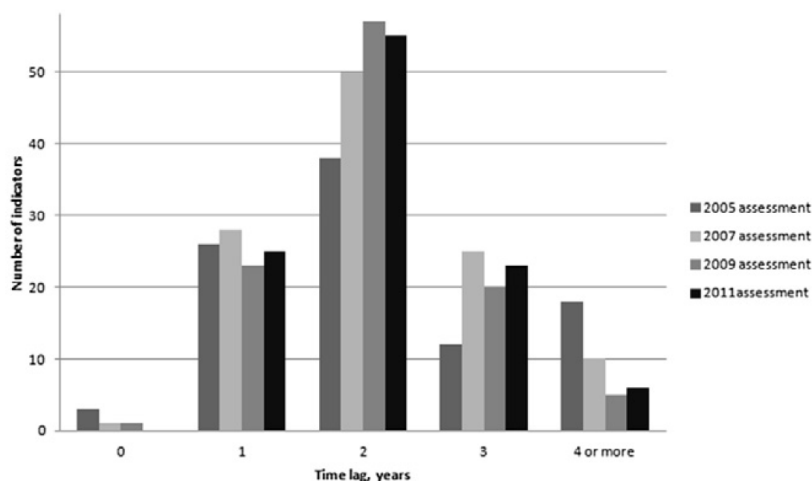


Figure 2. The timeliness of the indicators used in EU SD strategy assessments.

Indicators presented in the 2007 assessment had an average time series of over 13 (13.4) years, starting from the year 1992 and ending around 2005. The average time lag of indicators remained at the same level as in the 2005 report (2.2 years). However, because of the earlier publication date of the 2007 report, the indicators can be considered slightly more up-to-date than the indicators published in 2005. The most up-to-date data was presented by an indicator describing the real effective exchange rate. The indicator describing gross household saving had the longest time lag (seven years). The indicator named "at-persistent-risk-of poverty rate" had a time lag of six years. Five indicators describing life expectancy and healthy life-years had a time lag of five years. The 2007 review presented a target value for 16 indicators and a forecast or

projection of the future development for five indicators. Forecasts were related to: the growth rate of real GDP; gross investment; old-age dependency ratio; healthy life-years and life expectancy; and projections of greenhouse gas emissions.

Indicators presented in the 2009 assessment had an average time series of over 13 years (13.5), starting around the year 1994 and ending in 2007. The timeliness of indicators was slightly improved from previous reports but was still over two (2.1) years. The most up-to-date data was found from the indicator describing voter turnout. The indicator describing change in land cover included the longest time lag of nine years. Only four other indicators had a time lag of four years or more: deadwood on forest land; domestic material consumption; resource productivity; and subsidies for EU agriculture. Six indicators included a forecast or projection of future development and 18 indicators presented a target value.

The length of time series (13.6 years) and timeliness of indicators (2.1 years) remained at the same level in the 2011 report. No indicators with a time lag of zero years were found. Only two indicators presented forecasts or scenarios, including a baseline scenario of the projected evolution of age-related public spending and forecast of old-age dependency ratio of EU 27 countries. Twenty one indicators presented a target value, most commonly for year 2020 or 2010.

Indicators typically presented the aggregated temporal development in selected EU countries. Long-term data series from all current EU countries were often missing and the longest time series were typically from EU 15 countries. Additional information typically describing a snapshot illustrating the situation in a single year was presented from a larger group of countries. Altogether 26 indicators in the 2005 report presented data only from 15 or less EU countries. In the 2007 report, the number of such indicators was 24 and in 2009 the number was 23. In the 2011 report, most indicators described the EU 27 countries.

The results were generally in line with preliminary results gathered by the DECOIN project from the Eurostat SD indicator database (Vehmas et al., 2007). The DECOIN project analysed the publicly available indicator dataset at the Eurostat webpage on sustainable development indicators, valid in September 2007. They found that about a quarter of the indicators had a time lag of one year, 30% had a time lag of two years, 18% a time lag of four years and 27% five years or more. They also found that the timeliness of the SD indicator data varied considerably between different indicators, between different indicator themes, and between individual indicators within one theme. The most timely data was found for the headline indicators describing economic development and good governance. Rather old data was found from indicators describing themes of ageing society; production and consumption patterns; and public health and management of natural resources. For a large number of indicators, including several headline indicators, the length of time series data was found to be very short and much data especially for the 10 new member states was lacking.

4. Discussion: Facing the need to improve timeliness

Lack of major improvements of timeliness at the European level was a rather expected result. What may be more surprising is that the timeliness of national level SD strategy evaluation reports was not substantially better than that of EU-level reports. Furthermore, the average timeliness of indicators in national level SD assessment reports did not improve, although the most recent assessment report introduced several timely indicators. A partial explanation can be found from the assessment processes. All three national level SD assessments examined here were based on different and individually tailored preparation processes. Therefore there were only limited possibilities to learn from and utilize practices developed for earlier national assessments.

There are several possibilities for improving the timeliness of indicator-based assessments. It is possible to streamline the indicator production process, produce shorter reports with few key indicators, streamline data collection, select only those indicators that can be produced in timely fashion, and to use preliminary data or outlooks (Rosenström and Lyytimäki, 2006). Results from the Findicator portal showed that using on-line reporting instead of time consuming printed reports can considerably improve the timeliness of national level reporting. Experiences from European environmental indicators suggest that some improvement of timeliness can be achieved through regular reporting routines with adequate resources, commonly shared tools to facilitate data flows, and increased number of data collections which receive quality feedback (EEA, 2011).

Securing adequate resources for monitoring, data storage and processing is a prerequisite for producing up-to-date indicators. As shown by the survey focused on the national level reporting of economic data, countries with small populations disseminate economic data with poorer timeliness than countries with larger populations (Allum and Agça, 2001). In Europe, small and relatively poor Eastern European countries have the greatest difficulties to produce timely environmental indicators (EEA, 2011).

Yet another way of improving the timeliness relates to the timing of assessment reports. Timeliness is not only a question of the shortest possible time lag between the indicator release date and the latest data point presented by the indicator. The question is also about the timing of the indicator-based evaluation. Information presented by the indicators and the release of the evaluation report should be adjusted to the timeframes of decision-making (Hildén, 2009). Timely information should be readily available for decision-making whenever it is needed. A standard practice of publishing evaluation reports every two years is effective only if this interval is compatible with the decision-making cycle.

The current practice of producing a comprehensive evaluation report once in two years can also be criticized since the average time lag of indicators is over two years. More frequent release of shorter theme-based evaluation reports may allow the use of more timely data. Another option would be to shift the emphasis of reporting from printed reports to continuously updated on-line indicator databases or portals. Currently, the EU assessment reports only briefly mention the Eurostat indicator portal (<http://epp.eurostat.ec.europa.eu/portal/page/portal/sdi/indicators/>).

The enlargement of the EU has clearly brought challenges to the SD indicator work. Acquiring timely and reliable data and indicators describing all EU member states is still difficult, despite continuous efforts to improve the information flows. Frameworks and practices of indicator production vary in different countries, as well as the coverage of statistical databases and policies towards open access to data.

Experiences from air quality monitoring show that it is possible to develop procedures to generate accurate and reliable real-time or near real-time indicators over large areas (Normander et al., 2008). However, it is unrealistic to expect that these kinds of indicators covering all topics related to SD could be developed. Hence, the use of provisional, preliminary or non-validated data continues to be a tempting way to improve the timeliness, although the producers may be then forced to compile the indicators from incomplete source data, leading to the decreased validity of the indicator (Fixler, 2007).

Well-established practices of indicator production may improve the timeliness of the indicators without compromising the validity of individual indicators. However, there is a danger that the streamlined assessment process and fixed reporting framework aimed at improving the timeliness of the existing indicators may become ossified, incapable of addressing rapidly changing policy concerns or emerging socio-economic and environmental fluctuations (Lyytimäki and Rosenström, 2008). As Ramos and Caeiro (2010) remarked, methods of SD evaluation have proliferated, but most methods are time-consuming and expensive to conduct, making reiteration, a crucial part of the assessment process, an unappealing and difficult task. Thus, one key question is what kind of methods are available for improving the timeliness without compromising the flexibility of reporting and the ability of indicators to capture relevant emerging issues.

Timeliness has usually been considered a secondary level criterion for good SD indicators and it has not been explicitly addressed as a key criterion in the performance evaluations of sustainability indicators (Garcia and Staples, 2000; Becker, 2001; Ramos and Caeiro, 2010). For example, timeliness was one of the selection criteria of the EU SD indicators but it was not included in the priority concerns of the actual indicator selection process (Ledoux et al., 2005).

In this study, the lack of attention towards timeliness was illustrated by inadequate attention to the visual quality of some indicators, making it difficult to discern the exact termination year of the data. Lack of clarity may influence an indicator's use and relevance if the timeliness of the information cannot easily be perceived from the indicator. At least in some cases, the timeliness can be improved simply by presenting the data unambiguously. Compared to economic reporting, timeliness of SD indicators has raised only minor concern. In particular, the timeliness of short-term economic statistics has attracted interest within the international statistical community (McKenzie, 2006). A collection of the best practices to improve timeliness within different stages of the statistical production process has been compiled by the Organisation for Economic Cooperation and Development (www.oecd.org/std/research/timeliness). Gathering together the best practices related to the production and dissemination of timely SD indicators would be a useful next step.

5. Conclusions

Timeliness of the indicators presented in the EU and Finnish SD strategy assessment reports has not substantially improved during the past decade. Development of new practices of data gathering and processing, as well as streamlining of current practices, is clearly needed in order to increase the timeliness of the indicators. Favouring continuously updated online reports instead of printed reports appears to be the first step to improve the timeliness.

However, further improvement of the timeliness of indicator sets is not likely to be achieved if the timeliness remains as a second order quality criterion for indicator development work. Timeliness is a quality criterion

that relates especially to the use of indicators. As long as the main focus of indicator work is on how to produce indicators — rather than on the use of indicators — the timeliness of information is likely to remain as a second order criterion. The general level conclusion is that more emphasis in empirical research should be placed on the actual use of indicators, and on the role of timeliness as one factor influencing their use.

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