A NEW TREND IN EDUCATION AND RESEARCH AT BUDAPEST BUSINESS SCHOOL: GREEN CATERING

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Abstract

Budapest Business School, as an institute of higher education of the 21th century, is committed to the goals of sustainable development. These goals of 17 fields where adopted by 193 countries at the United Nations Conference at New York. Among these 17 fields several ones are linked to our institute. The goal most linked is the aim of sustainable consumption and prevention of climate change through modification of consumption patterns. In this sense the Faculty of Commerce, Catering and Tourism has chosen sustainable catering and hospitality as the research field of its Research Center.

Detection and calculation of the environmental impacts can be given by several indices. Methodology and content of these indices are continuously developing and their relevancy can be from local to global scale. Determination of the processes and the impacts gives heavy tasks because of modification and number of the different methods.

Among the several indices carbon-footprint is the most suitable to the goals of our Research Center. Introduction of the methodology of carbon-footprint is of high importance: this indicator provides opportunity to measure the environmental impact and sustainability of the catering sector, provides the opportunity of making comparisons, and can help to influence the decision making of the consumers and of the contractors.

A case study is summarizing the difficulties of the calculation of carbon-footprint in the field of catering, its advantages and limiting factors beside the detailed introduction of the carbon-footprint literature.

Keywords: sustainable development, Budapest Business School, product carbon-footprint

Összefoglalás

A Budapesti Gazdasági Egyetem, mint XXI. századi felsőoktatási intézmény elkötelezett a fenntartható fejlődési célok iránt. Ezeket 2015. szeptemberében, a New Yorkban megtartott ENSZ-csúcstalálkozón 193 ország által egyhangúlag elfogadott határozat fogalmazta meg. A 17 terület közül több is szorosan kötődik intézményünkhöz. Karunk profiljához és lehetőségeinkhez leginkább a felelős fogyasztás és termelés, valamint az ehhez kapcsolódó fellépés az éghajlatváltozás ellen célja köthető.

Ennek szellemében a Kereskedelmi-, Vendéglátóipari és Idegenforgalmi Kar Kiválósági Központja egyik fő kutatási területeként a vendéglátás környezetterhelésének

tanulmányozását határozta meg. Ennek során többek között azt vizsgálja, hogy a vendéglátás mennyire felel meg a fenntarthatósági szempontoknak, milyen módon és mértékben javítható a fenntartható jellege.

Introduction

Environmental issues have impacts on hospitality industry in a similar way to those arising in other sectors (Taylor et al., 2017). One third of tourists' costs is to be spend for food consumption in the hosting country (Torres, 2000). Food service provision imposes significant environmental impacts (Filimonau et al., 2017). Filimonau and colleagues (2017) suggest that public knowledge on the climate significance of restaurant food choice should be reinforced. Carbon-footprint calculation and carbon labelling of the served dishes should be a suitable solution. According to Brunner et al. (2018) changes in human diets has a significant potential for greenhouse gas emission mitigation. The 29% of global emissions of GHGs are from agriculture and food production (Schmidt Rivera et al., 2014, Vermeulen et al., 2012). Espinosa-Orias and Azapagic (2018) estimated the carbon footprint of commercial and home-made sandwiches and found that the impact from the home-made is two times lower than for the ready-made one. In general, the results of Schmidt Rivera and colleagues (2014) suggest that the impacts of the home-made meal are lower than for the equivalent ready-made meal. Tourists usually consume ready-made meal during the stay at a destination.

Budapest Business School, as a higher educational institute is committed to sustainable development, founded its Sustainable Catering Research Center in the autumn of 2017. This Research Center supports financially several scientifically important goals in the field of Catering and Tourism. Research proposals are of 3 years cycle. One of these research aims is to make a temptation to calculate the carbon-footprint of some products of served food in restaurants. As a first step of the project the researchers summarized the literature of carbon-footprint calculation methods, carbon-footprint of the agricultural cultivation specified for food industry and food products. Carbon-footprint of some food materials used for catering is calculated. Why carbon-footprint was chosen as research field among others of the Research Center? Several indices are used to describe the environmental impact human activities, for example of food industry, catering and tourism.

The World Business Council for Sustainable Development (WBCSD) has settled nine crucial targets with indicators in its document Action2020, and the Hungarian adaptation incorporated five of them by Business Council for Sustainable Development in Hungary:

1. food and feed,
2. sustainable lifestyles,
3. employment,
4. climate change,
5. water.

Detailed goals for these main aims are summarized in *Figure 1*.

Among the fields and targets of Acton2020 Budapest Business School Sustainable Catering Research Center is linked to Food and Feed, Sustainable lifestyles by its research proposals. The realization of the targets can be detected by indicators. In *Figure 2.* the indicators most relevant in the research of the current project are signed in bold and italic.

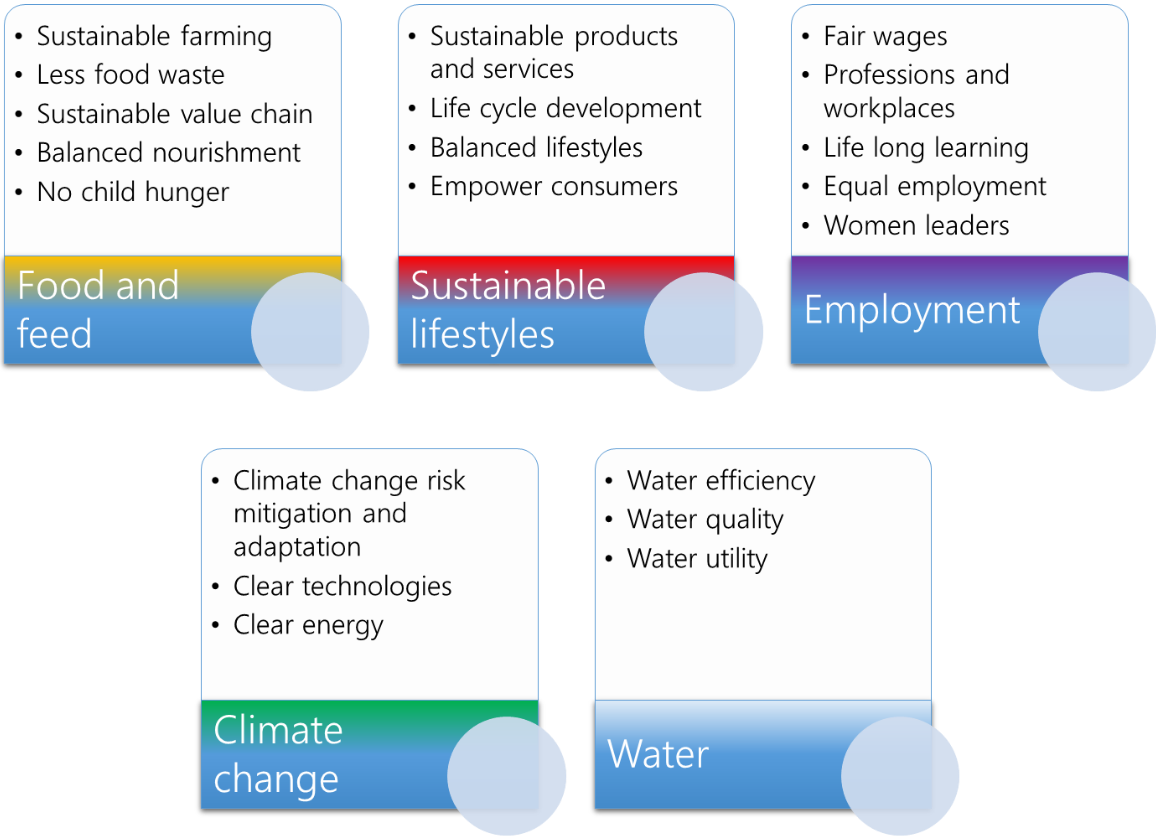

Figure 1. Main and detailed targets of Action2020 (https://action2020.hu/en/celok/)

Figure 2. Targets and indicators of Action2020 most relevant in the current project

Definition of carbon footprint was given by several authors (Mujica et al., 2016, Rebolledo-Leiva et al., 2017). For example according to Wiedmann and Minx (2008) carbon footprint is a part of the ecological footprint, that measures the total amount of carbon-dioxide emitted directly or indirectly to the atmosphere by a certain activity or person or surface, etc. and the surface unit that is capable to neutralize it. Carbon-footprint can be considered as a part of ecological footprint, and Mancini et al. (2016) developed a refining method for carbon-footprint calculation in this sense.

In general carbon-footprint summarizes the greenhouse gas emission equal to carbon-dioxide amount of the production or manufacturing of a product or service. The specific carbon-footprint of Hungary is favorable in comparison to other European countries (*Table 1.*). Greenhouse gas emission is important as an aspect of contamination of the environment, and main accelerative force of global climate change. Nowadays contribution of food production and food industry to the greenhouse gas emission and climate change gets more and more highlight among its environmental impacts.

Table 1. Greenhouse gas emission per capita of the member countries of European Union (given in carbon dioxide equivalent) (European Environmental Agency)

Country	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	10.4	10.2	10.3	11.5	11.1	10.8	10.7	9.8	10.4	10.1	9.7	9.7	9.2	9.4	9.4
Belgium	15	15.6	15.1	14.2	13.9	13.5	13.4	12.1	12.6	11.5	11.1	11.1	10.5	10.8	10.8
Bulgaria	12	9	7.3	8.4	8.6	9.1	9	7.8	8.3	9	8.4	7.7	8.2	8.7	8.4
Czech Republic	19.4	15.4	14.7	14.6	14.7	14.8	14.2	13.3	13.5	13.3	12.9	12.4	12.2	12.3	12.4
Denmark	14	15.3	13.7	12.7	14.1	13.2	12.5	11.8	11.9	10.9	10	10.3	9.5	9	9.3
United Kingdom	14.2	13.3	12.6	12.1	11.9	11.6	11.1	10.1	10.3	9.4	9.6	9.3	8.6	8.3	7.9

EU (28 countries)	**12**	**11.2**	**10.8**	**10.8**	**10.7**	**10.6**	**10.3**	**9.6**	**9.7**	**9.4**	**9.3**	**9.1**	**8.7**	**8.8**	**8.7**
Finland	14.5	14.3	13.8	13.5	15.7	15.3	13.8	13	14.4	12.9	11.9	12	11.1	10.5	11.1
France	:	9.3	9.3	9	8.8	8.6	8.5	8	8.1	7.7	7.7	7.6	7.1	7.1	7.1
Greece	10.4	10.6	11.9	12.6	12.3	12.5	12.2	11.5	10.9	10.6	10.4	9.6	9.4	9.1	8.8
Netherlands	15.1	15.5	14.4	13.8	13.5	13.4	13.3	12.8	13.5	12.6	12.2	12.2	11.7	12.2	12.2
Croatia	6.8	5	5.8	7	7.1	7.4	7.1	6.7	6.6	6.5	6.1	5.9	5.7	5.8	5.9
Ireland	16.1	16.7	18.5	17.3	16.8	16.2	15.6	14.1	13.9	12.9	12.9	12.9	12.8	13.2	13.5
Poland	12.3	11.4	10.2	10.4	10.8	10.9	10.7	10.2	10.7	10.7	10.5	10.4	10.1	10.2	10.5
Latvia	10	5.2	4.5	5.2	5.5	5.8	5.6	5.4	6.1	5.8	5.8	5.8	5.8	5.9	6
Lithuania	13.1	6.2	5.6	6.9	7.1	7.9	7.7	6.3	6.7	7.1	7.2	6.8	6.9	7	7.1
Luxemburg	34.5	26.1	24.3	30.7	29.7	28.2	27.5	25.8	26.5	25.5	24.2	22.7	21.5	20.4	19.8
Hungary	**9.1**	**7.4**	**7.3**	**7.6**	**7.5**	**7.3**	**7.2**	**6.6**	**6.6**	**6.5**	**6.1**	**5.8**	**5.9**	**6.3**	**6.3**
Germany	15.9	13.9	12.9	12.3	12.4	12.1	12.2	11.4	11.8	11.8	11.8	12	11.4	11.4	11.4
Norway	12.3	11.9	12.4	12.1	12	12.3	11.8	11.1	11.5	11.2	11	10.8	10.7	10.7	10.5
Italy	9.2	9.5	9.9	10.2	10	9.8	9.5	8.5	8.7	8.4	8.1	7.5	7.1	7.3	7.2
Portugal	6.2	7.2	8.3	8.5	8	7.8	7.6	7.2	6.9	6.8	6.6	6.5	6.6	7	6.9
Romania	10.7	8	6.3	7	7.1	7.3	7.2	6.3	6.1	6.4	6.2	5.8	5.8	5.9	5.8
Spain	7.5	8.4	9.7	10.3	10	10.1	9.2	8.2	7.9	7.9	7.7	7.2	7.3	7.5	7.3
Switzerland	8.4	8	7.9	7.8	7.8	7.5	7.6	7.3	7.5	6.9	7	7.1	6.5	6.4	6.4
Sweden	8.5	8.5	8	7.6	7.6	7.4	7.1	6.5	7.1	6.6	6.2	6	5.8	5.7	5.6
Slovakia	14	10.1	9.2	9.5	9.5	9.2	9.3	8.4	8.6	8.4	8	7.9	7.5	7.6	7.6
Slovenia	9.3	9.4	9.6	10.3	10.4	10.4	10.7	9.7	9.6	9.6	9.3	9	8.1	8.2	8.6

Materials and methods

The carbon-footprint is a sustainability indicator that gives numerically the amount of emitted greenhouse gases during the life cycle of the product. Life cycle assessment (LCA) is a proper tool to calculate potential environmental impacts of products or systems (Civancik-Uslu et al., 2018). LCA is a methodology used to evaluate the environmental impacts of products and services by taking into account all the production and consumption stages, from the production of raw materials to the end of life, including all intermediate steps (Bicalho et al., 2017), therefore it has high data inquiry. The uncertainty of product information is a critical question to estimate product carbon footprint for product life cycle (He et al., 2018). The methodologies used for the calculation of the carbon-footprint are not uniformed. Even in 2017 the standardization of the latest indicators has not been succeeded and a unique internationally accepted standard has not been developed (Lombardi et al., 2017). Crop production is strongly linked to food production and while different methods are available to account for GHG emissions in life cycle assessments (LCA) of crop production, there are no standard procedures (Goglio et al., 2018) even in this field. Mostly PAS 2070 guidelines can be followed or ISO 14067 standard can be used. ISO 14067 (Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification and communication) standard is based on the standards of lifecycle analyses and assessment, eco-labelling and environmental reporting (ISO 14040. 14044. 14020. 14024. 14025) (www.iso.org). The principle of the standards of the Intentional Organization of Standardization is the PDCA cycle or named also as Deming-cycle (*Figure 3.*).

The basis of the carbon-footprint methodology is lifecycle assessment. The process begins the settle of goals and establish of the system boarders. In case limits are well defined the following step is life cycle inventory analyses, and then lifecycle impact analysis. Finally lifecycle assessment summarizes all the environmental impacts of the process and gives a report for further innovations or planning of improvement (*Figure 4.*)

Schaltegger and Csutora (2012) give a holistic view of carbon inventory analysis methods and carbon-footprint calculation methods that is rapidly developing field of environmental management. Stechemesser and Guenther (2012) provide a literature summery about the methodology of carbon inventory and carbon account.

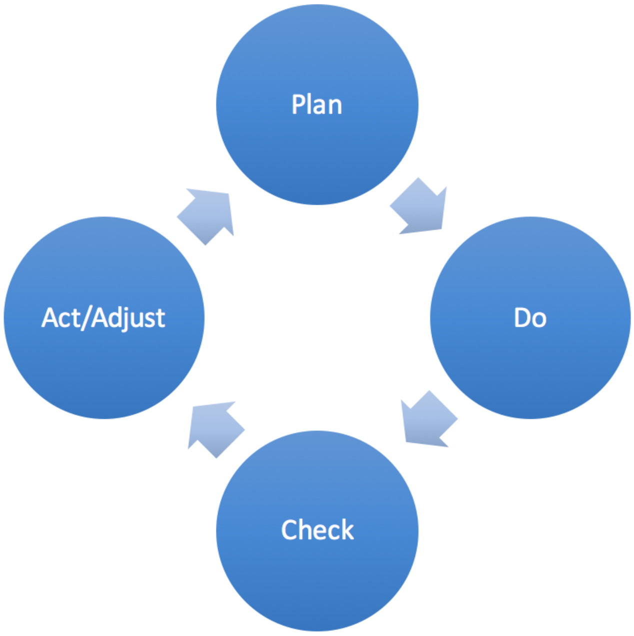

Figure 3. PDCA cycle /Deming-cycle/ (https://iinnovatemag.com/blog/techniques/what-is-deming-cycle-shewhart-cycle-pdca/)

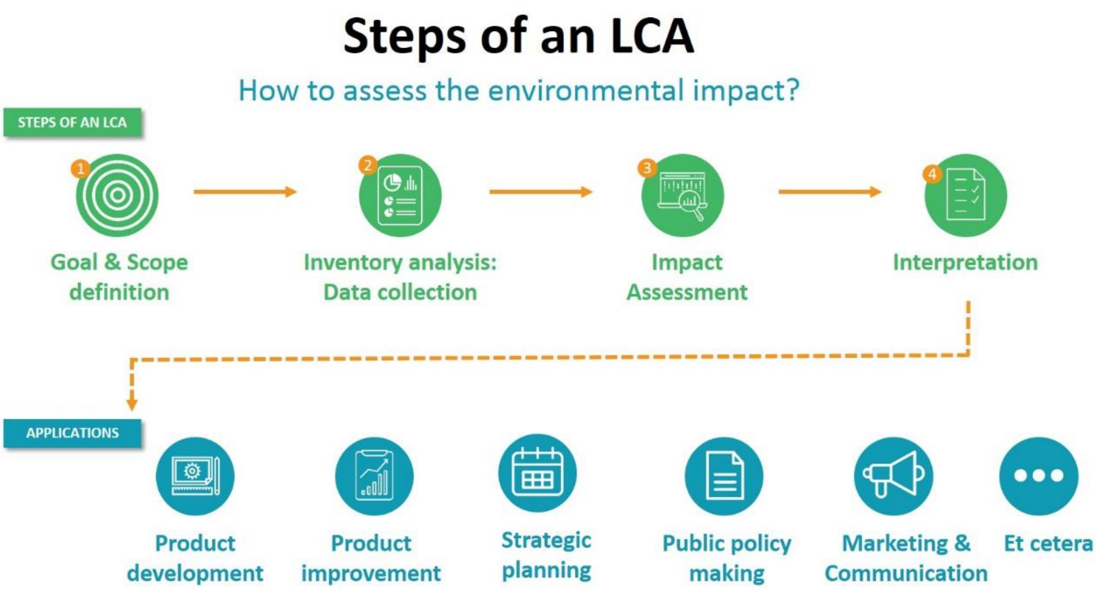

Figure 4. Steps of a lifecycle assessment (http://www.blonkconsultants.nl/what-is-life-cycle-assessment/?lang=en)

Results

Frozen sweet maize product of Mirelite Mirsa PLC was chosen as test material and carbon-footprint was calculated with bottom-up method. Mirelite Mirsa PLC has environmental protection, sustainability and support of local producers at principal position in its business strategy. Hungary is one of the main producers of sweet maize products in Europe.

Dr. Viktor Losó, expert of the company was on our help and provided several useful information about the production. A special thank should be expressed in this form to him by the researchers. The interview led with him gave the basic information to compose the flowchart of the steps of the production system (*Figure 5.*). This was the first stage towards calculating the carbon-footprint of frozen sweet maize per ton.

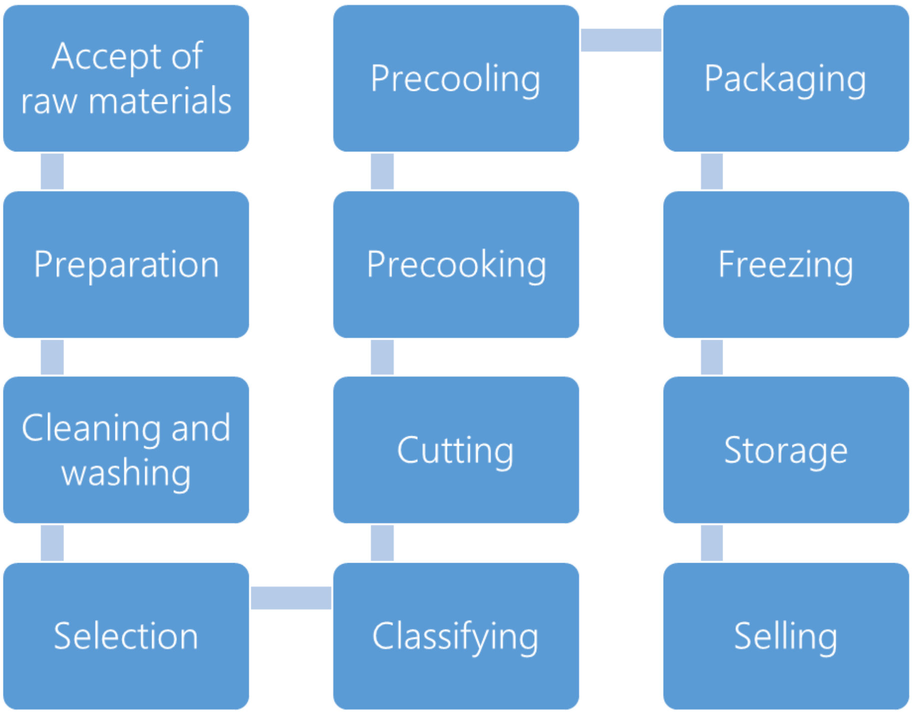

Figure 5. Flowchart of the frozen food industry products

Data at the stages shown in *Figure 5.*, for calculation of carbon-dioxide emission are provided by the interview with the expert, nominal performance of the machines, technical descriptions, transport information, waste management, international databases. *Table 2.* summarizes the emissions of the life cycle of 1 ton frozen sweet maize.

Table 2. Parts of carbon-footprint of 1 ton frozen sweet maize

	Transport	Production	Storage	Waste management	Total
Maize	66.46	4.56	124.97	0.09	196.08
Packaging	52.62	0	0	0.812	53.432
Total	119.08	4.56	124.97	0.902	**249.512**

The carbon footprint of packaging in the phase of production and storage is not part of the carbon-footprint of frozen sweet maize product, but the emission of the transport of the packaging material used in the production is calculated in the CF of the product because Mirelite Mirsa PLC solves the transportation.

This value of the carbon-footprint of frozen sweet maize is calculated just for a selected part of the production. For the scarcity of information the system borders was chosen according to the data available from the Mirelite Mirsa PLC. The most serious limitation of the method is that unfortunately the willingness of providing data suitable for such calculation is poor in the stakeholders of the whole production chain. In this case only the data of the production steps of frozen maize has been provided, but information about the cultivation's carbon-footprint cannot be taken into account, nor the production of the packaging material. As the borders of the system can be freely chosen during the calculation and the limiting factor is the information, the results are not comparable to other values. The calculation method is building bottom-up the value of the carbon footprint for the selected part of the production and follows the guidelines of the life cycle assessment, but has no strict rules. This is the other limitation of such calculations and makes hard to compare to other result. The information and data used in these type of evaluations also vary by the system borders, by technology used, data available and by geographical area.

Discussion

We have calculated the carbon footprint of sweet maize on the basis of an in-depth interview and manual data collection. With the in-depth interview, we have measured the steps of the manufacturing process, while in the course of the manual data collection we have developed a database of CO_2 emissions for the specific performance of the machines. For such a "simple" (less processed) product as frozen sweet maize, only at Mirelite Mirsa PLC we had to take into account the performance of 48 machines. These are closely and directly related to the manufacturing process. In accordance with the LCA approach, when calculating the carbon footprint, CO_2 emission associated with the stages of transport, storage and waste management of the75-step process should also be specified. Experiencing the difficulties of data collecting, we proposed that the University support the research center by obtaining a software and database for the carbon footprint calculation. This process is taking place just now. With this program, we would like to research how the carbon footprint of a product changes with each step of a particular workflow. In parallel with the methodology study, we plan to evaluate the practical utilization of the carbon footprint. We are looking for partners to accomplish this research.

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