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# The Hot Spot Analysis: Utilization as Customized Management Tool towards Sustainable Value Chains of Companies in the Food Sector

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## Abstract

The food and agricultural sector will face numerous challenges in the next decades, arising from changing global production and consumption patterns, which currently go along with high resource use, causing ecological and socio-economic impacts. The aim of this paper is to illustrate and evaluate the practical applicability of the Hot Spot Analysis methodology in the context of supply chain management in companies. The HSA is a method to identify social and ecological problems along the entire life cycle of a product. Special emphasis is put on a customized implementation in the value chain beef of McDonald's Germany. The HSA of McDonald's beef value chain shows that the main ecological problems arise in the phase of raw material extraction, whereas the main social problems can be identified in the phase of slaughtering. Finally, the paper shows potentials and shortcomings of such a customized application and how the results can be implemented in the sustainability management of a company.

## Key words

Hot Spot Analysis, food, beef, sustainability assessment, supply chain management, McDonald's Germany.

## Introduction

The use of natural resources by societal metabolism has been constantly growing during the recent decades and since the year 2000 global resource extraction has increased stronger than ever before (Bringezu et al., 2009). Caused by such (over) use of natural resources, ecological, social, and economic impacts were identified (Rockström et al., 2009). Among other stakeholders, companies are key actors for sustainable development (Seuring, Müller, 2008). Sustainable innovation and internal departments for sustainability management are on the move and 87% of German DAX-companies now publish sustainability reports (PWC, 2011).

Results of current sustainability research show that resource-intensive production and consumption systems of companies have to be modified strongly. However, it is still a major challenge to combine sustainability actions and evaluate their impacts in a transparent way.

The present paper focuses on nutrition as one of the three most resource intense areas next to mobility and housing and the related food sector, including agriculture (Lettenmeier et al., 2012). This sector is economically important in Germany, e.g. illustrated by sales figures of around 154 billion Euro in the food retail sector or regarding the 5,900 companies with over half a million employees in the food industry (BVE, 2014). Although the food sector has a huge environmental impact so far only few studies have assessed the environmental and social impacts of single products or entire value chains (Lettenmeier et al., 2014; Liedtke et al., 2010). Furthermore, methods and tools introduced so far are sometimes deemed too academic and often company's needs are not satisfied. Thus, reliable and applicable tools are highly needed that support the identification of key impacts as a basis for sustainability management of national and international supply chains. Therefore, this paper presents the methodology of the Hot Spot Analysis (HSA) and its application in specific value chains as such a more applicable tool. The HSA has been established as a method to generate knowledge about long term and mid term risks in value chains by using a brought range of key indicators. It was explicitly developed to assess sustainability impacts in entire value chains, from raw material extraction or farming,

use phase to waste disposal (Bienge et al., 2010).

The objective of the paper is to illustrate and evaluate the practical applicability of the HSA in the company McDonald's Germany as well as to identify critical ecological and social aspects along the life cycle of beef. Furthermore the paper shows how the results can be discussed within the company and with stakeholders and implemented in the sustainability management of a company. In the course of the on-going research project "Sustainable McDonald's Germany", HSA has been applied on two value chains (beef and chicken), which are highly related in economical, social and ecological issues and which are specific in their regional and global organisation. Based on these two case studies, the HSA has been further applied as an enabler for a company to assess its own sustainability impacts and to integrate this method in a holistic management perspective. This application and modification of the methodology is presented in the following.

The paper first shortly outlines existing approaches to evaluate ecological and social issues along value chains. Concluding from this, the concept of the customized HSA is introduced using current examples of application of this method. One main focus is the beef value chain of McDonald's Germany. The paper ends up with a short conclusion on advantages, challenges and shortcomings of the method.

### Companies addressing ecological and social impacts

The European Commission decided in April 2014 that companies with more than 500 employees have to publish non-financial reports, e.g. sustainability reports, which disclose all relevant social and ecological aspects. These reports are expected to be obligatory for the financial year 2017 (European Commission, 2014). Nevertheless, several (inter-)national companies already today publish non-financial reports and it is expected that the number of companies, which publish separate general purpose, non-financial (sustainability) reports, will rise following this decision. Within their sustainability reports, companies mainly address several ecological and social aspects, often using freely accessible indicator systems, e.g. the Global Reporting Initiative framework (GRI, 2011). To report ecological and social impacts along company internal processes, the identification of all relevant material flows in supply chains are obligatory (Kirsch, 2013). In the long term instruments are needed to integrate valid data into these non-financial reporting frameworks. For instance, ecological impacts of relevant procedures are often displayed by using specific assessment tools. In this case, the application of footprint assessments, e.g. Carbon Footprint, Water Footprint (Cucek et al., 2012) or Material Footprint (Lettenmeier et al., 2009) is common to underline improvements in production systems. Besides the footprint methodologies, further quantitative assessment methods and indicators are available to measure environmental impact of a product, e.g. the MIPS approach and Life Cycle Assessment (ISO 14040/44) (for methodological differences see Liedtke et al., 2014). In contrast to environmental footprint concepts, social indicators have a qualitative perspective (e.g. poverty and slavery footprint) (Cucek et al., 2012). The categories provided by UNEP/SETAC (2009) and GRI (2011) are comprehensive but sometimes difficult to apply on single products due to their very detailed framework. Many companies start reporting by using few selected indicators.

However, the demonstrated concepts are often focused on one specific topic. Instead, HSA as a tool, which includes several indicators, could be very helpful to gain a more comprehensive view on value chains. Within the analysis, ecological and/or social categories along a whole value chain of a product are evaluated. It comprises more aspects than environmental footprints but not as many details as the lists of indicators by UNEP/SETAC or the GRI.

## Materials and methods

In 2002, the Research Group 4 of the Wuppertal Institute developed the Hot Spot Analysis methodology (for further information on method development see Liedtke et al., 2010 and Bienge et al., 2010). The starting point was the idea to develop a quick and reliable life cycle assessment method based on available information, which highlights the most urgent problems within a product value chain. The HSA is a qualitative life cycle analysis that estimates the social and/or ecological impacts of a products life cycle. Historically, the method has been applied to several food value chains (Liedtke et al., 2010) and it was proved that the method is suitable for a systemic application on entire life cycles.

Bienge et al. (2010) described the Sustainability

HSA method. Based on that, the authors in the following give an overview of the HSA method to provide a better understanding of further methodological developments in recent years, including applications in the food sector.

The main objective of the HSA is to identify key impacts along the entire value chain. Environmental and social impacts of each life cycle phase and their interrelations are identified as well as the overall impact level of different social and environmental categories. The environmental and social "peaks" identified are defined as hot spots. The HSA method is divided into five steps (Bienge et al., 2010).

First of all the aim and scope of the study has to be determined. This includes the definition of the life cycle phases and the categories to be assessed. For most products, the life cycle phases can be roughly divided into raw material extraction, processing, usage and waste disposal. Depending on the scope, examined life cycle phases are adaptable (e. g. subdividing of raw material extraction phase or separate analysis of important phases like transport or packaging) but should cover the whole life cycle of a product. Secondary analysis of existing scientific literature is conducted to identify typical value creation processes of a product, such as the usual countries of origin of raw materials and characteristic production methods.

Along the defined life cycle social and/or ecological categories can be analysed. Table 1 shows the main environmental and social categories. The selection of the categories depends on the research question and aim of the project. Aspects and descriptions are derived from the international standards GRI and UNEP SETAC Life Cycle Initiative (UNEP/SETAC, 2009; GRI, 2011; Bienge et al., 2010). They are updated on a regular basis and best available scientific knowledge. The categories can be adapted to keep up with recent developments. The Sustainability HSA considers both environmental and social aspects (Bienge et al., 2010). The HSA method in general allows focusing on either social or environmental aspects and the selection or widening of aspects (Liedtke et al., 2010). However, any adaption should be documented.

After defining the categories and life cycle phases, step 2 comprises an extensive literature review to assess the significance of each aspect within the life cycle phases. The secondary literature review includes scientific studies as well as studies without a typical scientific background (e.g. data from trade unions etc.) and internal data from companies. The data can be complemented with knowledge of internal or external experts. The data is integrated for each category in every life cycle phase. To this aim, it is recommended to create a table for every life cycle phase and within the table one line for every category. So for every category the collected data are put together clearly. Upon completion, the categories are evaluated according to their social or ecological relevance by constructing an index with values 1-3, whereas 1 means low relevance and 3 means high relevance.

Afterwards the life cycle phases have to be weighted one to another (step 3). Similar to step 2, the phases are assessed by their relevance of 1-3. The life cycle phase or phases with highest impact receive the highest value, whereas a stage with a low relevance is assigned a low value. The hot spots are determined by multiplying the value of the category and the value of the phase (step 4). This results in the lowest value being 1 and the highest one equals 9. Hot spots are defined

| Environmental aspect | Social aspects |
|---|---|
| Abiotic raw materials | General working conditions |
| Biotic raw materials | Social security |
| Energy resources | Training & Education |
| Water resources | Workers health & safety |
| Land use | Human rights |
| Waste | Living wages |
| Emissions to air (incl. greenhouse gas emissions) | Consumer health & safety |
| Emissions to water | Product quality |

Source: Bienge et al., 2010

Table 1: Main environmental and social HSA categories.

for values of 6 or 9. As the final step 5, results are presented to and evaluated by relevant stakeholders and experts. This is necessary to close gaps and to increase acceptance and reliability of results.

### HSA application in companies and research projects

Since 2002, several ecological and/or social HSA have been conducted and applied in companies (Liedtke et al., 2010, Bienge et al., 2010), consumer information (REWE Group, 2014), quality assessment (Alfred Ritter GmBh & Co. KG, 2011), social learning environments (Nordmann et al., in press), and design processes (Liedtke et al., 2013) have been elaborated.

The case studies of REWE and Ritter Sport as companies, which are already using the methodology for a longer time, are briefly introduced here.

The German retailer REWE developed the Label PRO PLANET, which helps consumers to recognize products that are more sustainable than comparable products. The aim of the label is to promote the concept of sustainability as well as to minimize the problems along a specific value chain. Suggestions for products, that should be analysed, are made by a sustainability management group of REWE, the advisory board of the PRO PLANET label or by external stakeholders. For REWE, the HSA is important to identify ecological and social problems along a value chain. REWE divided the value chain in four sections: Agriculture/resource extraction, production, logistics/trade, and consumption/end of life. In addition to the basic method the analysed categories are supplemented by two categories. In the ecological analyses, the category 'emissions to air' is subdivided in the categories 'greenhouse gas emissions' and 'emissions to air'. The social analysis is supplemented by the category 'animal welfare'. To visualize results, a 'HSA-map' is developed for every labelled product. A product achieves the label if one or more hot spots have been overcome by the implemented measures. In contrast to the basic method, REWE modified the categories and also uses fixed life cycle phases. But all in all, the changes are not very extensive and close to the basic method (REWE Group, 2014).

The chocolate producer Ritter Sport uses the HSA in another way of modification. Besides ecological and social effects of a product, the Ritter Sport HSA considers the economic perspective of products. Important questions are related to the wage level or avoiding monopoles. Employees from different departments discuss the results and develop measures. The biggest change in contrast to the basic method is the addition of an economic perspective. The Ritter Sport HSA, thus, includes the three main topics of sustainability. This example shows that the analysis framework is open for modification if necessary. Among other effects, the analysis can thus become more comprehensive or focused on specific topics, but might also take more time (Alfred Ritter GmBh & Co. KG, 2011; Forum Nachhaltiges Wirtschaften, 2014).

## Results

In the following, the application of the HSA in the case of McDonald's Germany Inc. is illustrated as a third example, presenting new results from the project "Sustainable McDonald's", which has been established from 2011-2014. Within the project, several sustainability topics were analysed. One part of the project was the assessment of specific and economically relevant value chains in Germany. Within this step, the conceptual framework for applying ecological and social HSA to the case of McDonald's value chains was developed.

The original HSA method is carried out in five steps (cf. above); the company-specific application is now based on up to eight steps. Differing from the original method, the new management tool was expanded and adjusted to some relevant objectives. Table 2 compares key similarities and differences of the HSA method and the customized HSA application.

The Hot Spot Analysis was carried out to gain detailed knowledge about risks and potentials of relevant value chains, which goes beyond regular standards and may be established by the sustainability department of McDonald's Germany Inc.

Two economically and ecologically relevant value chains were analysed as a whole: beef and chicken. Both are relevant to a large number of products. In particular, beef is systematically very crucial for McDonald's Germany Inc., due to its high share in products. Further, the idea to control national and international sourcing strategies was in the centre. Quantitatively, potatoes are the economically and quantitatively next most

important value chain, but the focus was set on animal products, thus, the value chain of chicken was chosen. For the sustainability department it was particularly important to gain insights into ecological and socially relevant hot spots. Additionally, the department wished to develop a specific field manual to internally map value chains.

Considering all framework modifications of the Hot Spot Analysis (see table 2), one of the most important changes is the modification of information sources. While the original HSA is based on a theoretical literature review, the customized Hot Spot Analysis will be applied based both on a theoretical literature review and additional primary data collection. Such data collection is rather labour-intensive, which however leads to generating more explicit and significant data. Furthermore, a comprehensive view is created by the integration of all relevant contact persons of suppliers (aim).

Based on these general and company specific aims and the development within the project, eight key steps of the customized HSA were carried out within the period of one year. The modification was led by results of primary data collection. Table 3 shows the main differences

| | HSA Method | HSA application in company supply chain management |
|---|---|---|
| **Overall HSA aspects** | | |
| **Aim** | • Sustainability assessment to identify most relevant impact along the value chain<br>• List of recommendations for action | • Sustainability assessment to identify most relevant impact along the value chain<br>• List of recommendations for action<br>• Relevant persons, e.g. sustainability manager, quality manager or supply chain manager and the suppliers are integrated in the process<br>• Management aim: definition of specific Hot Spots as a support for internal risk management<br>• Establishment of company specific HSA database and monitoring tool called "toolbox HSA" linked with overall sustainability strategy of the company |
| **Application** | • Generic product value chain<br>• Specific product value chain<br>• Assessment results for e.g. supply chain management, design processes, consumer information/label, education | • Specific product value chain: Most relevant supply chains considering future management strategies, relevant for sustainability issues and sourcing; based on present scientific results<br>• Assessment results for supply chain management: Translation of assessment results into supply chain management to improve sustainability performance (incl. monitoring) |
| **HSA conduction** | • Company<br>• Science<br>• Design | • Company – Unit Corporate Responsibility and Supply Chain Management<br>• Science within the project framework |
| **Source of information** | • Secondary literature: Scientific literature, Further fact-based information (e.g. reports, media<br>• External expert knowledge (e.g., company, sector, NGO, trade unions, federations, consumer associations, experts) | • Secondary literature: Scientific literature, further fact-based information (e.g. reports, media)<br>• External expert knowledge (e.g. company, sector, NGOs, trade unions, federations, consumer associations, experts)<br>• Primary data collection and internal expert knowledge: Data gathered in own supply chain (value chain data, management / process knowledge) |
| **Stakeholder involvement** | • Generally non-recurring (data gathering, assessment)<br>• Involvement generally in step 5 (earlier involvement in step 1 to 4 possible)<br>• Internal and / or external stakeholder involvement | • Probably recurring (data gathering, assessment, management plan, implementation, monitoring)<br>• Internal stakeholder involvement: Involvement of the company in all steps of the assessment and following steps<br>• External stakeholder involvement: Supply chain and optional further associated stakeholder |

Source: HSA methodology based on Liedtke et al., 2010; Bienge et al., 2010; extended by unpublished datasets

Table 2: Comparison of HSA method and HSA application in company.

| | HSA Method | HSA application in company supply chain management |
|---|---|---|
| **HSA phases and corresponding steps and specific aspects of HSA integration into Sustainable Value chain management** | | |
| **Management (ex ante HSA)** | (Not included in general HSA steps, depending on specific application) | The HSA is included in the sustainability management strategy; the results shall be used for the internal detection of hot spots. Two value chains were analysed – both very economically and ecologically relevant |
| **Defining scope & aim** | Step 1: Definition of the life cycle stages and categories | Step 1: Definition of the life cycle stages and categories |
| **Analysis** | Step 2: Aspects significance assessment | Step 2: Literature review<br>Step 3: Company and factory visits (parallel to step 4)<br>Step 4: Surveying suppliers along the value chain; consideration of existing, internal standards<br>Step 5: Analysis and evaluation of the specific and generic data including assessment |
| **Assessment** | Step 2: Aspects significance assessment<br>Step 3: Life cycle phase significance<br>Step 4: Identification of Sustainability Hot Spots | Step 5: Analysis and evaluation of the specific and generic data including assessment und identification of Sustainability hot spots |
| **Review** | Step 5: Stakeholder evaluation and verification | Step 6: Presentation and discussion of the results with internal and associated stakeholders (e.g. selected companies of the value chain or direct suppliers) |
| **Recommendation/ measures** | Optional (not included in general HSA steps but mostly part of HSA application) | Step 7: Develop measures and afterwards implementation (for example integration in internal standards) |
| **Update** | Optional (not included in general HSA steps but recommended) | Step 8: Recommend update of the HSA (e.g. every 3 years); Update of data and update of stakeholder dialogue |
| **Management (ex post HSA)** | Optional (not included in general HSA steps) | Integration of results into the sustainability management strategy, e.g. multi-stakeholder dialogue or comprehensive project to support and improve identified hot spots |

Source: own composition based on Liedtke et al., 2010; Bienge et al., 2010, extended by unpublished datasets

Table 3: Comparison of HSA method and HSA application in company.

between the original methodology and the customized HSA for McDonald's Germany Inc. step by step.

Compared to the basic method, the first part of the analysis of McDonald's beef is identical. First of all, the overall management aim and relevant value chains have to be defined. The identification of relevant phases and categories is next. For the case of value chains of McDonald's Germany this means that a definition of important categories for the sustainability management of McDonald's Germany and of aims of the analysis is required. Analysing the beef value chain, all categories were included to gain a brief overview of all relevant aspects. At the same time the literature research is carried out as the second step of analysis. Preferably, scientific studies are used, but also other studies or reports such as information from trade unions can be important data for the analysis. For the case of McDonald's beef, information from associations of the meat sector was important and for the question of animal protection, animal welfare NGOs delivered useful information. Also internal data from companies is important. In this case it should be acknowledged that grey literature such as reports from trade unions or other organisations is not always scientifically reliable. As far as possible scientific literature and experts' information should thus be used. In addition to the basic method, steps 3 and 4 supplement the method.

Step 3 includes visits of companies or factories along the value chain. This is important to achieve a better impression and a better understanding of the value chain. The project team visited all relevant stages of the value chain such as a slaughter house and worked for one day in a McDonald's restaurant. The problem is that the visits only show the situation in the visited factory or company. The situation could be completely different

in other companies or factories. Especially in other countries the preconditions could be different e.g. because of other laws.

In parallel and as a fourth step, company and supplier are surveyed along the value chain; considered are existing, internal standards. Within the fourth step questionnaires were developed to collect primary data. The supplier companies were asked for general information and to provide information on their ecological and social impacts along their production steps. For example, the specific consumption of resources, water and energy of companies were included, as well as question on wage levels as a social aspect. If procurable, such statements of companies should be verified using scientific literature.

Step 5 provides the analysis and evaluation of the specific and generic data including assessment und identification of Sustainability Hot Spots. This includes that the collected data are analysed and evaluated. This procedure has to be performed for the literature sources as well as for the value chain phase specific questionnaire. The document then is red by every participant of the internal project team and evaluated individually. Afterwards the individual evaluation schemes are compared in detail, discussed and modified if necessary. This team review process results in a collective assessment of the value chain.

Step 6 includes the internal presentation of the results. Following this the findings can be discussed with stakeholders. The previous internal discussion is important so that the project team has a consistent argumentation strategy during the discussion with the stakeholders. The exchange of information with the stakeholder can be important because they can give additional information and can draw attention to possibly existing mistakes. The results of the beef analysis were discussed e.g. with the "Bayerische Bauernverband" – the Bavarian farmer's association and different slaughter houses regarding the extraction of raw materials.

As a temporarily final step 7, measures are developed after the discussions with internal and associated stakeholders. The question is at which point of the value chain the biggest problems occur and how they might be solved. For example new internal standards or guidelines can be developed. The results of the beef analysis were discussed with the different stakeholders.

The optional but recommended step 8 includes an update of data within the period of three years or in shorter. The HSA can be updated after a certain period, which is essential because after a certain period of time several conditions may have changed, e.g. processes, laws and guidelines.

The following table 4 shows the results of the HSA beef in the project "Sustainable McDonald's Germany". Represented are the multiplied results of the values for each phase and category. As mentioned before, if a category receives the value of 6 or 9 it is identified as a hot spot.

The results show that hot spots are concentrated in specific phases of the value chain beef. In the ecological analysis the hot spots are accumulated in the phase of raw material extraction. All ecological categories in this phase are identified as hot spots. The reasons for this lie e.g. in the huge requirements of raw materials, water, energy and land use, that are needed to produce animal feed. Due to the high amount of waste arising in the restaurants, the category Waste disposal can be seen as a hot spot in the stages Usage and Waste treatment. Other hot spots are energy demand in the stage of Usage and biotic raw materials in the stage of Waste treatment.

The social analysis shows that several categories in the stage of Slaughtering can identified as hot spots. The reasons can be seen in the high amount of unskilled workers, the absence of social security, low payment and bad effects on workers' health – as great problem overall Germany. The category Product Quality in the stage of Agriculture can be identified as a Hot Spot as well as the categories Training & Education and Consumer health in the stage of Usage. Finally, the workers' safety and health can be seen as critical factors in the stage of Waste treatment.

Considering the adjustments, particularly two significant changes become apparent. Whereas the customized analysis strictly involves internal and associated stakeholder, the original method supports the integration of several stakeholders and points out the importance of a multi-stakeholder dialogue to evaluate the results. From the company perspective, internal and associated stakeholders are the first choice. The integration of a multi-stakeholder dialogue in a customized HSA may lead to a diverse and less goal-oriented dialogue, which is in the first step not necessary, but may be a good opportunity for a future management application

| Category | Raw material extraction | Slaugh-tering | Pro-cessing | Use | Waste disposal |
|---|---|---|---|---|---|
| **Ecological aspects** | | | | | |
| Abiotic raw materials | **6** | 1 | 1 | (4) | (4) |
| Biotic raw materials | **9** | 1 | 1 | (2) | **6** |
| Energy resources | **6** | 2 | 1 | **6** | 4 |
| Water resources | **9** | 2 | 1 | 4 | 2 |
| Land use | **9** | 1 | 1 | 4 | (2) |
| Biodiversity | **9** | 1 | 1 | 2 | 2 |
| Waste | **6** | 2 | 1 | **6** | **6** |
| Emissions to air | **9** | 1 | 2 | 4 | 2 |
| Emissions to water | **6** | 2 | 1 | 2 | 2 |
| **Social aspects** | | | | | |
| General working conditions | 4 | **6** | 2 | 4 | 4 |
| Social security | 2 | **6** | 4 | 4 | 4 |
| Training & education | 2 | **6** | 2 | **6** | 4 |
| Workers health & safety | 4 | **6** | 4 | 4 | **6** |
| Human rights | 4 | **6** | 2 | 4 | 4 |
| Living wages | 4 | **9** | 4 | 4 | 4 |
| Consumers health and safety | 4 | 3 | 4 | **6** | - |
| Product quality | **6** | 3 | 4 | 2 | 4 |

* values in brackets are preliminary results
Source: own analysis and calculation, unpublished datasets

Table 4: Results of the HSA beef.

(ex post HSA). Further, the recommended update of primary data collection and a circular update of the internal stakeholder dialogue are opportunities to gain a good perspective on changing risks and potentials in value chains.

In the presented example of McDonald's beef, the results were discussed with various stakeholders. Because of the accumulation of ecological hot spots in the phase of Raw Material Extraction, the results were discussed with the Bavarian farmer's association. The social hot spots are accumulated in the phase of Slaughtering mainly because of working conditions and were discussed with the dismemberment and slaughtering sector. Based on the results of the HSA, the sustainability management team implements several action plans to overcome these hot spots. For instance, a project to improve the husbandry conditions for cows (this project is called 'Best Beef') was established due to the consolidated findings in the project. Another point was a check of work contracts of suppliers as part of the Social Workplace Accountability (SWA) audit (McDonald's Germany, 2013; McDonald's Germany, 2014).

## Conclusion

The customized Hot Spot Analysis provides a comprehensive framework to evaluate several impacts of specific value chains. It is a flexible methodology, which, as we have shown in this paper, is adaptable to specific cases. Interestingly, the method is applicable to different stages of sustainability management systems and helps the internal sustainability management team to extend their view on the companies' relevant systems. Due to the wide range of included indicators, a brought view on supply chains in all phases is achieved.

The results of the example of McDonald's beef show how to use the customized HSA. By collecting primary data it becomes more

obvious that specific problems of the life cycle are accumulated in the phase raw material (ecological analysis) and Slaughtering (social analysis). Steps towards and integration of results in the sustainability management of McDonald's Germany show in the form of the presented action plans, such as the check of work contracts of suppliers.

Applying the methodology, several potentials became apparent. One main potential of the method is that the results of the analysis emphasise the core impacts and problems of the different life cycle phases. After identifying these aspects, action plans can be created to tackle hot spots. So all in all the analysis can help sustainability management departments of a company to identify ecological and social problems and develop measures. The integration of suppliers in the whole process is a decent method to get in touch with several suppliers in a more familiar and non-hierarchical way. This point reflects another potential of the HSA. Furthermore, the recommended update after a period of three years may again strengthen the contact between company and supplier.

As one more important aspect, the scientific support within the first application of a HSA analysis is essential. During a first implementation and analysis process, companies and suppliers and the scientific institution may gain in-depth knowledge of relevant processes. Afterwards, all stakeholders will acquire comprehensive process know-how and companies may conduct the process on their own. Based on these considerations, another opportunity is manifested: the analysis can be carried out without inappropriately high resource input within the company. This even more applies to the update of HSA. Thus, the sustainability department is able to analyse value chains on their own at relatively low expenditure.

Nonetheless, also shortcomings of the method and its application became visible. Collection of primary data and connected processes are labour-intensive and the data delivered by companies may not be verified in detail. Additionally, a major challenge is manifested in the collection, differentiation and comparison of different data sets of several suppliers from different countries. The more complex the data material is, the more time-consuming the analysis turns out. Thus, the decision about most relevant value chains is essential.

For the future, it may be desirable to encourage several national and international companies, even small or medium enterprises, to create a more sophisticated database for transparent value chains using the methodology of the HSA, among others. Especially in the sector of food production, a database of transparent datasets would be very useful. Within this context, the methodology might prove helpful because it is applicable to all phases of these value chains. Even the „more distant" first phases in the agricultural production, where regularly hot spots are discovered, can be easily evaluated.

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