DESIGNING SUSTAINABLE AND HEALTHY FOOD SYSTEMS THROUGH CATERING: THE ROLE OF DESIGNERS

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ABSTRACT

Our food system is responsible for some of the world's greatest environmental and societal challenges from climate change to chronic diseases linked with global dietary transition. As the trend of eating out increases, catering has a great potential to lead the transition toward more sustainable food systems. As professionals, designers involved in food service systems design and menu planning not only have to consider environmental impacts through Life Cycle Assessment (LCA) but also have to consider the health impacts of different types of meals. Dietary guidelines may be used for this purpose, however, relying solely on them to compliment LCA will not lead to menu offers with the least environmental impact and the greatest health benefits. As individuals, designers may also choose to facilitate the transition toward more sustainable food system by acting as role models and consuming less animal-based meals both at home and at work.
Keywords: food service system design, sustainability, catering, health

1. INTRODUCTION

Climate change is one of the most pressing global environmental challenges we face today. Changes in the climate system, caused by the global-scale transformation of the composition of the atmosphere due to anthropogenic greenhouse gas (GHG) emissions, and the widespread impacts on human and natural systems are already evident (IPCC, 2014). Our food system is estimated to be responsible for 19 to 29% of global anthropogenic GHG emissions (Vermeulen et al., 2012).

Livestock production alone accounts for 14.5% of the emissions (Gerber et al., 2013). Without addressing the increased trend in meat and dairy consumption that has been observed globally in the past few decades (Scanes, 2018), an 80% increase in global agriculture GHG emissions is predicted by 2050 (Tilman and Clark, 2014). As so, global mean temperatures will likely to exceed 2°C, even with major emissions reductions from other sectors (Kim et al., 2015). Furthermore, animal agriculture is not only a significant contributor to climate change but is also a highly intensive and inefficient user of resources. It is the largest use of land, using 30% of the total land surface of the Earth and consumes 70% of fresh water (FAO, 2006). In addition, one third of total arable land is used to produce feed crops for livestock (FAO, 2006).

Animal agriculture is also linked with the emergence of zoonotic infectious diseases (Greger, 2007), and a notable rise in chronic diseases such as increased risk of cardiovascular disease and mortality (e.g. Walker et al., 2005; Huang et al., 2012) diabetes (e.g. Barnard et al., 2006; Vang et al., 2008) and some cancers (Huang et al 2012; Mitrou et al., 2007). Moreover, there is a positive association between meat consumption and obesity (e.g. Wang and Beysoun, 2009, Rosell et al., 2006). Since the scope of this paper is not to give an extensive overview of the health implications of meat consumption, readers are encouraged to follow up references and review papers synthesising the great amount of scientific literature and results of various studies and clinical trials (e.g. Tuso et al., 2013 or Satija and Hu, 2018). Nevertheless, the results all point to the same direction: the health benefits of consuming whole, plant-based foods (primarily fruits and vegetables) and minimising the consumption of animal-based products (e.g. meat, eggs and dairy).

There is a strong case for reducing the consumption of animal-based products and moving towards the consumption of plant-based foods both from an environmental as well as from a public health point of view. As the trend of eating out is increasing in our societies, the catering sector is becoming a growing component of many economies and a significant part of urban food systems (Edwards, 2013). As a result, the catering sector has an increasing potential to shift our food systems towards sustainability. Designers involved in food service systems design and menu planning have an important role to play by facilitating this transition both as professionals and individuals.

This paper will examine the role of designers in facilitating transitions toward truly sustainable and healthy food systems through menu planning and food service offers. A special focus will be on the role of Life Cycle Assessment (LCA) and dietary guidelines in facilitating the design of environmentally sustainable and healthy catering offers.

2. METHOD

A systematic review was conducted to examine the latest trends of using LCA in the catering sector (e.g. to facilitate the design of environmentally sustainable offers amongst others). In total, 35 papers were identified in which LCA was applied to assess environmental impacts of the catering sector and LCA-based interventions were used to improve sustainability. In this paper the results of only a subset of the 35 studies papers will be discussed which specifically focused on the LCA of different ingredients and meals. The results of these studies can be used to inform designers about what truly constitutes as sustainable catering offer and thus some of the key trends from these studies are briefly described in Section 3.2.

Based on the results of the systematic review, which indicated a lack of inclusion of health impacts associated with different types of meals in the LCA, further desk-based research was conducted to find ways to incorporate health criteria into menu design. Food-based dietary guidelines of seven countries were reviewed. These included Brazil, Mexico, India, China, Italy, South Africa (selected especially because of their relevance to this conference) and Canada (selected so that at least one country from each geographical location is included in the review). Food-based dietary guidelines were accessed from the website of the Food and Agriculture Organization of the United Nations (FAO, 2019).

Information on the specific content of dietary guidelines (restricted to information available in English) of different countries were extracted using a pre-determined data extraction form. Information on: publication year, the authorities responsible for the development of the guidelines, target audience, food categories included in each country's food guide, whether or not they encourage or discourage the consumption of certain types of foods (e.g. fruits, vegetables, grains, meat, dairy or processed food) and if any lifestyle recommendations or reference to sustainable eating and food culture are included in the guideline were extracted. Data were then coded and analysed according to common themes, which will be briefly discussed in the next section.

3. THE ROLE OF DESINGERS

3.1. As professionals

Food systems are inherently interconnected and dynamic systems (Ericksen, 2008) and require professionals who have expertise in using system-based approaches to address specific challenges within the food system. Life Cycle Assessment is one such approach, allowing designers to effectively assess the environmental impact of different meal options and avoid the burden shifting of impacts. With regards to the environmental impacts of meals, an overarching conclusion amongst different LCA studies is that vegetarian meals generally have significantly lower emissions than average meat-based meals (e.g. Pulkkinen et al., 2016, De Laurentiis et al., 2018; Saarinen et al., 2012). However, that is not necessarily always the case as some vegetarian meals rich in animal-based ingredients such as dairy have environmental impacts as high as average (meat-based) meals (De Laurentiis et al., 2018; Pulkkinen et al., 2016). From an environmental point of view, the most sustainable meals tend to be made with low or no amount of animal-based ingredients. This is because the environmental impacts associated with the production of meals using animal-based ingredients (whether meat or dairy) are significantly higher than those made of plant-based ingredients. Furthermore, the production method of ingredients also matters (i.e. whether they were grown organically or conventionally, in greenhouse or sourced locally or regionally) (De Laurentiis et al., 2018).

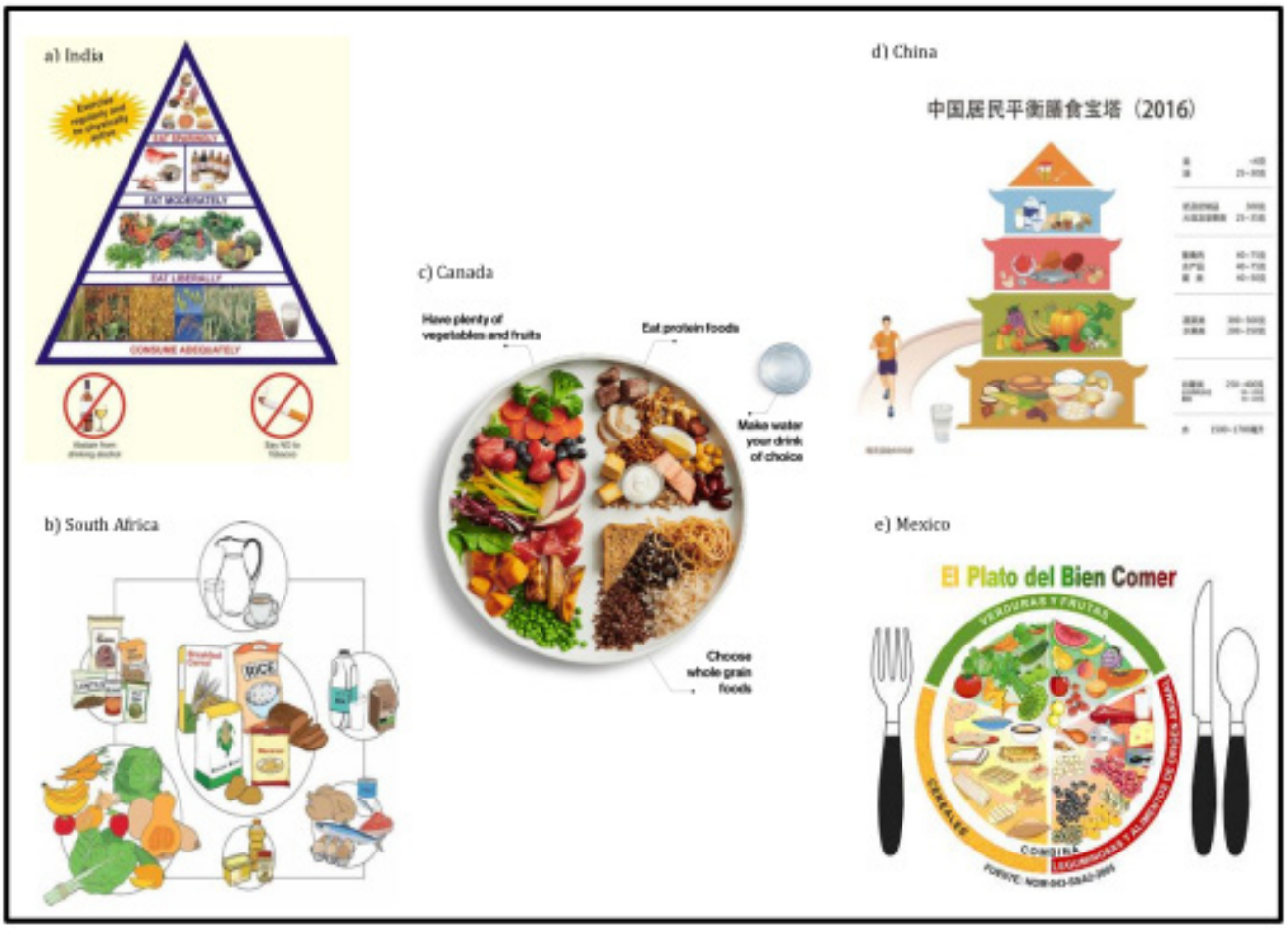
Sustainable food service systems design and menu planning does not end with the consideration of environmental impacts of meals. The role of designers, besides assessing the environmental impacts of meals, is to also carefully consider the health implications of each meal and to assess the trade-offs between health and environmental sustainability. To date LCA studies that included health and the assessment of the nutritional quality of meals either use single parameters such as energy or nutrient intake of macronutrients (e.g. protein, fat or carbohydrate content; Schaubroeck et al., 2018; Benvenuti et al., 2016) or both macro- and micronutrients (e.g. fibre, calcium, iron or different vitamins; e.g. Ribal et al., 2016; Wickramasinghe et al., 2016). Although these parameters are useful for ensuring that the overall nutrient intake from meals is sufficient, they tell us little about the healthiness of meals from a disease fighting and preventing point of view.

Generally speaking, meals with low environmental impact also tend to be healthier, however, there are exceptions to this as well (see Visschers and Siegrist, 2015). Such exceptions highlight issues with using terms like vegetarian and vegan that are commonly used not only in LCA but many nutritional and health studies. As also suggested by Tuso et al (2013), moving away from terms like vegetarian or vegan and starting emphasising the consumption of whole, plant-based foods (primarily fruits and vegetables) while minimising the consumption of animal-based products (e.g. meat, eggs and dairy) could be useful. Such distinctions between animal-based (which include vegetarian meals) versus whole, plant-based meals (which may include vegan meals but not the processed vegan meals) may lead to more consistent results across LCA studies both in terms of environmental and health impacts. In summary, although LCA is a well-established tool for assessing environmental impacts of meals, the assessment of health impacts of different types of meals is less often considered as part of the LCA and comprehensive nutritional criteria are lacking (Benvenuti et al., 2016). Designers therefore may turn to dietary guidelines to inform the design process of menu planning. But will adhering to dietary guidelines be sufficient to design menu offers that are truly healthy and sustainable?

Although the reviewed dietary guidelines overall encourage the consumption of plant-based foods (e.g. they all recommend eating plenty of fruits and vegetables) they differ in their recommendations regarding the consumption animal-based products. Milk is a good example that shows variation between countries. Certain countries (e.g. South Africa and China) see the consumption of milk and dairy as an essential food group to be consumed on a daily basis, while guidelines in other countries (e.g. India, Mexico and Italy) do not put emphasis on the consumption of milk. Canada is one of the countries that recently removed dairy completely from its food guide diagram and no longer considers milk and dairy as an essential food group to be consumed on a daily basis as part of a healthy diet (see Figure 1).

The phrasing of guidelines regarding the consumption of animal-based products also varies from country to country. Dietary guidelines in South Africa and China are phrased in a way that suggest the daily consumption of animal-based products is an essential part of a healthy diet. On the other hand, countries like Brazil encourages people to make natural or minimally processed foods the basis of their diet, in great variety and mainly of plant origin as these support socially and environmentally sustainable food systems. Somewhat contradictory to this statement, the Brazilian guideline then is continued with a sentence encouraging the consumption of animal products such as milk, eggs and meat along with cereals, legumes, nuts, vegetables and fruits as part of a varied diet.

Other countries such as Canada also encourages the intake of vegetables, fruit, whole grains and protein-rich foods, especially plant-based sources of protein. Italian guidelines also seem to put more emphasis on eating more plant-based foods such as cereals, vegetables, tubers and fruits than animal-based foods. Although this is not a common practice, but some guidelines also encourage certain life style behaviours and include sustainability dimensions of food consumption, with messages like “Eliminate waste and develop a new ethos of diet civilization” (China) or encouraging the purchase of locally grown fruits and vegetables that are in season, and if possible grown organically (Brazil).



[Figure 1] Food guides of different countries: a) India, b) South Africa, c) Canada, d) China and e) Mexico. Note: Brazil and Italy do not use food guides hence these countries do not appear in this figure. Source: FAO, 2019.

From these observations, dietary guidelines may serve as useful tools for designers to develop healthy meal options, however their recommendations must be taken with a pinch of salt as the following question arises: If dietary guidelines are developed according to the latest evidence-based scientific knowledge on food, nutrition and health, how is it possible that some guidelines include dairy for example as an essential food group while others don't and why some countries put more emphasis on the consumption of plant-based foods than others? This is an interesting discussion that involves food politics, power relations and the role and power of the food (and even pharmaceutical) industries in influencing the recommendations of dietary guidelines. However, due to lack of space, these will not be discussed here in detail. Relying solely on dietary guidelines as health criteria for menu design, without reviewing evidence from the field of medicine and nutrition at first hand, may not always yield the most optimal solution if the aim was to create the most environmentally sustainable meals with the most health benefits. Inclusion of the results of academic studies, with a careful consideration of the funding sources of studies as suggested by Lesser et al. (2007), could give additional insights to healthy menu design.

3.2. As individuals

Designers do not only play an important role as professionals in creating more sustainable food systems but also can influence food systems for the better as individuals. They can serve as examples and leaders by changing their own lifestyle behaviours and adopting more sustainable and healthy dietary choices both at home and at work and asking for healthier and more sustainable plant-based options in catering facilities, university cafeterias and at professional conferences and meetings. After all what is there to lose? If the side effects of eating whole, plant-based foods are the possibility of decreased risk of cancer, reduced risk from heart disease, lower body weight and reduced number of medications people have to take daily to treat a range of chronic conditions (Tuso et al., 2013) while at the same time our impact on the planet would become smaller, wouldn't it make sense to encourage people all around us, including ourselves, to take up such eating habits?

4. CONCLUDING REMARKS

Given the considerable contribution of the food sector, especially the animal agriculture sector, to climate change, environmental degradation and the promotion of chronic diseases, replacing animal-based menu options with

healthy plant-based options should be a priority in food system design. Designers can play a significant role, both professionally and individually, in ensuring the long-term sustainability of our food system. As professionals, they can use a systems-based tools such as LCA to facilitate the design of environmentally sustainable menu offers without burden shifting environmental impacts. Furthermore, designers also ought to assess the health impact of meals along with their sustainability. Relying solely on dietary guidelines in evaluating the health impact of meals may not always be sufficient and therefore drawing on the expertise of multiple disciplines such as nutrition and medicine dierctly may be necessary. Lastly, designers may also choose to shape our food system by acting as role models and setting an example by consuming less animal-based meals and more plant-based meals both at home and at work.

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