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Risks of producing and using indicators of sustainable development goals

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Abstract

The Sustainable Development Goals (SDG) aim to provide humanity with a global roadmap to sustainability. Official SDG indicators have been intensively developed, and they have a prominent and pronounced role as a key monitoring and policy instrument. Furthermore, various complementary or alternative indicator sets have been introduced at the global, regional and national levels. This article focuses on the risks related to the national indicators. The analysis is based on experiences from the preparation processes of sustainable development indicators in Finland and insights from indicator professionals and stakeholders in Finland and Germany. The risks related to overuse, nonuse and misuse of indicators are analyzed from the perspectives of indicator contents, processes of production and communication and external context factors. Opportunities for avoiding different risks and improving the desired societal impacts and influences of indicator usage are discussed. The concept of risk is helpful in terms of empirical diagnosis and for formulating mitigation recommendations.

KEYWORDS

agenda 2030, Finland, indicators, risks, sustainability, sustainable development goals

1 | INTRODUCTION

The indicators of Sustainable Development Goals (SDG) can be characterized as a beacon that is potentially capable of guiding humanity in the right course towards sustainability. Indicators, at different sectors and levels of governance, are often considered a key tool for monitoring and assessment (e.g., Halisçelik & Soytas, 2019; SDSN & IEEP, 2019; UN, 2019). But what is the actual role of indicators, and what role could they ideally play in sustainability transformations? We offer the perspective of risk to recast these questions in a new light. With this perspective, we can examine whether indicators are useful or even potentially harmful.

Just like a traditional lighthouse with a rotating light beam, sustainability indicators may point out the safe route, but they cannot reveal all potentially important areas all the time (Figure 1). An indicator is only capable of highlighting certain trends—much like the operator of a rotating light beam is only capable of illuminating a certain spot at a time. The light beam may be too weak to reveal all relevant risks and there may be hidden dangers, with some of them just outside the illuminated area while others loom farther in the horizon. If the light is too strong, it may create glare that prevents noticing the imminent dangers. More distant dangers are difficult to detect if the eyes of the information receiver are adapted to bright light. Likewise, a societally salient indicator may direct

FIGURE 1 Metaphorical approach to indicators as light beams illuminating the 17 Sustainable Development Goals. Illustration by Kai Widell/ Finnish Environment Institute [Colour figure can be viewed at wileyonlinelibrary.com]

attention to immediate risks and leave background factors with little consideration. Last but certainly not least, the conditions for steering are often nonoptimal. Sometimes the sea (of information) is covered by a thick fog that makes even the best lighthouse useless, and at other times rough seas can seriously disturb navigation even when the correct information about the safe route is successfully received, understood and believed.

The metaphor implies some normative ideals often present in risk management debates (Assmuth, Hildén, Lyytimäki, Benighaus, & Renn, 2009; Renn, 2008), including calculable paths towards sustainability and the existence of pathways that are discoverable, and that those producing and using indicators are the ones who might be in control of such paths. While this can be criticized as overly linear or dirigiste, we consider the metaphor to be apt in uncovering risks relevant for the indicator production and use. The metaphor also leaves open the fact that different ships can have different pathways to their destinations.

There is a variety of reasons for the use of sustainability indicators (Lehtonen, 2015). They are used to simplify the complex process of sustainable development and thus make it communicable (Hatakeyama, 2018; Mair et al., 2018; Martinuzzi & Sedlacko, 2016). In most cases, sustainability indicators have an instrumental goal, that is, they show the key trends, provide information to improve political decisions, initiate sustainable development policies, improve communication between experts and nonexperts and raise public awareness (Lyytimäki, Gudmundsson, & Sørensen, 2014; Mair et al., 2018; Miller, 2007). However, optimistic expectations about the high and immediate societal influence of the indicators have often failed, especially those related to the direct, immediate and large-scale utilization of indicators in policy-making (Boulanger, 2007; Rinne, Lyytimäki, & Kautto, 2013; Sébastien, Bauler, & Lehtonen, 2014).

Sustainable Development Goals (SDG) indicators are the most notable recent process aiming to accelerate a transition towards sustainability at the national level and globally. Finland was one of the first countries to collect and openly publish the national data for SDG indicators in February 2019. The country has relatively long traditions in developing national sustainable development indicators and assessing their use (Lyytimäki, 2019; Lyytimäki & Rosenström, 2008; Rosenström, 2009; Rosenström, 2018; Rouhinen, 2014). Therefore, Finland can serve as a potentially interesting case country for a study focusing on the risks of the use of national sustainable development indicators. Insights from Germany are used to corroborate the interpretations and provide an international comparison.

The overall aim of the article is to discuss how the concept of risk may help indicator practitioners and users in the context of operationalizing SDGs. We focus on the following research questions:

- First, we ask what are the key risks of indicator-based monitoring and reporting for the implementation of the SDGs on a national level. More specifically, what risks are associated with the production processes and communication about indicators at the national level?
- Second, we ask what are the contributing factors that are likely to lead to indicators being overused, nonused or misused.

Based on these, we aim to produce recommendations for overcoming the risks of SDG indicators. The following sections present our conceptual framework and methodological approach, followed by the results that focus on the key risks identified, as well as discussion and conclusions.

2 | INDICATOR RISKS: A PROPOSAL TO RETHINK INDICATOR USAGE

The concept of risk comprises multiple definitions that vary across fields and contexts. In scientific contexts, a risk may be understood as

uncertainty of outcomes, expected loss, chance of damage, probability and extent of undesirable events, and deviation from a reference level (Assmuth et al., 2009; Aven, 2013; Renn, 2008). All definitions of risk include, depending on the perspective, some potential event with a potential loss or undesirable outcome (Gray & Wiedemann, 1999). The nature of the loss or undesirable outcome differs between different risk definitions, ranging from the physically measurable to the socially perceived or constructed (Gray & Wiedemann, 1999). In this article, we mean by risk the possibility that an attempt to utilize (or not utilize) indicators in a meaningful way would lead to a situation in which the disadvantages of using (or not using) the indicators exceed their benefits. Here, the benefits and disadvantages could be related to the monetary costs or savings, or the value of the indicators for the decision-making, which can also be negative, for example, if the use of indicators would lead to nonoptimal solutions. It should be noted that an outcome of the decision being positive or negative may also depend on the valuations of the stakeholder in question (Aven, 2013).

Sustainability issues are often fickle (Hukkinen, 2003) and characterized by a degree of wickedness and complexity, leading to a number of risks related to sustainability indicators. Different risks can be involved with the production, dissemination and use of sustainable development indicators. Voluminous literature focuses on the risks related to the data processing and indicator selection, while less scholarly attention has been directed to the potential risks related to the actual use phase of the indicators (Moldan, Billharz, & Matravers, 1997; Bell & Morse, 2018).

Here, the distinction of *indicator, process/user and context factors* as well as risks related to *overuse, nonuse and misuse* of indicators is taken as a starting point (Figure 2. Lyytimäki, Tapio, Varho, & Söderman, 2013; Lehtonen, Sébastien, & Bauler, 2016). The assumed baseline is that the system is monitored with indicators providing necessary data to get a reasonable view about the performance of the system to make information-based decisions regarding the system. With this baseline:

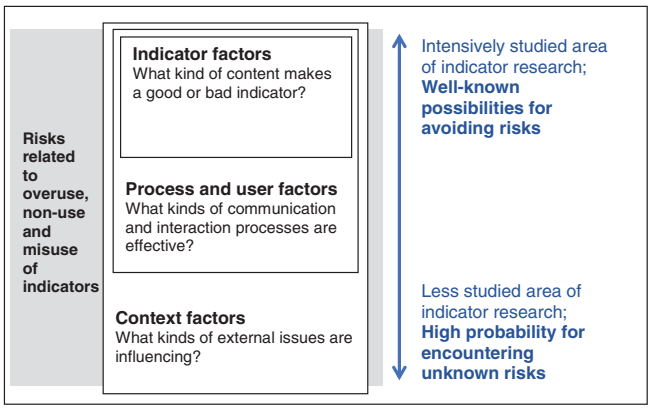

FIGURE 2 Key factors of indicator use and knowledge about the risks involved [Colour figure can be viewed at wileyonlinelibrary.com]

- Overuse of indicators denotes risks arising from the use of indicators whose value are negligible for decision-making, possibly with the result that other indicators (and other instruments) receive too little attention. In overuse situations, the marginal value of the obtained advantages remains low or can be even negative, if the role of the most significant indicators is then reduced.
- Nonuse of indicators means that the potential of the information provided by the indicators is not fully utilized. Nonuse refers here, first, to the lack of use within current reporting systems and, secondly, to the more political way of not using indicators effectively to establish policy measures. Nonuse may waste the resources used for indicator preparation and, more importantly, leads to a risk of noninformed and consequently nonoptimal decisions.
- Misuse of indicators means that the indicators are used to distort or create false impressions or the information they provide is interpreted erroneously. This may be due to an attempt to save in costs, but also due to careless or otherwise poor planning of the indicator use or relying too blindly on them in decision-making.

The overuse and nonuse of indicators is largely affected by processes of data selection, processing and communication, while the misuse is more related to the interpretation of indicators by users. Sustainability indicators are particularly vulnerable to incompatible interpretations, since sustainable development "has many different meanings and therefore provokes many different responses" (Hopwood, Mellor, & O'Brien, 2005). It should be noted that the dividing line between these three is not fixed but dynamic and dependent on the assumed societal influence of indicator reporting.

The risks can be about not reaching an intended impact or about generating unintended negative impacts, or they may involve indirect effects by complex chains of cascading impacts. Perhaps the most obvious risk is the nonuse of indicators (Gudmundsson & Frederiksen, 2013; Hildén & Rosenström, 2008; Lehtonen et al., 2016). However, severe consequences can arise from the misuse of indicators leading to actions that can drastically worsen the situation compared to doing nothing (Mustajoki & Marttunen, 2019).

Expectations of effective and societally influential sustainability indicators are to a large extent based on inspiration from certain individual indicators or indices (Bell & Morse, 2013). A widely shared agreement exists among the indicator professionals about indicator factors, that is, what makes a technically sound indicator that is suitable for use. These range from considerations of relevancy, salience and legitimacy (Cash et al., 2003) to generic SMART criteria denoting specific, measurable/manageable, accurate/accountable, relevant/realistic and timely/time-bound criteria (Maxwell et al., 2015) and to BellagioSTAMP principles specifically guiding sustainability reporting (Pintér, Hardi, Martinuzzi, & Halla, 2012). For example, the unemployment rate is an indicator that is easy to grasp, matters to people and is intensively used by policy-makers and the media. It has a clear conceptual and methodological basis, and statistical organizations provide frequent updates for interested users. However, the technical soundness of an indicator does not guarantee social or political saliency. Studies of indicator use suggest that those indicators fitting well to

the personal values, interests and priorities of the policy-maker are likely to be used (Rinne et al., 2013; Rosenström, 2009). As emphasized by Garnåsjordet, Aslaksen, Giampietro, Funtowicz, and Ericson (2012), it is crucial to consider how sustainability is perceived by the intended users of indicators for the selection of indicators and their usefulness for policy. It is also important to create opportunities for unanticipated users and uses while at the same time minimizing the risk of misuses.

There are desirable properties for the whole set of indicators, such as the completeness of the set (i.e., it should cover all the relevant indicators) and the compactness of the set (i.e., each indicator should have an additional value) (Keeney, 1992). Due to possible overlapping of the indicators, the most suitable individual indicators do not necessarily form the most efficient set of indicators (Marttunen, Haag, Belton, Mustajoki, & Lienert, 2019). Thus, finding and operationalizing coherent sets of indicators that meet all key—and partly conflicting—criteria is difficult, especially at the international level. Continuous accumulation of potentially usable data can help, but it does not necessarily make the indicator selection and data processing easier. New data sources such as big data from social media, results from participatory citizen science programs, satellite-based measurements or data produced by complex modelling highlight the importance of questions of data transparency, comparability and trustworthiness.

Both unintentional misunderstandings and purposefully distorting interpretations of indicators are possible. Here, it is assumed that the aim of indicators is not to misguide the user but to deliver the best possible science-based understanding. Purposeful misleading is extensively discussed elsewhere (e.g., Monmonier, 1991; Scheufele & Krause, 2019). What is considered misuse from a certain perspective can be considered intended use from another perspective (Lyytimäki et al., 2013). Defining and recognizing misuse is a value-based process depending on the evaluators' values and knowledge base.

Certain indicator properties or processes may allow or even invite misuse (Lehtonen et al., 2016). For example, if outdated indicators remain available, they may be incidentally or purposefully used instead of updated ones. Missing data can result in biased and incorrect interpretations of the actual trends, and simplistic or methodologically questionable indicators may be favored even after more nuanced or reliable ones become available. Even the technically perfectly sound indicator can be used for other purposes than intended by actors unable or unwilling to understand the limitations of the indicator, or the indicator can be used in a context highly different from what has originally been assumed. For example, an influential—and highly debated—indicator is gross domestic product (GDP). Critics of GDP have been keen to assert that it easily misleads policy actions if it is understood as a direct representation of human wellbeing or societal progress (Marks, 2010; Stiglitz, Sen, & Fitoussi, 2009). Statistical experts have repeatedly warned against such misuse since its inception (Kuznets, 1934; Lepenies, 2016). Numerous alternative indicators aimed to complement, replace or go beyond GDP have been proposed, but so far with relatively minor societal influence (Hayden & Wilson, 2018; Malay, 2019; Morse, 2016; Schepelmann, Goossens, & Mäkipää, 2010; Stiglitz et al., 2009).

Interactions between issues may remain neglected because of indicators following the existing administrative silos or disciplinary boundaries rather than building bridges across intertwined issues (Le Blanc, 2015). However, the question is not only about indicator factors but also about the user and context factors. The most suitable level of simplification is highly dependent on the knowledge of the user and the context of the use. Importantly, attempts to completely eradicate the risks of misuses are futile, since if indicators are used, they unavoidably can generate unanticipated consequences (Lehtonen, 2017). In some cases, even the misuse of an indicator can eventually result in positive societal influences through cascading chains of effects.

3 | MATERIALS AND METHODS

This study integrates materials from several sources and uses qualitative expert interpretation as a main method (Table 1). First, an overall picture of the current situation of indicator work was drawn by examining the UN (2019) and national online indicator portals. Second, the national-level activities were contextualized based on various policy documents and assessments. Publicly available documents, indicator

TABLE 1 Data sources

	Data sources
Online indicator portals	Indicator portal presenting the global SDG indicators and metadata (United Nations). Indicator portal presenting the national sustainable development indicators (Prime Minister's Office, Finland). Indicator portal presenting the national SDG indicators (Statistics Finland).
Documents	Finnish National Sustainable Development Strategy 2013 (updated 2016), Government statement (PMO, 2017), and other parliamentary documents (Hoffrén, 2018; PMO, 2011). National assessment reports of sustainable development policies (Patosaari, 2003; VTV, 2010; Ramboll, 2009; Berg et al., 2019; VTV, 2019).
Participatory observations	National Monitoring Network coordinated by the Prime Minister's Office, Finland (2017 onwards). National Coordination Group for SDG indicator development organized by Statistics Finland (2019 onwards).
Interview data	Group interview of four senior officials of the Prime Minister's Office, Finland (recorded and transcribed data). Ten interviews involving 34 representatives of various ministries conducted as part of the national sustainable development assessment, Finland (Berg et al. 2019) (summary notes from interviews). Interviews with three German indicator professionals (recorded and transcribed data).

databases and web portals are used to draw an overall picture of the development and current status of indicator sets. Third, the understanding of potential and actual risks related to the preparation and use of SDG indicators was deepened based on participatory observations and interview data. Interviews with indicator developers and potential users in Finland were conducted to generate in-depth understanding of the potential risks. A set of complementary interviews with the same questionnaire was conducted in Germany. Respondents were asked for their views about the risks associated with both the production processes and the communication processes of the indicators. Secondary material includes insights from participation in the preparation processes of the development of a national sustainable indicator set in Finland (see Lyytimäki, 2019), minutes and correspondence of the national expert network supporting the development of Finnish SDG indicators as well as selected interviews of indicator developers and users conducted under the national assessment of sustainable development policies (Berg et al., 2019).

The study is based on a qualitative analysis combining data-driven observations and expert interpretations and categorizations from interviews and documents, with insights from earlier studies of indicator use and risk literature more generally (e.g., Aven, 2013; Bell & Morse, 2013; Lehtonen et al., 2016; Lyytimäki et al., 2013). Relevant insights from national grey literature are also included. Qualitative interrogation is a suitable method for an explorative study combining heterogeneous data (Alasuutari, Bickman, & Brannen, 2008). An abductive approach where data analysis and theoretical reasoning are not isolated steps but iterative and intertwined parts of a research process were followed.

Qualitative analysis based on different data sources focusing on selected countries allows identification of key risks related to wide-reaching sustainability concerns involving many types of uses of indicators. Key challenges of this approach include practical manageability of the data and comparability of the results. In order to improve the comparability and ensure wider applicability of the results, the United Nations' Agenda 2030 and globally agreed SDG indicators are taken as a general frame of interpretation.

The risks were analyzed by focusing on the perspective of indicator professionals. Indicator professionals are usually those institutions (composed typically of civil servants) who are mandated, on the national level, to construct, adapt or manage sustainable development indicators in a given framework. The typology below aims to capture what indicator professionals would conceive of as central risks. This approach differs from critical analysis by discussing risks related to the roles of indicator professionals in defining the substance of the indicators (e.g., Fukuda-Parr & McNeill, 2019).

4 | UNDERSTANDING RISKS IN THE CONTEXT OF SDG INDICATORS

4.1 | The overall conception of risk

The overall observation from materials is that risks are only sporadically addressed in the context of sustainability indicators. The indicator portals and documents mention risks only rarely, apart from some indicators describing specific risk (e.g., the indicator "Number of people living in areas with a significant risk of flooding" in the Finnish national indicator set). However, the interviews revealed a high variety of different conceptions of risk. Risk was seen by the indicator professionals as a heuristic to think about indicators more widely. In Finland, risks were most often considered from the perspective of the production of indicators, while in Germany the risks related to the (lack of) use or influence of indicators received more attention.

When asked about the risks, even the interviewees representing experienced civil servants familiar with sustainability issues had to seriously ponder the meaning of risk. As commented by a participant of the group interview in Finland: "Risks are a bit odd entry point to SDG-world. It´s hard to comprehend different perceptions about what kind of things risks may entail." It was noted that risks may be understood differently due to different disciplinary and professional backgrounds. However, some commonalities could be identified. The interviewees generally emphasized risks as surprising outcomes related to the issues described by the indicators:

- Risk as something that was not anticipated.
- Risk as an incapability to recognize the underlying causes or impacts of a certain action.
- Risk as an over-confidence and inability to recognize the limits of the influence of actions.
- Risk as a process that cannot be influenced with the tools that are currently in use, for example, government actions not really influencing societal development.

Experts with a similar background had differing conceptions of what types of risks may be the most relevant ones, but they generally shared an understanding of the wide and comprehensive nature and long timeframes of sustainable development as a key issue. The key risk is that relevant long-term issues (such as declining biodiversity) may not be salient enough among a myriad of other issues. Another risk is that the lack of a coherent overall picture and knowledge about interactions between different issues may leave synergies or trade-offs without proper attention.

The sector-based or "siloed" use of indicators has been recognized as a general-level risk potentially leading to nonoptimal societal impacts (Berg et al., 2019). Currently, there is also a risk of confusion in Finland because of silos created by two parallel national-level indicator processes aimed at describing sustainable development (Berg et al., 2019; VTV, 2019). In contrast, in Germany the position of the national sustainability indicators is strong, which entails the risk of neglecting the internationally defined SDG indicators and targets.

Other general-level risks mentioned in the interviews included the danger of focusing on convenient indicators showing positive development, difficulties in agreeing on suitable indicators and development of sustainability indicators without seeking synergies with other knowledge tools. Critical discussion about risks may also undermine the foundations of indicator work. As noted by one respondent in Finland, there is a danger of "rocking the boat, a risk that critical

debate will question the sustainable development work more generally."

4.2 | Risks related to the overuse of indicators

4.2.1 | Indicator factors

Different types of indicator factors contributing to risks related to the overuse of indicators emerged from the materials. Many of these risks relate closely to the risks of misuse. Indicators may present overly simplistic descriptions of complex chains of causes and effects or omit relevant background information that would be needed to make correct interpretations. In this case, excessive use of the indicators could lead to reduced benefits. In addition to factors intrinsic to individual indicators, the lack of the recognition of key synergetic or antagonistic cause-effects and the limited ability of many indicator systems to describe systemic interactions was identified as key limitations of sustainability indicators (Berg et al., 2019). For example, interviewees brought up the risk of relying on indicators describing economic growth that leaves the potential increase of economic inequalities or harmful environmental effects of economic growth unaddressed.

The results on indicator factors also point out risks related to the universal or internationally harmonized conceptual framework. In particular, the lack of sensitiveness towards the local context was highlighted. A trade-off between preciseness of indicator definitions and applicability across different contexts was noted. If international targets and indicators are clear and precise, they risk losing relevancy when applied in certain local policy contexts with distinct characteristics. If the definitions allow considerable local adaptation and variation, they face a risk of remaining too vague and potentially misleading for international comparisons. Even though the SDG framework aims to create commonly shared understanding, it can be interpreted in different ways, potentially leading to confusion and disagreements.

4.2.2 | Process and user factors

Earlier studies from Finland have noted that the use of sustainability indicators has largely remained confined with those actors and stakeholders that are involved with the production of indicators or that are obliged to use indicators in their reporting (Rinne et al., 2013; Rosenström, 2009). In line with these studies, our results suggested the risk of overuse of indicators inside the sphere of core actors and a lack of policy influence outside the core sustainability policies. Indicators were considered to be informational knowledge tools that were reliant on the willingness of the users to take them into account. As noted by one interviewee, the risk of failing to meet the considerable expectations is high because "there is no stick, just a rope that can be used for pushing." The respondents also pointed to the risk of using the SDG indicators as the only tool for assessing sustainable development and drawing conclusions for effective policies. In contrast, it is necessary to integrate the entire reporting system into the development of effective measures to achieve the SDGs. Another risk that was occasionally mentioned is bolstering. Indicators may allow for taking credit for the positive development that would happen without the activities of certain actors.

The good fit between indicator processes and personal-level motivations of potential users of indicators are vital for the success of indicators. In practice, users of sustainability indicators are often interested about specific topics, as pointed out by our material and earlier studies (Rosenström, 2009). This runs largely against the basic idea of sustainability indicator sets as tools that aim to deliver a comprehensive overview. Therefore, there is a risk of the overuse of indicators leading to ignoring the overall picture, especially if indicator design and communication processes identifying and highlighting the overall picture and interactions is lacking. As a result, decisions guided by the indicators may fail to acknowledge the underlying diversity of issues, complexity and potential cascading effects.

4.2.3 | Context factors

The overuse of indicators is partly governed by factors outside the practices of sustainability indicator work. Indicator overuse is strongly influenced by personal preferences and routines, organizational arrangements and institutionalized practices of information retrieval and knowledge use. For example, indicators that are commonly used and easily available from elsewhere, such as GDP or the employment rate, face the risk of providing little value as a part of the sustainable development indicators.

4.3 | Risks related to the nonuse of indicators

4.3.1 | Indicator factors

Nonuse can simply be the result of insufficient data when describing a certain issue. However, even in such cases indicators can be built based on proxy data or by utilizing qualitative descriptions instead of quantitative time series (PMO, 2017). For example, only a qualitative textual description of environmentally harmful subsidies was included in the updated version of the Finnish national indicator set because of difficulties in agreeing what can be counted as environmentally harmful, despite the definitions and examples presented in the state budget proposals submitted to Parliament. In Germany, difficulties in agreeing on any soil indicator lead to the absence of the issue from the indicator set. Such information deficits create a risk that certain topics are also left out from societal debate. Emerging knowledge needs due to rapid or unexpected changes in the physical or social environment also challenge the ability of indicator systems to cover all relevant issues.

The conceptual frameworks of indicator sets may also include omissions even when aiming to deliver a full picture of the key sustainability concerns. In such cases even the readily available, reliable

and timely data may remain unused. Including such data by growing the number of indicators is a potential solution, but it also entails the risk of drowning under information overflow (Berg et al., 2019). In particular, the framework of 17 SDGs and 169 targets were criticized as a too complicated basis for indicators. A high number of different goals, targets and indicators may lead to confusion rather than holistic and systemic understanding. As claimed by one interviewee in Finland, "a set including more than one hundred indicators should not be called an indicator set. It's rather a collection of statistics."

4.3.2 | Process and user factors

Insufficient attention to communication and interaction processes can contribute to a lack of use of indicators. This risk is especially high if communication is considered as a separate and isolated phase of one-way dissemination starting after the indicator set is finalized. Resources reserved for the communication, interaction and follow-up processes being marginal in comparison to resources reserved for the preparation of indicators is a concrete risk. Several communication and interaction deficits were pointed out, including:

- Lack of communication and outreach activities.
- Risk of focusing too much on facts and lack of strong and appealing core messages, for example, visualizations.
- Nonrecognition of the importance of images, framings and storytelling in public debate.
- Lack of a participatory approach and too much trust in the traditional one-way science communication model.

The discussants of the group interview in Finland speculated that these deficits can, in some cases, result from indicator processes motivated mainly by routine reporting obligations rather than considerations that someone genuinely may need and use the information. A key insight from Germany was that individual people and their personal experiences are of the utmost importance for the success of the communication.

The lack of interfaces between indicator systems in the national level and other levels was identified as one issue limiting the use of indicators in the interviews and documents (e.g., Hoffrén, 2018; Berg et al., 2019). For example, indicators focusing on the development of a single country are of little use in cross-national comparisons or decision-making focusing on the local level or a certain economic sector. Low resonance with some key audiences was also noted in the interviews. For example, it was pointed out that even though the SDG framework may serve the strategic planning and communication of a large business, it is unsuitable for communication with individual consumers.

Lack of interaction and interfaces between different types of knowledge tools is another explanation for the nonuse. A weak signal from the documents and interviews was the apparent inability to build on and utilize the work done elsewhere (Berg et al., 2019). For example, national-level sustainable development indicator work could more effectively support evaluation and anticipation practices. Currently, the sustainability indicators play no major role as a basis of national-level scenario exercises.

4.3.3 | Context factors

The gatekeeper role of the media was recognized as the key external factor influencing the nonuse of indicators. The Finnish results highlighted that temporally distant sustainability targets are easily overlooked in the societal debate focusing on immediate policy or business concerns (VTV, 2019). In addition to media attention, deeply rooted personal-level routines govern whether a certain indicator is excluded. In particular, the interviewees noticed the lack of policy attention given to well-being indicators that provide alternatives for the already institutionalized measures such as GDP, which was also pointed out by Hoffrén (2018). The inability or reluctance to adopt new information sources is particularly problematic if the external context changes rapidly.

4.4 | Risks related to the misuse of indicators

4.4.1 | Indicator factors

Risks resulting from data shortages and inadequate indicator contents were widely acknowledged by both interviews and documents (PMO, 2017; Hoffrén, 2018; Berg et al., 2019; VTV, 2019). Indicators may fail to address all relevant issues; data describing certain issues may be completely lacking, unreliable or insufficient in adequately describing a certain physical area, functional unit or temporal development. Also, as noted by interviewees and national assessments (Berg et al., 2019; VTV, 2019), indicators often lack clear formulations of target levels, which makes them susceptible to interpretations serving certain political, ideological or economic interests. For example, SDG targets include several cases where target levels are missing and only the direction of development can be evaluated. Visualizations with target levels can provide an effective tool for communication but, as pointed out in German interviews, visualizations can also create possibilities for manipulation.

Since indicator sets are constructions of individual indicators, they carry a risk of "cherry-picking" that was recognized especially in relation to the tendency of actors to focus on indicators describing success stories (Berg et al., 2019). The possibilities for selective use of indicators increase as the number of available indicators increases. A selective use of indicators not only focuses attention on convenient SDGs but also increases the risk of neglecting "taboo" subjects such as women's rights in countries with legislation not providing equal rights. As bluntly stated by one interviewee in Finland, "there is a risk of lip service" and no easy escape from self-praise. A key risk is the resulting lack of ambition due to highlighting what has been already done instead of suggesting and taking new steps.

TABLE 2 Summary of recommendations for risk mitigation strategies related to sustainable development indicators

Usage type	Risk factors	Examples of risk mitigation strategies
Indicator is overused	Indicator factors	Consider the whole set of indicators as an entity instead of trying to select the best individual indicators. Focusing specifically on the interactions between the indicators will help reduce the risk of overusing some indicators without generating a value (and neglecting others).
	Process/use factors	Carefully communicate and visualize (the systematic nature of) indicators to make them attractive and meaningful for different stakeholders. Create indicator systems that support both bottom-up and top-down knowledge sharing between local, national and global levels.
	Context factors	Provide clearly defined, up-to-date indicators and descriptions of their features to support their usage for different purposes under different contexts. Make the decisions behind visualization/presentation and reporting transparent to enable societal debate about them.
Indicator is nonused	Indicator factors	Consider how to cover the relevant themes with fewer indicators to provide more focus, reduce confusion and increase their usability. If quantitative data series are missing, qualitative descriptions can be provided.
	Process/use factors	Prioritization of indicators together with stakeholders in order to create concrete connections between a high-flying SDG framework and down-to-earth interests of citizens and other actors. Encourage broad discussions and systematic assessment on gaps that are not covered by the indicator sets. Adequate resources need to be secured for the communication, interaction and follow-up processes.
	Context factors	Seek new policy-relevant themes and operationalize indicators to describe them to keep the policy interest alive.
Indicator is misused	Indicator factors	Provide indicators that offer a systemic view on the theme to avoid cherry-picking. Define target levels for all indicators to unify their interpretations. Transparency of communication and interaction processes and a critical review and public debate on the use of sustainability indicators can reduce the risk of misuse.
	Process/use factors	Define clearly the desired societal influence of indicator reporting in order to help identify potential misuse. Increase the transparency and public accountability of indicator production and communication processes to reduce the risk of misuse. Involve the different stakeholder groups in the indicator process and use early on in order to avoid the indicators being interpreted in a targeted way that only serves certain interests.
	Context factors	Sustainability issues are typically characterized by long timeframes. Thus, in order to reduce the risk that these temporally distant sustainability targets are easily overlooked, intermediate objectives should be set.

4.4.2 | Process and user factors

It is possible that the misuse of sustainability indicators remains underreported as the actors that misuse indicators are obviously motivated to hide the misuse from critical scrutiny and public debate. The transparency of communication and interaction processes influence the risk of misuse such as selective use, not disclosing all relevant knowledge or misleadingly framing certain indicators as important (Berg et al., 2019).

Several risks related to the user factors were brought up by the interviews. The most prominent risk was distorting use, that is, purposefully interpreting the indicators in a way that serves certain interests. In addition to directing debate towards safe topics, indicators can serve whitewashing or greenwashing, that is, purposefully misleading about issues such as human rights or environmental effects. A lack of transparency and public accountability of indicator production and communication processes increases the risk of misuse.

4.4.3 | Context factors

Certain characteristics of external contexts may increase the risk of misuse of indicators. Isolated use of indicators persists despite the calls for integrative and inclusive use to capture the interactions of

sustainability targets. According to the Finnish and German respondents, risks arise from the enduring sectoral thinking within the ministries. Therefore, sets of indicators that essentially describe systemic interactions are often misused to describe development from the perspective of a certain sector.

5 | RECOMMENDATIONS FOR RISK MITIGATION

Based on the risk conceptions outlined above, the following recommendations for risk mitigation can be outlined for sustainability indicator professionals (Table 2). Perhaps most importantly, risks related to overuse, nonuse and misuse can be managed by open and interactive communication processes that are responsive to the needs of the potential users of the indicators and sensitive to the context of use.

As noted by Morse (2016), there is a need "to move beyond thinking about technical issues of indices and indeed indicators and to consider 'success' in terms of whether these tools are used and have an influence." The producer of the indicator can decide what information will be openly available, but the user has the ultimate choice of what information will be omitted or used and how it will be used. Therefore, even the most careful attempts to generate a balanced and comprehensive overall picture by focusing on the indicator factors can lead to nonuse or misuse. One possibility to overcome this limitation is to communicate about the whole set of indicators as an entity and emphasize the interactions between the indicators instead of highlighting messages from individual indicators.

Earlier research suggests that the greatest societal impact of sustainability indicators in many cases is generated through the stakeholder participation (Rinne et al., 2013; Rosenström, 2009). Such stakeholder involvement may raise questions of potential biases in indicator selection and preparation. However, the expert-based indicator selection process always carries an element of subjectivity. Value-based decisions of indicator selection and interpretation cannot be completely eradicated, but they can be addressed by a transparent and participatory indicator process involving multiple areas of expertise and democratizing the knowledge production (Bell & Morse, 2013; Ott & Kiteme, 2016). Instead of directly advising decisions, indicators should be used as "door openers" into the world of evidence-informed reporting, as stated in German interviews.

Misuse resulting from information deficits can at least partially be addressed by clearly and openly communicating about the data gaps and other identified problems with the indicators. This may entail a risk of losing credibility. However, this risk is even greater if suspicions about the honesty of the indicator process arise along with accusations of purposeful nondisclosures. Open communication is important, especially since the users of indicators often do not have a profound understanding of the technicalities and choices related to indicator data processing.

A key general-level risk is that the attempts to avoid misuse may lead to nonuse. Indicator processes emphasizing indicator factors may generate reliable and accurate indicators that nevertheless lack the properties that make them appealing in the eyes of the potential user. For example, producing a reliable indicator typically takes a lot of time. Therefore, the indicator may be outdated, unfit for the topical debates and current information needs, and unable to raise major public attention or policy interest.

Ideally, indicators should be able to effectively simplify the complexity of sustainable development and pinpoint the most crucial issues and risks for the implementation of sustainability policies (PMO, 2017). In practice, this is a daunting task. The limits of indicators in describing inherently complex and value-based sustainability issues should be acknowledged and acted upon. Neglecting other types of information is one type of risk evident in the attempts to measure the unmeasurable, that is, the obsession of aiming at quantitative indicators even when other forms of knowledge might be readily available and more useful for decision-making.

6 | CONCLUSION

Our results suggest that the greatest risk of sustainability indicators is nonuse. In other words, sustainability indicators are more like a flashlight occasionally serving a single person than a lighthouse guiding all seafarers. The nonuse results largely from an inadequate focus on communication and interaction. While the sustainability indicator community is preoccupied with the production of indicators and concerned with quality criteria focusing on the properties of the indicator themselves, the user, process and context factors remain secondary concerns.

The understanding of risks related to sustainable development indicators is still underdeveloped, and there is a need for a more systematic treatment of risks. An instrumental and direct use of indicators as a basis for decisions is often assumed to be the dominant and preferable use of indicators, even though other, more indirect forms of use of indicators exist. Indicator processes aiding societal learning and serving as platforms of institutional memory may be highly relevant. Neglecting the wide variety of uses is a risk regarding the implementation of comprehensive sustainability frameworks such as Agenda 2030 and SDGs.

Finally, stressing the importance of comprehensive, reliable and user-friendly indicators does not imply that indicators should alone dominate the monitoring, reporting and evaluation of sustainable development. Because of the complexity of sustainability trends and policy processes, a diverse set of information sources and various means of communication and interaction are needed.

Not all lighthouses are built perfectly, nor are all light beams always set to rotate towards the most important direction by the lighthouse personnel. Institutions that are responsible for producing and using indicators are similarly imperfect, as are their indicator professionals. However, the SDGs should be understood as the most sophisticated and commonly agreed lighthouse system heretofore. For those on the shore, unsure about whether to embark on a journey towards sustainability, the beams are clearer than ever before.

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