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SDG-EVALUATION OF PRODUCTS — SEP

SUSTAINABILITY EVALUATION OF PRODUCTS AND SERVICES BASED ON THE SUSTAINABLE DEVELOPMENT GOALS

INDEX

SDG-EVALUATION OF PRODUCTS
— *THE APPROACH*

To date, there are hardly any methods for the integrated analysis and evaluation of the sustainability of products and services based on globally uniform and accepted goals. However, this is now often required. A major reason for this is that until recently there was no globally uniform and accepted system of objectives. With the United Nations' Agenda 2030, adopted in September 2015, and the 17 Sustainable Development Goals - SDGs this is now available.

Figure 1:
The 17 Sustainable Development Goals of the United Nations Agenda 2030 (UN 2017)

Against this background, the method presented here was developed to identify sustainability impacts (sustainability analysis) and to evaluate their contribution to a sustainable development (sustainability assessment). Since an assessment is always normative, it requires an evaluation scale. In order to achieve acceptance for an evaluation result - and thus also for the underlying evaluation method - it is necessary to use an evaluation scale that is as widely accepted as possible and to disclose this scale.

SDG Evaluation of Products (*SEP*) uses the United Nations' Agenda 2030 with its 17 Sustainable Development Goals and 169 sub-goals, which was adopted in September 2015 (UN 2015) as a reference. Since the Agenda 2030 was signed by 193 states, it is accepted worldwide and the member states of the UN are called upon to implement it in their national strategies. But not only states have to make their contribution. In 2015, Ban Ki Moon, the then Secretary-General of the United Nations, explicitly called on companies to contribute to achieving the 17 Sustainable Development Goals (GRI et al. w/o year, p.4). With SEP, a method is now being presented for the first time with which the contribution to the achievement of the Sustainable Development Goals can be explicitly measured at product level.

Previous methods for the analysis and evaluation of products such as the environmental Life Cycle Assessment (eLCA) or the social Life Cycle Assessment (sLCA) focus on selected sustainability aspects. The eLCA focuses on the assessment of environmental and health impacts, the sLCA on the assessment of the social impacts of systems. Both approaches do not include an evaluation of the potential impacts. They end with an impact assessment, for example the possible contribution to the greenhouse effect, or at the level of the life cycle inventory, for example the wages paid. An assessment of whether this contributes to more or less environmental or social performance or to more or less sustainability is not part of the study.

This is where *SEP* comes in: Building on the analysis of the system with regard to sustainability impacts, the contribution to the achievement of the Sustainable Development Goals of Agenda 2030 is evaluated. The indicators used for the evaluation are based on the SDGs, which have a clear product reference.

SEP has been designed to be compatible with the approach specified in ISO 14040/44 for product life cycle assessments. *SEP* complements this with the sustainability evaluation and is based on predefined indicators.

SDG-EVALUATION OF PRODUCTS —*THE OVERVIEW*

SDG-Evaluation of Products (*SEP*) is a method for the sustainability evaluation of products and services based on the approach of life cycle assessment. *SEP* consists of three building blocks and optional aggregation:

THE SYSTEM ANALYSIS

This is the basis for carrying out a sustainability assessment, as the system under consideration is analysed here. At *SEP*, this is carried out analogously to the procedure described in ISO 14040/44 (chp. system analysis - the basis).

THE SUSTAINABILITY INDICATORS

These are *SEP*'s measurements and are pre-defined. This ensures that contributions to the SDGs of Agenda 2030 are measured and that this is done in a uniform manner. In *SEP*, 45 indicators have been defined, 22 of which are core indicators that must be used in a product sustainability evaluation (chp. sustainability indicators - the measurement parameters).

THE SUSTAINABILITY EVALUATION

This is the core of the method and aims to measure the contribution of the product or service to the respective SDGs using the defined indicators. At the level of the individual indicators, the result shows in which of the addressed sustainability issues the product is already good and in which there is still need for improvement (chp. sustainability evaluation - the core).

Optionally, the results can be aggregated following the evaluation (chp. aggregation approaches - the simplification). This introduction is followed by a description of the individual components, examples of use, and tips for application.

Figure 2:
Approach of the SDG-Evaluation of Products (*SEP*)

SYSTEMANALYSIS
— *THE BASIS*

An analysis of the system under consideration is the basis for the sustainability evaluation of products and services. This is carried out at *SEP* in the same way as described in ISO 14040/44, which means that *SEP* is fully compatible with existing methods for product analysis (Figure 2).

First of all, the **goal and the scope** of the investigation are defined. This includes the definition of the investigation goal as well as the determination of the functional unit, the description of the system boundaries and the definition of the rules for data quality. The indicators, impact categories and impact assessment methods (chp. sustainability indicators - the measurement parameters) are already predefined for *SEP*. As in the LCA, all material flows, social and economic aspects analyzed in the product sustainability analysis refer to the defined functional unit.
The next two steps are then the preparation of the **life cycle inventory** and the **impact assessment**. ISO 14040/44 would now be followed by the **interpretation**.

In the case of *SEP*, however, the next step after the Life Cycle Inventory and the impact assessment is first the **evaluation** (chp. sustainability evaluation - the core) and, if necessary, the **aggregation** (chp. aggregation approaches – the simplification). Product analysis and evaluation in the narrower sense can be supplemented by a benefit analysis (chp. analysis of added benefit - the addition). This analyses the additional societal benefit that goes beyond the core benefit of the system under consideration as defined in the functional unit.
As in ISO 14040/44, each step of *SEP* must be documented so that the procedure is comprehensible. This is of particular importance if an aggregation of the evaluation results is planned. And of course - if the sustainability evaluation is intended for publication and is to be used for marketing purposes - a critical review by independent third parties should be carried out, as required by ISO 14040/44.

SUSTAINABILITY INDICATORS —*THE MEASUREMENT PARAMETERS*

In *SEP* the indicators are predefined. This ensures that contributions to the Sustainable Development Goals of Agenda 2030 are measured and that this is done uniformly and according to the same methodology.

Since the 17 SDGs were not primarily formulated for companies and for assessing the sustainability of products and services, first of all the SDGs to which products and services can actually contribute were identified. Based on the results of the analysis, the sustainability indicators were then defined. This was done at the level of the 169 sub-goals, which concretize the 17 Sustainable Development Goals.
The following questions were asked:

Does the product or service along its life cycle have a direct impact on the achievement of the sub-goal?

This question covers the material-flow-related effects along the life cycle of the product or service, for example through emissions or the use of resources. The resulting indicators are called Case 1 (C1) indicators.

Do the companies along the life cycle that produce or offer the product or service have a direct influence on the achievement of the sub-goal through their activities?

This question addresses the effects triggered by the activities of the companies involved in the production of the product or the provision of the service along the life cycle. This can be, for example, through measures to prevent corruption in product-related sustainability risk management or through the wages paid. The resulting indicators are referred to as Case 2 (C2) indicators.

On the basis of these questions, a reference to products and services could be identified for 59 of the 169 sub-goals (Annex, Table 1).

For the sub-goals identified in this way, indicators were defined to measure the contribution to the respective sub-goal.

The United Nations General Indicator Framework (GIF) on Agenda 2030 has already developed indicators to measure the SDGs. These are the primary source of *SEP*'s indicators. In cases where the indicators could not be applied, they were amended or supplemented by further indicators. The supplemented indicators usually originate from other accepted indicator frameworks, such as those proposed in the European process to establish a Product Environmental Footprint (EU 2012) or proposed by the Global Reporting Initiative (GRI 2016). This approach was chosen to ensure that *SEP* has the greatest possible compatibility with other initiatives, such as the European Product Environmental Footprint process (EU 2012).

In this way, 45 indicators were defined, 25 of which directly measure the contribution of the product or service (C1) and 20 of which measure the contribution of the companies involved along the life cycle (C2). Sometimes the same indicator can measure the contribution to several objectives, sometimes several indicators are needed to determine the contribution to a sub-goals (Annex, Table 2 & Table 3).
The best insight into the sustainability impact of a product or service is, of course, gained when all 45 indicators are included in the analysis. However, in order to simplify the analysis and to ensure that the minimum information required for this purpose is still available, the 45 indicators have been divided into mandatory core indicators and supplementary, comprehensive indicators.
Two "filters" were applied to determine the core indicators:

- The planetary boundaries (Steffen et al. 2015) were used to select the most relevant ecological indicators. They are a widely accepted scientific concept that has explored the limits of our planet from an ecological perspective.

- The Declaration of Universal Human Rights of the United Nations (UN 1949) was signed by almost all states worldwide and is socially accepted worldwide. It forms the basis for selecting the most relevant socio-economic indicators.

With the help of the two "filters" 21 indicators could be identified, which are set as mandatory core indicators (Annex, Table 2 & Table 3). For individual sectors, indicators going beyond these were defined as mandatory. These can be found in the document "Indicator Profiles" with detailed explanations of the indicators (www.sdg-evaluation.com).

SUSTAINABILITY EVALUATION — *THE CORE*

The sustainability evaluation is the core of the method. Its aim is to measure the contribution to the respective SDGs on the basis of the defined indicators. At the level of the individual indicators, the result shows in which of the addressed sustainability issues the product is already good and where there is still need for improvement.

However, the two types of indicators (C1 & C2) require a different evaluation approach, in particular due to their dependence or independence from the material flow of the product or service under analysis. The C2 indicators focus on the impacts caused by the activities of the companies providing them. Their characteristics are independent of the so-called functional unit chosen in the analysis, such as quantity, litres of product or working hours. However, the indicators can easily be related to the functional unit, for example, by the number of working hours required to produce the product or service. This does not affect the value of the indicator. For example, the level of employees' wages considered in indicator #C2.1 is independent of the number of units of the product included in the analysis. However, this is different for the C1 indicators, where in principle the expression of the indicator value depends on the material flow, i.e. the chosen functional unit. For example, indicator #C1.20 requires more energy if a higher number of units of the product is considered, or indicator #C1.11 emits more greenhouse gases if the functional unit is chosen larger.

This conceptual difference in the indicators also requires different evaluation approaches. While it is relatively easy to define clear target values for most of the C2 indicators on the basis of the SDGs, or in the best case they are directly defined by the SDG, this is much more difficult for the C1 indicators. In order to define C1 target values at product level, the question would have to be answered as to how much water, energy etc. the respective product is allowed to consume.

EVALUATION OF THE C1 INDICATORS

In order to evaluate the C1 indicators in terms of their contribution to the SDGs, it is essentially necessary to answer a fundamental question of distribution:

How much ecological or health resources may the respective product or service claim in order to contribute to the achievement of the SDGs?

This can be explained using the example of greenhouse gas emissions. The goal - even if the SDGs only refer to Kyoto and the follow-up process here - is: no more anthropogenic greenhouse gas emissions by 2050. This means that a product or service that does not emit greenhouse gases contributes fully to achieving the goal. But how are the greenhouse gas emissions of five kilograms of CO_2 equivalents for a product X assessed, given an exemplary functional unit of 100 pieces of ready-to-sell packaged product?

Since this question cannot be answered in *SEP*, the following procedure is used in *SEP*:

In a first step, the indicator results are standardised to average population values for the geographical region concerned. This makes it possible to assess the different importance of the various C1 indicator results. This makes it possible, for example, to answer the question of whether the effects with regard to the greenhouse effect are more serious than those with regard to biodiversity.
Furthermore, the lower the normalized indicator result of the C1 indicators, the lower the negative impact in terms of the SDGs. In order to develop an evaluation method here, further research is necessary.

EVALUATION OF THE C2 INDICATORS

The evaluation of the potential contribution of the individual C2 indicators to the SDGs is based on evaluation functions that show a relationship between the level of the indicator and the contribution to the SDG (Kühnen et al. 2019).
A scale from "-1" to "+1" was chosen to assess the potential contribution of the C2 indicators to achieving the SDGs:

- "+1" means that the product contributes fully to achieving the sub-goal
- "-1" means that the product has a negative impact on achieving the sub-goal.

For example, the indicator #C2.1 "Employees earning below the UN poverty line" measures how many employees along the value chain earn below the extreme poverty line set by the UN of currently $1.90 per day. Accordingly, a full contribution to the SDG rated 1 means that all employees along the entire value chain earn above the poverty line. The percentage of people earning below the UN poverty line on average in the specific country was set as y=0. This means that for this indicator it is necessary to research the respective country-specific value for "0".
For some indicators only a positive contribution is possible (0 to +1). For example, indicator #C2.20 "Availability of product-related sustainability information" assumes that the absence of sustainability information does not necessarily have negative effects. Nonetheless, any additional information, e.g. on the origin of the product or the sustainable use of the product, means a positive contribution to the achievement of the SDG.
Since the SDGs do not always specify a quantitative or quantifiable target, but this is necessary in the evaluation, a systematic approach has been developed for this purpose that defines how a quantitative target can be determined if the SDG itself only specifies a qualitative target. First priority was always given to the SDG itself: If the target value to be achieved is clearly defined here, then this was taken as a basis.

This is the case, for example, with SDG 1.1, which states that no one in the world should earn below the UN's extreme poverty line.
In the second priority the guiding statute of the SDGs "Leave no one behind" was used: This states that all countries, peoples, individuals, etc. must be included in sustainable development and that no one must be left behind (UN 2018). For the target value, this meant, for example, in indicator #C2.2 that all employees along the value chain should benefit from social security and none should be excluded, for example in the upstream supply chain. The basis for considering this statute was the Sustainable Development Report (2019) of the Sustainable Development Solutions Network and the Bertelsmann Stiftung, which proposes a comparable approach (SDSN & Bertelsmann Stiftung 2019).

In the third priority, the average of the three best companies in the respective sector or the three best OECD countries was then selected to define the target value.
The fourth priority was to use expert knowledge to set objectives.
As a last resort, if the definition of a target value was not possible in the way described, the topic in question was included in indicator #C2.3 "Sustainability risk management". Here it is asked how the company takes up the topic in management, whether goals, measures and responsibilities have been defined. This approach was borrowed from the "Management Approach" of the Global Reporting Initiative (GRI 2016).

As an example, the approach is described below for two indicators:

INDICATOR #C2.2

► *Coverage of social security systems*

The basis for this indicator is SDG 1.3 „Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable".
This SDG stipulates that "substantial" coverage should be achieved among the poor and those in need of protection. The SDG follows the principle "Leave no one behind". Applied to companies and the indicator, this means that the goal is that all employees along the product life cycle can benefit from social security systems (y = 1). A company is rated as neutral, i.e. no positive, but also no negative contribution to the SDG (y = 0), if the coverage of the company's employees reaches the average coverage of employees with social insurance in the country concerned. A negative contribution is made if the coverage in the company is below the national average. The evaluation was based on a straight line, as each employee more who benefits from social security is positive.
The International Labour Organisation (ILO) has been used to define a social security system, which includes the following types of social security: Child and family benefits (e.g. child allowance), sickness insurance, maternity protection, unemployment benefits, benefits for accidents at work, sickness, disability, and benefits for retirement and survivors.
In order to measure the contribution to the SDG, it must be ascertained how many employees participate in the various types of social insurance.

INDICATOR #C2.9

► *"Equal share of training for women and men"*

The basis for this indicator is SDG 4.5 „By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations".
The target value of the indicator, based on the SDG, is the equal treatment of female and male employees in further education and training in the company.
This indicator therefore defines the negative contribution (y = -1) in the case of absolute inequality, i.e. either only women or only men receive further training. The maximum contribution to the SDG (y = 1) is reached when both genders are equally enabled to participate in further training measures. However, since it is difficult to establish absolute equality, smaller inequalities are allowed, for example, when the share of women accounts for 52% of the hours of training and that of men for only 48% or vice versa. The evaluation was therefore based on a square function. This clearly penalises discrimination in both directions, but allows for smaller inequalities.
In order to measure the contribution to the SDG, it is necessary to record the share of the average hours of further education and training of women and men in the total hours of further education and training.

SEP
— *THE APPLICATION*

In order to make an evaluation, it is necessary to become familiar with all indicators or at least all core indicators. The "Indicator Profiles" (www.sdg-evaluation.com), which describe all indicators and the data required for the evaluation, can be used for this purpose. It is necessary to analyse at least all indicators marked as core indicators in order to carry out the evaluation.

Ideally, the evaluation is carried out for all involved actors along the product life cycle. However, as this is usually difficult to realise in practice, it should at least be carried out for those actors who account for a major share of the working hours for production (including raw materials), distribution, marketing and disposal of the product. Average values for actors in the upstream or downstream value chain can also be used here: for example, in the context of a sustainability analysis and assessment for a piece of butter it will hardly be possible to collect data individually for all farmers who produce the milk for butter production on their farms. However, average data may be available for milk production in the country concerned.

The valuations based on the individual companies involved are then combined according to their share of the hours worked to produce the product under investigation.

The result is an evaluation of the individual indicators differentiated according to the actors involved. This can be used very effectively to identify concrete levers for improving sustainability impacts, i.e. for reducing negative impacts and increasing positive impacts.

The SDGs are intended to bring about change over time, e.g. greater efficiency, less waste or a doubling of productivity. However, product or service analyses and evaluations such as *SEP* always consider a point in time (e.g. a year, a day, a season, a growing season). Therefore, to measure a change over time with *SEP*, two evaluations at different points in time must be compared.

To facilitate the evaluation, a software was developed (chp. ProFitS - the software), which is freely available.

EXAMPLE:
EVALUATION OF AN INDICATOR

A company grows vegetables. The assessment is carried out from the farm to the factory gate of the vegetable producer. Two indicators of product-related sustainability (risk) management are considered (#C2.3g & #C2.3i). The indicators are described in detail in the "Indicator Profiles" (www.sdg-evaluation.com).
In our example two groups of actors are involved. The agricultural sector, which grows the vegetables, and the processing to the finished sales product. A good 93% of the person-hours used to produce the finished end product (functional unit) are accounted for by agriculture and 7% by processing.

Indicator C2.3g
"Coverage of product-related sustainability (risk) management - chemicals" (SDG 12.4)

The questions to be answered to evaluate the indicator are: Are chemicals addressed in product-related sustainability management? If so, how is the issue addressed: Have targets been agreed? Are responsibilities & resources defined? Are concrete measures planned?
For our vegetables, chemical management in agriculture and processing is addressed, there are clear measures and responsibilities, but targets are not agreed.

Indicator C2.3i
"Coverage of product-related sustainability (risk) management - climate change" (SDG 13.2)

The questions to be answered to evaluate the indicator are: Is climate change addressed in product-related sustainability management? If so, how is the issue addressed: Are targets agreed? Are responsibilities & resources defined? Are concrete measures planned?
In our example, climate change in agriculture is not addressed, but in processing there are goals, responsibilities and concrete measures to combat climate change.

	C2.3g: Chemicals		**C2.3i: Climate Change**	
	Agriculture	Processing	Agriculture	Processing
Targets	0	0	0	1
Responsibilities & resources	1	1	0	1
Measures	1	1	0	1
Assessment at actor level	0.67	0.67	0	1
Share of working hours	93%	7%	93%	7%
Assessment according to share of working hours	0.62	0.045	0	0.068
Overall assessment	**0,645**		**0,068**	

AGGREGATION APPROACHES — *THE SIMPLIFICATION*

The differentiation into 21 core indicators or 45 comprehensive indicators is necessary and helpful in order to identify concrete levers for improving sustainability impacts. If, on the other hand, the results are to be compared or communicated, it can be helpful to summarise them further.

However, information is lost with every simplification, so that aggregation is always in the area of conflict between "as simple as possible" and "as differentiated as necessary". It is therefore essential to be aware of which information has been lost through aggregation and which statements are therefore still possible.

SEP prefers aggregation to the Sustainable Development Goals. Since a Sustainable Development Goal (SDG 11) has no product relevance (Table 4), aggregation provides results for 16 SDGs. So far, aggregation can only be done for C2 indicators. The overall evaluation here is carried out as an equally weighted aggregation of the individual indicator results summarized by working hours.

For aggregation, it is necessary to document all aggregation steps in a comprehensible manner and, in particular, to disclose the results at the level of the individual indicators before aggregation.

AGGREGATION USING THE EXAMPLE OF SDG 6:

The C2 indicators #C2.3d "Water use & scarcity" of the indicator on product-related sustainability and risk management as well as the indicators #C2.12 "Drinking water at the workplace", #C2.13 "Adequate sanitation at work" and #C2.14 "Wastewater treatment" are relevant for the evaluation of SDG 6.

The example of our vegetable production shows that both groups of actors involved in the latter three indicators are excellent. However, indicator C2.3d is not addressed at the level of agriculture in product-related sustainability management ("location"). As a result, in the aggregation according to the pro portion of working hours, this indicator is evaluated at 0.02, while the other three indicators each have a 1. In total, this results in an aggregated evaluation for the contribution to SDG 6 of 0.76 or 76%. This means that our exemplary vegetables already contribute quite well to the fulfilment of SDG 6, but there is still room for improvement.

		Agriculture		Processing		Overall assessment
		Location (100%)	Product (Share of working hours, 93%)	Location (100%)	Product (Share of working hours, 7%)	
C2.3d	Water use & scarcity	0,00	0,00	0,33	0,02	0,02
C2.12	Drinking water at the workplace	1,00	0,93	1,00	0,07	1,00
C2.13	Adequate sanitation at work	1,00	0,93	1,00	0,07	1,00
C2.14	Wastewater treatment	1,00	0,93	1,00	0,07	1,00
	SDG 6 (balanced aggregation)	0,75	0,70	0,83	0,06	0,76

The aggregated result itself is easier to communicate, but no longer shows where the optimization potential lies. To do this, it is necessary to look at the evaluation at the level of the individual indicators.

Aggregation into SDGs has the advantage that double counting is not relevant here due to the fact that one indicator can contribute to several SDGs. Nevertheless, this type of aggregation still requires 16 results to be communicated.
Further aggregation possibilities are:

- Aggregation to the three dimensions of sustainability (ecology, economy, social).
- Aggregation to the so-called "Five Ps": People, Planet, Prosperity, Peace & Partnership. These are explicitly named in Agenda 2030

A further aggregation step would then be to aggregate into a single indicator that is easy to communicate. In the calculation software, a choice can be made between the two approaches of aggregation to SDGs and aggregation to the three dimensions of sustainability.

ANALYSIS OF THE ADDED VALUE — *THE ADDITION*

The main objective of the benefit analysis is to be able to integrate the benefits of products into the sustainability evaluation in a well-founded and systematic manner so that this can be adequately taken into account in political and consumer-related considerations and evaluations. The reference value for analysing the benefits in product sustainability assessments is the functional unit. Nevertheless, this is defined in ISO 14040/44 as the "quantified benefit of a product system for use as a comparative unit". For this reason, the benefit analysis analyses the additional benefit aspects that go beyond the core benefit defined in the functional unit.
A distinction is made between two categories in the benefit analysis:

- the individual benefit, which includes the functional benefit and symbolic benefit, and
- the societal benefit.

In the case of the latter, it has so far been difficult to reach agreement on the content of societal benefit due to the normativity involved. The SDGs now also provide the normative framework. For this reason, criteria were formulated for the benefit analysis, analogous to the *SEP* approach, in order to identify the goals that describe the societal benefit.
In this way, 30 benefit indicators could be defined that refer to 46 SDG sub-goals. In contrast to the sustainability evaluation, the analysis of the additional social benefit requires that for all benefit indicators it is necessary to examine whether the product or service can make a contribution. For this contribution, a defined proof must be provided in each case. The benefit analysis is described in detail in a separate brochure (www.prosa.org).

ProFitS
— *THE SOFTWARE*

The software ProFitS was developed within the project to simplify the sustainability assessment. In particular, it enables the calculation and evaluation of C2 indicators. For the C1-indicators it is usually necessary to use a life cycle assessment software, e.g. openLCA, umberto®, GaBi or SimaPro and then transfer the impact assessment results or life cycle inventory results into the software so that an overall result can be obtained.

C2-Indicators

ID	ProFitS Indicator Name	Referring SDG	Result	Impact Graph
▾ C2-Indicators (Company related) (51 items)				
C2.1	Workers earning below UN poverty line	1.1	0.5	
C2.2	Coverage of social security support	1.3	0.26	
⊟ C2.3	Coverage of product-related sustainability (risk) management		0.67	
The indicator covers all sustainability issues mentioned in the SDGs relevant for a comprehensive management in the companies sustainability (risk) management. The indicator addresses the coverage of sustainability issues (C2.3a – C2.3t) and the form of implementation of the issues in the management (input parameters a – c). However, the sustainability issues are split up in core issues (c, i, j, k, n, p & s) and comprehensive issues. According to the Global Reporting Initiative (GRI) management approach there are three aspects of comprehensive management of sustainability issues: a) policies, goals and targets, b) responsibilities and resources, c) specific actions, such as processes, projects, programs and initiatives and measures. The evaluation is done per sustainability issue covered. Thus, the highest possible contribution is achieved when all management measures (policies / goals and targets; responsibilities / resources; specific actions / measures) are covered. The lowest contribution is assumed when no management measures are covered.			
└ C2.3a	sustainable agriculture	2.4	0.33	
└ C2.3b	driver/passenger safety/reduction of accidents	3.6	1	
└ C2.3c	equal opportunities	5.1	0.67	
└ C2.3d	water use&scarcity	6.5 , 6.6	0.67	
└ C2.3e	natural resources	12.2	0.67	
└ C2.3f	food losses	12.3	0.67	
└ C2.3g	chemicals	12.4	0.67	
└ C2.3h	waste	12.5	0.67	
└ C2.3i	climate change	13.2	0.67	
└ C2.3j	marine biodiversity	14.2	0.67	
└ C2.3k	terrestrial&freshwater biodiversity	15.1 , 15.2 , 15.3 , 15.4 , 15.5 , 15.8	0.67	

Figure 3: Screenshot ProFitS

The software can be used free-of-charge at www.sdg-evaluation.com.

ZNU
— *CENTER FOR SUSTAINABLE LEADERSHIP*

ZNU is an applied research institute founded by Dr. Christian Geßner and Dr. Axel Kölle in the Faculty of Economics at the University of Witten/Herdecke. The focus of ZNU is on the practical measurement of sustainability at company and product level. In addition, ZNU works to inspire people for sustainable successful business and to enable them to shape sustainable change in their companies from within.

In particular, the ZNU Standard of sustainable management was developed for this purpose, which supports companies to manage their operations more sustainably and to make an active, measurable contribution to sustainable change in economy and society. The ZNU Standard demands improvement, activates potentials at the locations, promotes the development of more sustainable processes and products and enables a systematic differentiation in competition.

The ZNU management standard is now supplemented by the *SEP - SDG Evaluation of Products* method. It allows to analyze and evaluate the contribution of products to sustainability along the respective value chains and to identify optimization potentials.

If you have any questions regarding the use of *SEP*, please contact us at znu@uni-wh.de. We are happy to support you on your way to a sustainable future.

Contact at the ZNU for the method SDG-evaluation of products (*SEP*):
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Further information:
www.sdg-evaluation.com

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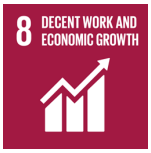
ANNEX

Table 1

► The identified sub-goals of the 17 SDGs with product or company reference

	SDG	TITEL
		**End poverty in all its forms everywhere**
	1.1	By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day*
	1.3	Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable (*currently 1.90 US dollars per day)
		**End hunger, achieve food security and improved nutrition and promote sustainable agriculture**
	2.3	By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment
	2.4	By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality
	2.5	By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality
		**Ensure healthy lives and promote well-being for all at all ages**
	3.6	By 2020, halve the number of global deaths and injuries from road traffic accidents
	3.8	Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all
	3.9	By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination

	SDG	TITEL
		**Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all**
	4.4	By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship
	4.5	By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations
	4.7	By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development
		**Achieve gender equality and empower all women and girls**
	5.1	End all forms of discrimination against all women and girls everywhere
	5.5	Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life
		**Ensure availability and sustainable management of water and sanitation for all**
	6.1	By 2030, achieve universal and equitable access to safe and affordable drinking water for all
	6.2	By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
	6.3	By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
	6.4	By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity
	6.5	By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate
	6.6	By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
		**Ensure access to affordable, reliable, sustainable and modern energy for all**
	7.2	By 2030, increase substantially the share of renewable energy in the global energy mix
	7.3	By 2030, double the global rate of improvement in energy efficiency

SDG	TITEL
	**Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all**
8.4	Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production, with developed countries taking the lead
8.5	By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value
8.6	By 2020, substantially reduce the proportion of youth not in employment, education or training
8.7	Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms
8.8	Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment
	**Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation**
9.3	Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets
9.4	By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities
9.5	Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending
	**Reduce inequality within and among countries**
10.2	By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status
10.3	Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard
	**Ensure sustainable consumption and production patterns**
12.2	By 2030, achieve the sustainable management and efficient use of natural resources
12.3	By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses
12.4	By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment
12.5	By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse
12.6	Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle
12.8	By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

SDG	TITEL
	**Take urgent action to combat climate change and its impacts**
13.2	Integrate climate change measures into national policies, strategies and planning
12.3	Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
	**Conserve and sustainably use the oceans, seas and marine resources for sustainable development**
14.1	By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution
14.2	By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans
14.3	Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels
14.4	By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics
	**Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss**
15.1	By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements
15.2	By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally
15.3	By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world
15.4	By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development
15.5	Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species
15.6	Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed
15.8	By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species
15.9	By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts
15.a	Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems
15.b	Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation

	SDG	TITEL
		**Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels**
	16.5	Substantially reduce corruption and bribery in all their forms
	16.a	Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime
		**Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development Finance**
	17.7	Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed
	17.11	Significantly increase the exports of developing countries, in particular with a view to doubling the least developed countries' share of global exports by 2020
	17.16	Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries
	17.17	Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships

Table 2:
► C1-indicators for sustainability assessment based on the SDGs

IMPACT INDICATORS

#	SDG	INDICATOR	CORE
C1.1	2.4	Soil quality index	
C1.2	2.4, 15.9	Terrestrial biodiversity potential	•
C1.3	2.4	Accumulated Exceedance (terrestrial eutrophication, acidification)	•
C1.4	3.9	Comparative Toxic Unit for humans C1.4a: cancer C1.4b: non-cancer	
C1.5	3.9	Photochemical ozone creation potential	
C1.6	3.9	Disease incidences (Particulate matter)	
C1.7	3.9, 6.3, 12.4	Comparative Toxic Unit for ecosystems	•
C1.8	6.3	P-equivalents (freshwater eutrophication)	•
C1.9	6.4	Scarcity-adjusted water use	
C1.10	8.4, 9.4	Abiotic resource depletion C1.10a: minerals & metals C1.10b: fossil fuels	
C1.11	9.4, 13.2	Global Warming Potential	•
C1.12	12.4	Ionising radiation potential	
C1.13	14.1	N-equivalents (marine eutrophication)	•
C1.14	14.2	Marine biodiversity potential	•
C1.15	14.3	Marine acidification potential	

INVENTORY INDICATORS

#	SDG	INDICATOR	CORE
C1.16	2.3	Income/ha - only Small Scale Producers	
C1.17	2.3	Yield/ha - only Small Scale Producers	
C1.18	3.6	Death rate due to road traffic injuries	
C1.19	6.4	Water use	
C1.20	7.2, 7.3	Energy use C1.20a: renewable C1.20b: non-renewable	•
C1.21	12.3	Food losses	
C1.22	12.4	Waste generation (per fraction)	
C1.23	12.5	Use of recycled material	
C1.24	14.1	Marine debris (incl. (micro) plastic)	•
C1.25	14.4	Share of by-catch in catches	•

Table 3:
► C2 indicators for sustainability assessment based on the SDGs

INVENTORY INDICATORS

#	SDG	INDICATOR	CORE
C2.1	1.1	Workers earning below poverty line of 1.90$/day	•
C2.2	1.3	Coverage of social security support	•
C2.3	2.4, 3.6, 5.1, 6.5, 6.6, 7.3, 8.7, 8.8, 9.3, 12.2, 12.3, 12.4, 13.2, 14.2, 15.1-15.6, 15.8, 15.9, 15.a, 15.b, 16.5, 16.a, 17.7, 17.11, 17.16, 17.17	Coverage of product-related sustainability (risk) management: a: sustainable agriculture b: driver/passenger safety/reduction of accidents c: equal opportunities d: water use & scarcity e: natural resources f: food losses g: chemicals h: waste i: climate change j: marine biodiversity k: terrestrial & freshwater biodiversity l: patents on natural resources m: corruption prevention n: human rights o: promotion of environmental sound technologies in developing countries p: energy efficiency q: small scale suppliers/industry borrowers in supply chain (particular from LDC) r: share of products/materials from DC s: Investments in conservation and sustainable use of biodiversity/ecosystems t: Engagement in multi-stakeholder partnerships for sustainable development	• c: equal opportunities i: climate change j: marine biodiversity k: terrestrial & freshwater biodiversity o: human rights p: energy efficiency s: Invest-ments in conservation and sustain-able use of biodiversity/ ecosystems

#	SDG	INDICATOR	CORE
C2.4	2.5	Number of used breeds / varieties	•
C2.5	3.8	Share of employees covered by health insurance or a public health system	•
C2.6	3.9, 8.8	Number of, time loss or frequency rates of fatal and non-fatal occupational injuries	
C2.7	3.9, 8.8	Access of workers to protective clothing	
C2.8	4.4, 4.7, 13.3, 16.5	Share of employees trained in sustainability issues: a: ICT skills b: sustainability in general c: climate change d: corruption prevention	
C2.9	4.5	Average hours of training per employee by share of men/woman	
C2.10	5.1, 8.5	Ratio of average hourly wage of men to women	•
C2.11	5.5	Share of women in managerial positions at all hierachy levels	•
C2.12	6.1	Availability of safely managed drinking water at work	•
C2.13	6.2	Availability of lockable sanitation at work, including a hand-washing facility with soap and water	•
C2.14	6.3	Percentage of safely treated wastewater flows	
C2.15	8.6	Share of employees (incl. apprenticeships) under 24	
C2.16	8.7, 8.8	Fulfillment of ILO conventions by sex a: freedom of assembly b: child work c: forced labour d: discrimination e: collective bargaining	•
C2.17	9.5	Investments in R&D	
C2.18	10.2	Relative poverty rate (50% of median disposable income)	•
C2.19	10.3	Palma Ratio	
C2.20	12.6, 12.8, 14.4	Sustainability information about the product (incl. value chain) publicly available	

Table 4
► Aggregation

SDG	#	INDICATOR	CORE
1.1	C2.1	Workers earning below UN poverty line	●
1.3	C2.2	Coverage of social security support	●
2.3	C1.16	Income per hectare - Small Scale Producers	
2.3	C1.17	Yield per hectare - Small Scale Producers	
2.4	C1.1	Soil quality index	
2.4	C1.2	Terrestrial biodiversity	●
2.4	C1.3	Accumulated Exceedance (terrestrial eutrophication)	●
2.4	C2.3a	Coverage of product-related sustainability (risk) management: sustainable agriculture	
2.5	C2.4	Use of different breeds&varieties	●
3.6	C1.18	Road traffic deaths	
3.6	C2.3b	Coverage of product-related sustainability (risk) management: driver&passenger safety & reduction of accidents	
3.8	C2.5	Health insurance	●
3.9	C1.4a	Comparative Toxic Unit for Human Health (Human toxicity): cancer	
3.9	C1.4b	Comparative Toxic Unit for Human Health (Human toxicity): non-cancer	
3.9	C1.5	Photochemical ozone creation potential	
3.9	C1.6	Disease incidences (Particulate matter)	
3.9	C1.7	Comparative Toxic Unit for ecosystems (Ecotoxicity)	●
3.9	C2.6	Occupational injuries	
3.9	C2.7	Access to protective clothing	
4.4	C2.8a	Training in sustainability issues: ICT skills (e.g. technical and vocational)	
4.5	C2.9	Equal share of training for men and women	
4.7	C2.8b	Training in sustainability issues: sustainability in general	

SDG	#	INDICATOR	CORE
5.1	C2.3c	Coverage of product-related sustainability (risk) management: equal opportunities	•
5.1	C2.10	Equal wages for men and women	•
5.5	C2.11	Equal managerial positions for men and women	•
6.1	C2.12	Drinking water at work	•
6.2	C2.13	Adequate sanitation at work	•
6.3	C1.7	Comparative Toxic Unit for ecosystems (Ecotoxicity)	•
6.3	C1.8	P-equivalents (Freshwater eutrophication)	•
6.3	C2.14	Wastewater treatment	
6.4	C1.9	Scarcity-adjusted water use	
6.4	C1.19	Water use	
6.5	C2.3d	Coverage of product-related sustainability (risk) management: water use&scarcity	
6.6	C2.3d	Coverage of product-related sustainability (risk) management: water use&scarcity	
7.2	C1.20a	Energy use: renewable	•
7.3	C1.20b	Energy use: total	•
7.3	C2.3p	Coverage of product-related sustainability (risk) management: energy efficiency	
8.4	C1.10a	Abiotic resource depletion: minerals & metals	
8.4	C1.10b	Abiotic resource depletion: fossils	
8.5	C2.10	Equal wages for men and women	•
8.6	C2.15	Employees under 24 years	
8.7	C2.16a,b	Fulfillment of ILO conventions: child work & minimum age, forced labour	•
8.8	C2.16c,d, e,f	Fulfillment of ILO conventions: freedom of association, discrimination, collective bargaining for all employees, equal remuneration of workers	•
8.8	C2.6	Occupational injuries	
8.8	C2.7	Access to protective clothing	
9.3	C2.3q	Coverage of product-related sustainability (risk) management: small scale suppliers/ industry borrowers in supply chain (particular from least developed countries)	
9.4	C1.10a	Abiotic resource depletion : minerals & metals	
9.4	C1.10b	Abiotic resource depletion: fossils	
9.4	C1.11	Global Warming Potential	•
9.5	C2.17	Investments in R&D	

ANNEX
— *TABLE 4*

SDG	#	INDICATOR	CORE
10.2	C2.18	Relative poverty rate	•
10.3	C2.19	Income Spread	
12.2	C2.3e	Coverage of product-related sustainability (risk) management: natural resources	
12.3	C1.21	Food losses & waste	
12.3	C2.3f	Coverage of product-related sustainability (risk) management: food losses&waste	
12.4	C1.7	Comparative Toxic Unit for ecosystems (Ecotoxicity)	•
12.4	C1.12	Ionising radiation potential	
12.4	C1.22	Waste generation	
12.4	C2.3g	Coverage of product-related sustainability (risk) management: chemicals	
12.5	C1.23	Use of recycled material	
12.5	C2.3h	Coverage of product-related sustainability (risk) management: waste	
12.6	C2.20	Product-related sustainability information	
12.8	C2.20	Product-related sustainability information	
13.2	C1.11	Global Warming Potential	•
13.2	C2.3i	Coverage of product-related sustainability (risk) management: climate change	•
13.3	C2.8c	Training in sustainability issues: climate change	
14.1	C1.13	N-equivalents (Marine eutrophication)	•
14.1	C1.24	Marine debris	•
14.2	C1.14	Marine biodiversity	•
14.2	C2.3j	Coverage of product-related sustainability (risk) management: marine biodiversity	•
14.3	C1.15	Marine acidification potential	
14.4	C1.25	Share of by-catch	•
14.4	C2.20	Product-related sustainability information	

SDG	#	INDICATOR	CORE
15.1	C2.3k	Coverage of product-related sustainability (risk) management: terrestrial&freshwater biodiversity	•
15.2	C2.3k	Coverage of product-related sustainability (risk) management: terrestrial&freshwater biodiversity	•
15.3	C2.3k	Coverage of product-related sustainability (risk) management: terrestrial&freshwater biodiversity	•
15.4	C2.3k	Coverage of product-related sustainability (risk) management: terrestrial&freshwater biodiversity	•
15.5	C2.3k	Coverage of product-related sustainability (risk) management: terrestrial&freshwater biodiversity	•
15.6	C2.3l	Coverage of product-related sustainability (risk) management: patents on natural resources	
15.8	C2.3k	Coverage of product-related sustainability (risk) management: terrestrial&freshwater biodiversity	•
15.9	C1.2	Terrestrial biodiversity	•
15.A	C2.3s	Coverage of product-related sustainability (risk) management: Investments in conservation and sustainable use of biodiversity & ecosystems	
15.B	C2.3s	Coverage of product-related sustainability (risk) management: Investments in conservation and sustainable use of biodiversity & ecosystems	
16.5	C2.3m	Coverage of product-related sustainability (risk) management: corruption prevention	
16.5	C2.8d	Training in sustainability issues: prevention of corruption & bribery prevention	
16.A	C2.3n	Coverage of product-related sustainability (risk) management: human rights	•
17.11	C2.3r	Coverage of product-related sustainability (risk) management: share of products & materials from developing countries	
17.16	C2.3t	Coverage of product-related sustainability (risk) management: Engagement in multi-stakeholder partnerships for sustainable development	
17.17	C2.3t	Coverage of product-related sustainability (risk) management: Engagement in multi-stakeholder partnerships for sustainable development	
17.7	C2.3o	Coverage of product-related sustainability (risk) management: promotion of environmental sound technologies in developing countries	

IMPRESSUM

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