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Assessing sustainable limits for meals – first results from the project NAHGAST: Developing, Testing and Dissemination of concepts for sustainable production and consumption in the food service sector

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Abstract
The food industry belongs to the most significant economic sectors worldwide. Regarding resource use, human nutrition is responsible for about 30 % of global resource consumption. In order to decrease resource consumption to a level in line with planetary boundaries, it is suggested to reduce the resource use of the nutrition sector by factor 2. In view of about 40 % market share in the total nutrition market in Germany, the restaurant and catering sector presents a large untapped potential to increase resource efficiency and improve consumers' health status.
In the light of the above, the current project NAH_Gast aims at initiating, supporting and promoting transformation processes for sustainable business in the hospitality sector. Therefore the project will promote the concept of a resource-efficient and socially inclusive economy through the development and testing of instruments for sustainable product innovations, which should be integrated in hospitality settings so actors will be able to measure and assess foodstuff and menus from the viewpoint of sustainability and health. By now, already existing indicators and assessment methods, e.g. Carbon and Material footprinting, or already targeted concepts such as the Nutritional Footprint or SusDISH have to be compared and analyzed. The aim is to provide a comparison of existing concepts and their adaption to reach the overall goal towards a deeper understanding of sustainable catering and food procurement. The paper may be seen as the conceptional and methodological part of the general framework of the NAH_Gast project.

Keywords: nutrition, out-of-home catering, sustainability assessment, resource conservation, resource efficiency

Introduction and objective

Background

The pace of modern life is leading people to eat out more often – at cafeterias, canteens, fast food outlets, bars and restaurants. With so many food offers high in salt, saturated fat and/or sugar, eating habits do not always conform to current dietary guidelines and further do have a great ecological impact (Macdiarmid et al. 2012). Thus, Nutrition – meaning the consumption of meals – is responsible for a significant share of the resource consumption of a society and results in considerable material footprints (Mancini et al. 2012). In Europe, the food sec-

tor (agriculture, food manufacturing and hotels and restaurants) accounts for 17 % of greenhouse gas emissions and 26 % of natural resource use in final consumption. In order to reduce global resource use to a sustainable level, a sustainable level of resource use has to be defined for nutrition (see Foresight 2011; Jungbluth 2010; Koerber and Kretschmer 2006, Schmidt-Bleek 2009). In general, there is a notable lack of data differentiating dietary intake and ecological or social impact of meals eaten at out-of-home catering.

Objective

Following the idea of the nutrition ecology (Leitzmann 2003), the dimension of health has to be added to the typical three sustainability dimensions used to assess the sustainability impacts of food. Over the last years, different indicators and concepts have been established but most of them are lacking a definition of ecological targets or what is called sustainable levels in Lukas et al. 2015. To take the next step at this point, a comparison of several established methods seems to be necessary to develop a comprehensive concept which is useful for companies in the out-of-home sector and this is also fruitful to develop a deeper understanding about suitable sustainability assessment levels for nutrition, so far.

Methods

To provide a basis for the development of the new assessment method, a comprehensive desk research is needed. This here presented research offers a variety of economic, social, environmental and health indicators as well as relevant (multi-dimensional) concepts. To provide a satisfying number concepts and indicators, an expert workshop was hosted in July 2015 to rather evaluate the desk research.
The next steps may be the assessment of sustainable level for a distinct group of indicators. This has to be done in the near future.

Theoretical Background and indications

Obviously, more abstract and complex concepts tend to drawing up a greater number of indicators and potentially will have more dimensions. Indicators and concepts which are already applied to kitchens or food are of particular relevance for the NAH_Gast project. Therefore, seven concepts, some based on only one, other based on several indicators, have been selected.

The **Carbon Footprint** represents a certain amount of greenhouse gas emissions (usually quantified in tonnes of CO_2 equivalents) that are relevant to climate change and associated with human production and consumption activities. The carbon footprint can be calculated e.g. for countries, regions and towns, for branches and enterprises, for demands (like nutrition) or for households (Wiedmann/Minx 2007). The Carbon Footprint can also be understood as the carbon component of the Ecological Footprint translating the tonnes of emissions into hectares of productive land and sea required to sequester carbon dioxide emissions (http://www.footprintnetwork.org/en/index.php/GFN/page/carbon_footprint/).

“The **material footprint** is a tool to measure and optimize the resource consumption of both products and their ingredients and the production processes along the whole value chain. It covers the whole life-cycle of the products, from the extraction of raw materials to the processing industry, distribution, consumption, recycling, and disposal.“ (Lettenmeier et al. 2012: 584). It is a practical measure for assessing the resource use of meals, because all resources and ingredients used in each process are summed up. The material footprint includes the direct and indirect use of abiotic and biotic resources plus soil erosion in agriculture. The concept is based on the MIPS concept (material input per unit of service) (Liedtke et al. 2014, Schmidt-Bleek 1994). It is a purely quantitative measure for natural resource use (Rohn et al. 2013).

The **Water Footprint** is a concept to measure the direct and indirect volume of water use or pollution by a defined group like a consumer (individual, society, nation) or producer (company). It is defined as the total volume of fresh water, which is going into the production of the consumed or produced good or service. Water use is measured in terms of water volumes consumed (evaporated) and/or polluted per unit of time. The water footprint is a geographically explicit indicator that does not only show volumes of water use and pollution but also the locations. The footprint breaks down into three components: the blue (surface and ground water), green (rainwater stored in the soil) and grey (water that is required to dilute pollutants to such an extent that the quality of the ambient water remains above agreed water quality standards) water footprint. It is an analytical tool to address policy issues of water security and sustainable water use (Hoekstra et al. 2011/ Hoekstra 2008).

The **MNI** (Menü-Nachhaltigkeits-Index, "Sustainability-Index of Menus") is a concept developed in Switzerland to assess the sustainability of menus in the mass catering. The reason for developing this concept was that the consumer does not receive information about the health and environmental aspects of menus. To estimate the health dimension of the menu, the concept includes 8 indicators like the fat and carbohydrates content, based on the nutritional reference values for Germany, Austria and Switzerland (DEG et al. 2015). The health assessment is indicated by so-called "nutritional stress points" respectively "nutritional balance points". To analyse the environmental dimension and to weight the environmental impacts, the methods of LCA (Life Cycle Assessment) and "ecological shortage" are used. The evaluation of different environmental effects like emissions, water use or loss of biodiversity is based on national ecological goals of Switzerland, where actual values are compared to the tolerance values (Distance-to-Target). The environmental evaluation is indicated by so-called "environmental impact points". The aim is to provide a concept that helps the kitchen staff to create healthy and environmental-friendly menus and helps the consumers to select these menus (Müller 2015).

The **Nutritional Footprint** is a concept to evaluate the effects on health and environment because of nutrition. It includes four core-indicators each on health and environment. The dimension on health includes energy (kcal), content of salt, fibre and saturated fat (g). The indicators for the environmental dimension are Material Footprint (g), Carbon Footprint (g), water use (L) and land use (m^2). These eight indicators assemble to a new set of indicators where all phases of the value chain are examined. Next to that, a new ranking level was defined with regard to new limiting values of the effects of the indicators on environment and health, and was translated on a 3-steps-scale of small, medium and strong impact. The goal is to create a transparent and daily life oriented communication (Lukas et al. 2015, Goggins & Rau 2015).

susDish is subdivided in two accounting areas of health and environment (ecology) and has 31 indicators. The health value of the analyzed menus is assessed with 16 indicators, containing twelve reference-values of the DGE (German Society for Nutrition). With this approach, critical supply situations of single nourishments within the menu-line can be identified. To assess the ecological dimension, which includes 15 indicators, the life-cycle based concept of „ecological shortage" is used (see MNI), including a carbon footprint. susDISH is software based. Each indicator can be evaluated individually but also be aggregated so that dishes can be compared with each other. After calculating the "eco-points" and "health points", dishes can be placed in a traffic light coloured coordinate system so costumers can avoid eating "red" dishes – or kitchen managers can remove them from the offering (Meier et al. 2015).

FOODSCALE quantifies eleven sustainability categories (e.g. organic, seasonality, fairly traded food, meat, sustainable sourced seafood, eggs, water, food waste, origin of food, consumer engagement, engaging with smaller producers and local communities) that cover

36 food sustainability indicators. It incorporates social, economic and environmental issues, and considers the entire food system. It is based on a point scoring system, ranging from zero to 100. Each category and individual indicator is weighted to reflect its relative importance to food. This weighting was based on a number of factors including an extensive review of relevant literature, 25 qualitative interviews with food experts, as well as an iterative process of data collection adjusting during the development and pilot phases (Goggins & Rau 2015).

Conclusions

The field of nutrition represents an untapped (and, until now, even not systematically analysed) potential for reducing negative impacts on health and environment. Nevertheless only very few concepts exist which enable actors of the out-of-home catering to measure and assess foodstuff and menus from the viewpoint of sustainability and health. The presented paper aims to demonstrate the status quo of established indicators and concepts which are already applied to kitchens/food. The knowledge gained from the analysis and comparison will be used to develop integrated methods for the assessment of sustainability and health impacts of out-of-home catering.

To compare and analyze the existing concepts for assessing sustainability in out-of-home catering, categories have been formed and thus the results are concluded in Table 1). This table provides an overview and allows identifying correlations between the selected methods. Although, the table enables to evaluate the indicators and concepts by presenting their strengths and weaknesses. These evaluating items – as well as descriptive ones – in the very left column are checked for all seven analyzed concepts in the following columns; the more complex concepts are easily distinguished by different colour shades.

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