

‘Nudging’ as an architect of more responsible consumer choice in food service provision: The role of restaurant menu design

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Abstract

The sector of food service provision generates substantial environmental and societal impacts. Environmental impacts are particularly pronounced in terms of carbon footprint build-up while societal impacts are reflected in often unhealthy food choice. These impacts should be minimised to facilitate progress of the sector towards sustainability. A significant share of the negative impacts from food service provision is attributed to irresponsible consumer choice which needs to be architected and made more society- and climate-benign. Customer 'nudging' is an effective tool of consumer choice architecture and yet little research has examined its application within the context of private food service provision. This study set to better understand the determinants of consumer choice when dining out and how consumer choice could be reinforced to make it more beneficial from the sustainability viewpoint. To this end, the study reported on the outcome of a consumer survey conducted among visitors to a UK casual dining restaurant where menu design was employed as a customer 'nudging' tool. The survey demonstrated that, next to price, food provenance and nutritional value determined consumer choice when dining out. This information should therefore be displayed on restaurant menus to enable educated, and more environment- and society-benign, food choice. While presenting the food carbon values on a menu was well perceived, some skepticism attached to their prospective use as a determinant of consumer choice was recorded. Recommendations were made on the design of the industry and policy-making interventions required to enhance the public appeal of this menu item.

Keywords

Food service provision, casual dining, sustainability, consumer choice, customer nudging, menu design, UK

Highlights

- 'Nudging' can enable more responsible consumer choice
- We explore the application of 'nudging' in private food service provision
- Determinants of more responsible consumer choice are identified
- The potential of food carbon intensity values to inform consumer choice is revealed
- The importance of menu design as a 'nudging' tool is demonstrated

1. Introduction

Travel, tourism and leisure (TTL) activities play a vital role in modern society as they can enhance physical health and improve mental wellbeing of the public, both from the destination visitor and host community perspective (Andereck and Nyaupane 2011; Hartwell *et al.* 2012; Neal *et al.* 2007). They also hold substantial socio-economic benefits that are generated at all scales (Milne and Ateljevic 2001). While the large, and yet growing, societal and economic significance of TTL activities is well acknowledged, so are their environmental impacts (Filimonau *et al.* 2014; Gössling 2002; Gössling *et al.* 2011). Within the diverse environmental footprint attributed to this sector of the global economy, the on-going contribution to climate change represents an issue of particular concern (United Nations World Tourism Organization - UNWTO 2007).

The hospitality industry is an integral element of TTL activities. Within a broad portfolio of hospitality products and services, food service provision (also known as catering services in some countries) makes a substantial contribution into global climatic changes (Baldwin *et al.* 2011; Gössling 2011). While a large share of these carbon impacts is attributed to the organisational complexity and the operational intensity of catering enterprises, the carbon footprint also arises because of poor consumption choices and irresponsible consumer behaviour (Bohdanowicz *et al.* 2011; Gössling *et al.* 2011). For example, food waste generation has been negatively affecting food service provision for decades and determined the substantial share of the sector in global greenhouse gas (GHG) emissions (Bohdanowicz and Martinac 2007; Papargyropoulou *et al.* 2014). While this issue is often caused by operational inefficiencies of catering business ventures, which include imperfect food preparation and storage techniques, spoilage and inadequate training of kitchen and waiting staff, it is also a product of reckless consumer choice and behaviour (Bohdanowicz *et al.* 2011; Tuppen 2014). To enhance long-term sustainability of the food service provision sector, its operational shortcomings should be rectified while consumer choice managed so that it becomes more societally- and environmentally-responsible (Hall 2013; Phtidis and Sabbage 2011).

Re-shaping consumer choice to make it more environment- (for example, via the reduction of its climate impacts) and society-beneficial (for instance, via the minimisation of its impact on public health systems) represents a difficult task. National policy-making institutions, representatives of the food service provision industry, civil sector and academia all have a stake to play in its successful management (Guthrie *et al.* 2015; Mont *et al.* 2014). There is evidence that substantial scope exists for the food service provision industry to become more actively involved in consumer choice architecture. This can be achieved via closer integration of so-called 'social marketing' techniques into traditional industry marketing strategies (Kotler and Zaltman 1971) and through more active application of external 'nudging' of customers (Thaler and Sunstein 2008). Social marketing represents a marketing approach used to enable behavioural changes for the benefit of individual consumers and society as a whole (Truong and Hall 2013). To this end, it can employ various 'nudging' strategies that refer to changing the consumption environment with a view to alter people's behaviour in a positive, predictable way (Butcher *et al.* 2016). 'Social marketing' and 'nudging' have both been recognised as effective tools to facilitate consumer choice which is beneficial for the environment and society (Dinan and Sargeant 2000; Hall 2013; Lehner *et al.* 2016). While research into this area has been growing and there is empirical evidence showing increasing penetration of 'social marketing' and 'nudging' into various sectors of the world economy (Mont *et al.* 2014), the speed of the industry adoption of these techniques remains insufficient and should be increased (Hall 2013; Truong and Hall 2013).

The hospitality industry in general, and its food service provision sector in particular, offers a number of opportunities for the application of 'social marketing' and 'nudging' as a means to positively affect consumer choice (Truong and Hall 2013). Indeed, food consumption is a largely habitualised, routine activity where the scope for voluntary changes is minimal (Mont *et al.* 2014). This underlines the importance of applying external intervention, which can take the form of 'nudging' or reminding to catering service customers about the outcome of their food choice, in order to achieve behavioural patterns that are more societally benign (for instance, selecting healthier food options) and more environment-

friendly (for example, choosing less carbon intense food alternatives) (Arvai and Campbell-Arvai 2012; Kallbekken and Sælen 2013; Truong and Hall 2013).

Within the context of food service provision, restaurant menus can be employed as a powerful 'nudging' vehicle (Lehner *et al.* 2016; Mont *et al.* 2014). Menus are designed to display information which consumers consider when placing food orders. This information may relate, for instance, to the health (for example, calorific values of ingredients; amounts of fat, sugar and salt content) and environmental (for instance, provenance of ingredients and fair trade standards) qualities of menu items, thus enabling customers to make prompt, yet educated, choices about the societal and environmental impacts of the food choice (Arvai 2012; Wansink *et al.* 2001). While the value of restaurant menus as architects of consumer choice is recognised, there has been limited evidence of research conducted on this important topic to-date (Saulais 2015), particularly from the standpoint of minimising the impact of food service provision on climate change (Gössling 2011; Pulkkinen *et al.* 2016; Spaargaren *et al.* 2013).

This paper contributes to the growing stream of research on the application of the 'social marketing' and consumer 'nudging' paradigms in the context of food service provision. It reports on the outcome of a 'nudging' intervention that was carried out in the UK casual dining restaurant sector and whose outcome was captured via a consumer survey. It identifies determinants of consumer choice when dining out and reveals the important role played by menu design in affecting customer decision-making. Ultimately, the paper pinpoints the key blocks of the society- and environment-relevant information that UK restaurant visitors desire to see on menus. The findings of this study can therefore be used to reinforce environmental policy-making and hospitality management practices to ensure the food service provision sector becomes more environmentally sustainable, societally beneficial and consumer-focussed.

2. Literature review

Despite the growing international recognition of the substantial environmental pressures associated with the hospitality industry, studies designed to examine the complexity of the

inter-linkages between hospitality operations and the environment remain small in number, limited in scope of analysis and fragmented in terms of the sectorial and geographical coverage (Gil *et al.* 2001; Melissen 2013; Melissen *et al.* 2016; Myung *et al.* 2012). The issue is particularly manifested in the context of food service provision where sustainability implications of catering have received scant attention to-date (Gössling *et al.* 2011; Schubert *et al.* 2010). As shown by Myung *et al.* (2012), the environmental performance of the food service provision sector is under-studied as primary attention has traditionally been paid to the environmental impacts of tourist accommodation. This calls for a change given that public demand for food intensifies and accelerates environmental impacts attributed to its provision, both in 'at home' and 'out-of-home' settings (Gössling *et al.* 2011; Namkung and Jang 2013). The contribution of the catering service sector to global climatic changes deserves particular attention as the carbon footprint of dining out is large and yet growing, which implies urgent mitigation (Baldwin *et al.* 2011; Gössling 2011; Kasim and Ismail 2012).

The significant contribution of food service provision to climate change is determined by the complexity of its supply chain and distribution networks (Baldwin *et al.* 2011; Coley *et al.* 2009; Wang *et al.* 2013). It is also attributed to operational inefficiencies of catering enterprises (Hu *et al.* 2013) that can further be intensified by reckless managerial attitudes and decisions (Kasim and Ismail 2012). Limited understanding of the inter-linkages between food service provision and climate change by hospitality staff also plays a role (Bohdanowicz *et al.* 2011; Hu *et al.* 2013). This issue becomes particularly pronounced when careless behaviour of employees is mirrored by alike managerial attitudes (Melissen 2013). Lastly, irresponsible consumer choice contributes to the intensifying carbon intensity of food service provision (Tuppen 2014). This is also the area where substantial mitigation opportunities rest (Gössling *et al.* 2011).

Consumer choice in food service provision represents an established object of research inquiry which has been meticulously explored from a variety of perspectives, in a broad range of socio-economic, political and cultural contexts and through the application of different research methods. Seminal contributions include, but are not limited to, the works

by Auty (1992); Johns and Pine (2002); Kivela (1997); Yüksel and Yüksel (2002). A number of common and contradictory themes have emerged from research which underlines the complexity of the issue under review and emphasises the cumbersome process of analysing and predicting consumer choice when eating out.

The environmental implications of food consumption when eating out are significant (Gössling *et al.* 2011) and yet they have not been investigated in depth (Schubert *et al.* 2010). Existing research into this subject has been limited in number while the scope of analysis has been constrained due to its primary concern with a small set of issues, namely: customer perception of sustainability-related practices adopted by food service operators (see, for example, DiPietro *et al.* 2013b; Dutta *et al.* 2008; Jang *et al.* 2011); consumer willingness to pay for environmentally-benign products and environmental management initiatives applied by restaurateurs (see, for instance, DiPietro *et al.* 2013a; Frash *et al.* 2015; Kim *et al.* 2015); and customer attitudes to the use of 'green' marketing tools by catering establishments (see, for example, Hu *et al.* 2010; Jeong *et al.* 2014; Vieregge *et al.* 2007). Limited research has examined the role of catering business ventures in managing pro-environmental consumer choice (Gössling 2011). This is a significant drawback which ought to be addressed.

There are at least two reasons for why it is paramount to better understand how food service providers can affect consumer choice to make it more responsible. First, there is a broad consensus in literature that TTL customers are reluctant to voluntarily change their behaviour so that it becomes more benign towards the environment and society (Lehner *et al.* 2016; Mont *et al.* 2014). There are a range of factors that contribute to this negative behavioural pattern which comprise: lack of personal knowledge on the inter-linkages between individual consumer choices and environmental pressures; low levels of environmental awareness among the public; and general customer unwillingness to replace comfortable, largely unsustainable, leisure routines with more environmentally-responsible lifestyles (see, for instance, Cohen and Higham 2011; Dickinson *et al.* 2013; Gössling *et al.* 2012). This suggests that other TTL stakeholders should take a more active part in

facilitating positive behavioural changes among consumers. Second, there is evidence that many TTL customers rely upon others, including government and industry representatives, in terms of designing strategies for environmental impact mitigation and expect them to be pro-actively implementing measures developed to encourage environmentally- and societally-conscious consumer choice (Becken 2007; Stoll-Kleemann *et al.* 2001). Such a shift of responsibility to other stakeholders reinforces the argument that food service providers should be working harder to (re-)shape customer choice and make it more environment- and society-benign.

Ultimately, there are two major ways through which catering enterprises can manage consumer choice: one is to limit supply of environmentally- and societally-undesirable food options and the other is to affect customer demand (Saulais 2015). Imposing mandatory restrictions on food supply and limiting public access to certain food options is contentious and should be applied with caution as this may have a significant detrimental effect on the success of business operations (Currie *et al.* 2010). Affecting consumer demand may therefore represent a preferred option from the viewpoint of commercial feasibility when applied in the context of catering services (Kallbekken and Sælen 2013; Pulkkinen *et al.* 2016).

There is evidence showing that customer demand is influenced by the way choices are presented to them (Thaler and Sunstein 2008). Arana and Leon (2013) and Gössling *et al.* (2009) discuss, for instance, the effect of presenting a default opt-in option to offset carbon emissions from travel when booking holidays online on the increased number of offset payments collected from tourists. When applied in the context of food service provision, Dayan and Bar-Hillel (2011) highlight a link between the menu position of the item and its popularity with restaurant visitors. Likewise, Wansink *et al.* (2001) discuss the use of descriptive menu labels as enhancers of consumer perception of the quality of menu items and enablers of purchasing decisions. Affecting customer decision-making via manipulations with the choice environment is often referred to as 'nudging' (Thaler and Sunstein 2008).

Application of customer 'nudging' in food service provision is considered promising given the relative simplicity of its deployment from an operational standpoint (Saulais 2015).

For 'nudging' to succeed, it should meet two fundamental criteria. First, it is paramount to not restrict options so that consumers are given an opportunity to freely choose *any*, including unsustainable if they wish, product or service alternative (Arvai and Campbell-Arvai 2012). This is because customer choice restriction as a policy intervention instrument has a number of disadvantages and may even lead to public opposition (Lombardini and Lankoski 2013) which implies it should be employed with care. While 'nudging' imposes no limitations on customer choice, it strives to manipulate it so that it becomes more environmentally- and societally-beneficial. Second, 'nudging' should not impose too much distraction; in contrast, it is important to ensure that no or as little as possible changes to routine customer behaviour are made and no extra effort from consumer side is required (Johnson *et al.* 2012; Mont *et al.* 2014). Again, this is to avoid public opposition of what may be perceived as coercive choice.

In the context of food service provision, the most natural way of customer 'nudging' is via the use of menus (Saulais 2015; Wansink *et al.* 2001) as these facilitate consumer decision-making (Kozup *et al.* 2003). Furthermore, menus represent the main medium of customer choice which underlines the critical role they play in the choice architecture (Dayan and Bar-Hillel 2011; Thaler and Sunstein 2008). Restaurant menus can therefore be (re-)designed in such a manner that they inform consumers with an intention to 'nudge' more environmentally- and societally-beneficial food choices. Menus can also contain labels which signify various environmental (for example, carbon footprint) and nutritional (for instance, amounts of fat and sugar) qualities of the foodstuffs (Cohen and Vandenberg 2012; Liu *et al.* 2016; Vanclay *et al.* 2011). While the use of labels has deficiencies (Gössling and Buckley 2014), it is currently considered a feasible producer (or service provider)-consumer communication tool in the absence of other, more effective communication alternatives (Elofsson *et al.* 2016; Liu *et al.* 2016).

Although the substantial role of ‘nudging’ as a consumer choice architect in food service provision, alongside the importance of menu design as a ‘nudging’ vehicle, has been discussed in peer-reviewed literature, the scope of analysis undertaken to-date has been limited and calls for enhancement (Hall 2013; Truong and Hall 2013). The primary focus has been on the application of ‘nudging’ as a facilitator of healthier food choices and more nutritionally sound diets (see, for instance, Dayan and Bar-Hillel 2011; Hwang and Lorenzen 2008; Kozup *et al.* 2003). This is also because the discussion has largely been concerned with the public sector’s catering (see, for example, Just and Wansink 2009; Spaargaren *et al.* 2013; Sunstein and Thaler 2008) and little attention has been paid to the use of ‘nudges’ by private food service operators. Lastly, the geographical scope of investigation has been constrained by countries in North America, Australia and New Zealand, and continental Europe (see, for instance, Pulkkinen *et al.* 2016; Spaargaren *et al.* 2013; Truong and Hall 2013) while the UK has largely been excluded from analysis. This research rectifies this knowledge gap as it extends the scope of analysis from the diet-related ‘nudging’ only to the more holistic ‘nudging’ aiming to enable both environmentally- and societally-benign food choice. The study also looks into how ‘nudging’ could be applied to the UK private sector of food service provision.

3. Research design

This study employed a menu ‘intervention’ approach to explore the role played by menu design in ‘nudging’ more environmentally- and societally-conscious consumer choices. In line with ‘field experiments’, the merit of this approach is in the capability to test how the new concepts and hypotheses can be applied in the real-world settings, thus reinforcing theories with valuable empirical, business-related evidence (Harrison and List 2004). For this ‘intervention’ approach to succeed, it is paramount to identify a willing partner who has the capacity and demonstrates the readiness to facilitate implementation of the intervention project (Resch *et al.* 2014). While such an opportunistic approach to research and sampling has a number of shortcomings, it is considered appropriate given the busy and unpredictable nature of business in the private catering service sector (Poulston and Yiu 2010). This is in

line with Riemer (1977) who posits that planned interventions in real-life business settings can only be effective if a willing-to-help organisation is recruited. Similar field ‘interventions’ have been applied in the food service provision sector previously (see, for example, Pulkkinen *et al.* 2016; Spaargaren *et al.* 2013; also see Sinclair *et al.* 2014 for a review) which demonstrates the practical feasibility and investigative effectiveness of this research approach.

This study conducted a planned intervention in collaboration with a food service provider from Bournemouth (Dorset, UK) whose management had chosen to integrate sustainability values into its business operations and granted researchers access to their clientele. The project’s partner represented a busy casual dining restaurant of a small-to-medium size where return guests constituted a large portion of the operator’s custom. The focus on casual dining was deliberate as it represents the largest and most rapidly growing segment of the UK catering service market (Price Water Coopers - PwC 2013). It was also due to evidence that the custom of the casual dining sector is rather ‘conservative’ in terms of responding to sustainability-related trends in food service provision compared to the more upmarket clientele which calls for better understanding of their consumer choice and behaviour (DiPietro *et al.* 2013a; Namkung and Jang 2013).

To explore the role played by menu design in ‘nudging’ consumer choice, the partner restaurant agreed to develop a new ‘a la carte’ menu card. The management requested that, in addition to the informational content which could be classed as ‘traditional’ (i.e. menu item price, lists of ingredients and main allergens), the card would also display the sets of information that could be described as being rather unconventional for a typical restaurant menu, namely: nutritional, calorific and environmental credentials of the food served. Provenance of ingredients and the carbon footprint of food were selected as the key descriptors of the environmental quality given the issues of foodstuff origin and climate change are often referred to as the key environmental attributes of food service provision (Garnett 2011). Informing the public about the nutritional, calorific and carbon intensity values of food can affect consumer choice and make it more societally- and environmentally-

responsible (Helfer and Shultz 2014; Wills 2013); hence, all this information was adopted for the purpose of this study. The final, re-designed restaurant menu employed in the intervention contained the following key information blocks: price; list of ingredients; provenance of ingredients; allergens; nutritional; calorific; and carbon intensity values (Figure 1). The new menu card was considerably different from the original menu employed in the partner restaurant (Figure 2).

Presenting such a complex trail of information on a menu card was a cumbersome task to fulfil. First, although the required data were publicly-accessible and available via dedicated specialist food databases, the process of these data retrieval, especially for food carbon intensity indices (see next paragraph), was time-consuming. Second and most important, however, was to ensure that as little choice distortion as possible had been imposed on consumers. Certain categories of restaurant customers find exposure to detailed food-related information when dining out overwhelming and may therefore prefer when data facts are displayed in a short and concise format (Guthrie *et al.* 2015). To partially address this issue, labels can be employed as effective communication and 'nudging' tools because they enable consumers to make quick, yet informed, food choices based on certain key parameters (Grunert 2002). This factor was accounted for when displaying information on the nutritional attributes of foodstuffs which was communicated on a new menu card with the help of the 'traffic lights' label (Figure 1). The choice of this particular label was determined by the history of its adoption in the UK grocery retail sector through which it has gained substantial levels of consumer recognition (Campbell 2013).



Figure 1. Extract from the re-designed restaurant menu card.

Menu A

Soup of the Day

Sautéed Mushrooms Bruschetta topped with a
Poached Egg and Balsamic Glaze

-X-

Steak and Mushroom Pie topped with a Butter
Pastry Lid, Served with Garden peas and
French Fries

Smoked Haddock served on bed of Breaded Sauté
Potato cake and Creamed Leeks, Topped with
Poached egg.

Chefs Dish of the Day

Quorn Cottage Pie, Sweet Potato and
Caramelised Onion Topped with Creamy Mash.

Spinach, Leek and Ricotta Bouridos topped with
Cheese Gratin

Figure 2. A sample of the original menu card in the partner restaurant.

To accurately assess the carbon footprint of foodstuffs served in the partner restaurant, the life cycle thinking approach was adopted (Filimonau 2016). The data required to calculate the carbon intensity indices were extracted from a range of sources, such as: free-to-access life cycle assessment (LCA) databases (LCA Food Database 2007), peer-reviewed literature (for instance, Scarborough *et al.* 2014) and specialist industry and supplier publications (for example, Kingsmill 2015). The calculated carbon footprint values embraced the totality of lifecycle greenhouse gas (GHG) emissions associated with food production and transportation but, due to data availability, did not include the carbon footprint attributed to food storage and preparation. The carbon contribution of these operational processes is deemed low (Garnett 2011); hence this exclusion was not critical.

As part of the intervention, the partner restaurant's visitors were exposed to the new, re-designed menu card. The card was offered to customers by the waiting staff immediately after seating at a table. Diners had an opportunity to carefully explore the re-designed menu prior to placing a food order which was subsequently served to a table by a waiter. Operational logistics and managerial commitments dictated selection of lunch time as the only dining occasion suitable for carrying out the project. Lunch was preferred also due the shortness of the lunch menu in the partner restaurant which had reduced the amount of time and effort invested into the extraction of relevant data on various food qualities tested in a survey. This is considered a main limitation of the study whose implications are discussed in Conclusions.

The outcome of the intervention was captured with the help of a customer survey. A questionnaire was developed based on the themes emerged from the literature review as well as a qualitative pilot study whose outcome is reported elsewhere. The questionnaire incorporated items on: 1) socio-demographic data; 2) experience of dining out, including the type and the frequency of food service operators visited; 3) personal attitudes to the problem of climate change, particularly as manifested in the context of food service provision; and 4) determinants of consumer choice, including information related to the societal and environmental qualities of foodstuffs, as presented on the re-designed menu card. Items 2-4

were operationalised using a 5-point Likert scale. The Likert scale is a common ratings format for consumer surveys (Allen and Seaman 2007) which has determined its choice for this project.

The survey instrument was administered face-to-face. It took the form of a self-completed but researcher-observed survey which was conducted over a three-week period in August-September 2015 using a non-probability sampling strategy on a next-to-pass basis. This strategy dictates that when one response is obtained, the next person to pass the survey point is requested to partake. It is acknowledged that the chosen research instrument is not ideal and social desirability biases that force people to report on the desired by the wider society, rather than personally preferred options (see, for instance, Leggett *et al.* 2003; Nederhof 1985; Smith 2007) may have affected its outcome. Yet, its employment is deemed appropriate as the chosen survey format provided researchers with an opportunity to interfere and address any participant queries arising during the survey. The survey was explicitly asking participants to report on their *actual* consumption acts, rather than on a hypothetical situation, which represents one the approaches to avoid biased answers (Budeanu 2007).

To avoid distraction, restaurant visitors were approached after the meal had been consumed and requested to partake in the survey at the payment stage. During the survey the researchers remained available to ensure any questions were promptly addressed while any queries clarified. No incentives were offered. A small number of longer, informal conversations were held with selected, willing respondents upon survey completion to obtain better understanding of the public views on the subject matter studied.

4. Data analysis and discussion

In total, 340 usable questionnaires were collected with the response rate of circa 75%. The sample comprised of: 52.9% females; 85.3% educated to a degree level and above; and 75.3% in full- or part-time employment. In terms of age and income level, the data were slightly distorted towards younger demographics and the 'above-nation' income median of £25,600 (Figure 3). Bournemouth is home to two Universities with large student and staff

populations that have been growing recently; this can serve as a partial explanation to this phenomenon. This notwithstanding, the sample is deemed to be broadly representative of the UK casual dining out population (Mintel 2015).

The sample was made up by frequent restaurant diners, with 50.6% eating out casually once a week or more often. The proportion of respondents who dine out less frequently than once a month was small (13.1%). Casual dining and fine dining restaurants were the most and the least popular types of catering establishments within the sample, mentioned by 49.7% and 30.9%, respectively. This largely compliments recent statistical data on the UK eating out market compiled by Mintel (2015).

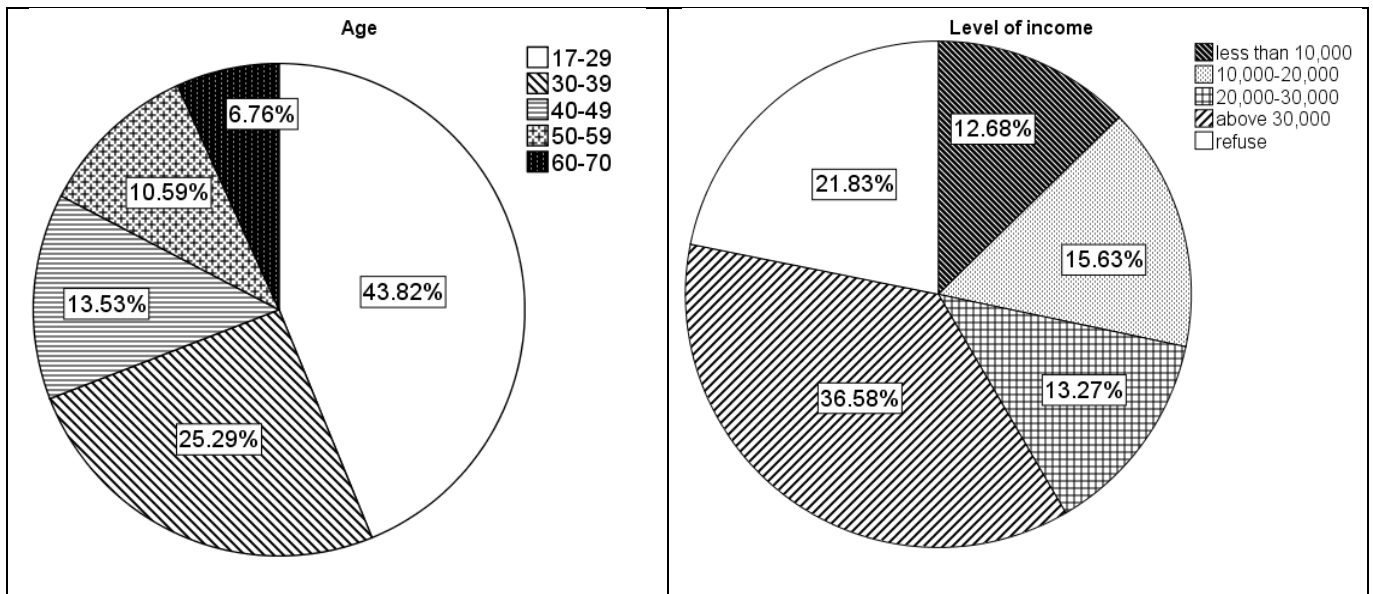


Figure 3. Age and income level of survey respondents.

According to managers of the partner restaurant, its lunch clientele are primarily made by repeat visitors. The novelty of the re-designed menu card can partially explain why the majority of respondents (80.5%) stated that they paid it close attention and gave full consideration to the information it presented before placing a food order. This underlines the long-established importance of menus as a means to affect consumer choice (Bowen and Morris 1995). While price represented an important factor in customer decision-making (M=2.56, where 1 = Strongly agree and 5 = Strongly disagree; Question: '*Price had a large impact on my choice when I was ordering food at this restaurant*'), there were further, more influential determinants of consumer choice, such as provenance of ingredients (M=2.39;

Question '*Provenance of the ingredients had a large impact on my choice when I was ordering food at this restaurant*') and the food nutritional values (amounts of fat, including saturated fat, salt and sugar) (M=2.42; Question '*Nutritional values of food had a large impact on my choice when I was ordering food at this restaurant*'). This confirms Mintel (2016) who report that while price represents an essential element of consumer decision-making process when eating out, there are a number of other, health-related factors that contribute to customer food choice.

The calorific values of food played less important role in customer decision-making (M=2.76; where 1 = Strongly agree and 5 = Strongly disagree; Question: '*Calorific information on the menu had a large impact on my choice when I was ordering food at this restaurant*'). This is in line with literature which suggests that the appeal of calorific labels may have been fading away and that the display of calories on restaurant menus has limited effect on contemporary consumer choice (see, for example, a systematic literature review on this subject in Swartz *et al.* 2011). Further comparison of the means revealed statistically significant association between female respondents and their attitudes to the display of calories on the menu ($t=2.82$; $p=0.005$) which confirms the different appeal of presenting calorific information on restaurants menus to the different genders as reported in literature (see, for instance, Bates *et al.* 2009 for an overview). Lastly, allergen information was found least influential (M=3.06; '*Allergy information on the menu had a large impact on my choice when I was ordering food at this restaurant*') which can be partially explained by a small share of customers suffering from food-related allergies in the sample studied (4.7%).

While displaying health-related characteristics of food on the menu was valued by diners, the majority (77.9%) opted to see this information presented in a more simplified and visually appealing manner, preferably in the form of images or labels, such as the nutritional 'traffic lights' (Figure 1). This compliments literature (see, for example, Guthrie *et al.* 2015; Grunert 2002) which states that numbers on a restaurant menu should be used sparingly and appear concise. The red-amber-green colour 'traffic lights' codes were particularly appreciated by many (81.3%) due to the ease of their understanding. The success of the 'traffic lights'

labeling scheme in the UK grocery retail sector (Grunert *et al.* 2010) outlines opportunities for its implementation in food service provision, with an ultimate goal to inform customer decision-making and encourage more societally-benign consumer choice.

Displaying food carbon intensity values on the restaurant menu was generally seen positively by the diners. However, only a small share of responders (11.5%) stated they took it into account when placing a food order. Furthermore, a substantial level of uncertainty was revealed regarding the future of this menu item as a determinant of consumer choice. The novelty of this information was appreciated and yet many respondents remained undecided on whether or not the carbon footprint of foodstuffs would drive their future decision-making when eating out (Figure 4). This outlines a vast area for prospective research; this research should at foremost aid in design of the managerial and policy-making interventions required to convey to restaurant customers the important role played by this menu item in shaping more climate-responsible food choices.

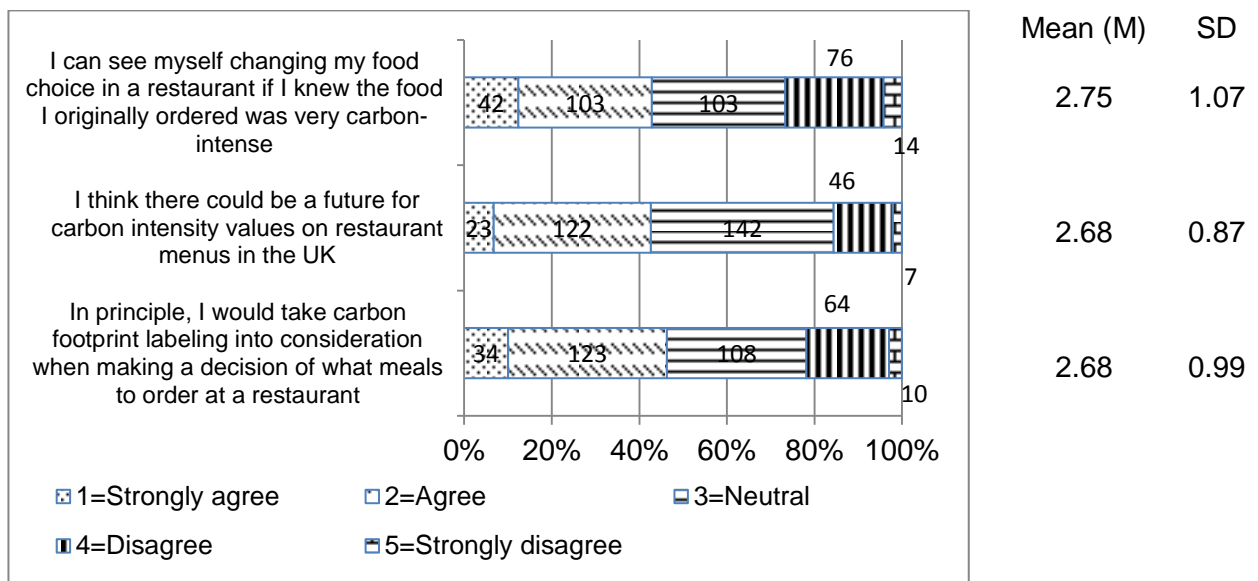


Figure 4. Food carbon intensity values and consumer choice when dining out.

To determine any statistically significant differences in respondents' views on the menu items studied based on education level and income, Kruskal Wallis tests were run. Education level was found to affect consumer choice for the following items: provenance of ingredients ($H=13.811$; $p=0.017$; particularly pronounced for University degree holders),

price ($H=14.952$; $p=0.011$; especially relevant to holders of University undergraduate degrees) and carbon intensity values ($H=13.090$; $p=0.023$; particularly strong for University degree holders). Income had a strong effect on price ($H=17.915$; $p=0.001$) for all customer categories aside from high income earners (i.e. income level above £30,000). A small effect of income on the food calorific values ($H=11.277$; $p=0.024$) was also recorded across all income levels. These findings are largely in line with the outcome of previous studies aiming to explore the inter-linkages between gender, the levels of education and income, and pro-environmental decision-making (see, for example, McCright 2010), also as applied in the context of food service provision (see, for instance, Hu *et al.* 2010).

Given the recent literature discourse on the often erroneous association of local food with more carbon-benign food (Coley *et al.* 2009; Hallsworth and Wong 2012; Kemp *et al.* 2010; Wong and Hallsworth 2012), a probe was made to examine if this applied to the sample studied. The majority (54.3%) were found to indeed draw parallels between local produce and lower carbon impacts ($M=2.47$; where 1 = Strongly agree and 5 = Strongly disagree; Question: '*Local food has lower carbon impacts*') albeit there was a large number of undecided (31.0%). The effect of education level and income was further measured but Kruskal Wallis tests indicated no effects. This is alarming given the sample was represented by the well-educated and affluent audience with high levels of environmental and climate change awareness, both at home and when dining out (Figure 5). This outlines a critical area for policy-making and managerial intervention calling for the enhancement of public awareness about the climate significance of food choice and explanation of the factors that may contribute to the substantial carbon intensity of some local products.

Lastly, the role of food carbon intensity values in shaping consumer choice was also indirectly tested via observed changes in the number of orders placed for most carbon-intensive menu items. Kitchen records indicated a small (circa 7%) decrease across orders of least climate-benign foodstuffs, most notably the gourmet beef burger (Figure 1), compared to the identical past operational period of similar duration when the conventional menu was utilised. While this evidence is largely anecdotal, the informal conversations with willing

respondents confirmed that some diners changed their initial intention to order the burger having seen disproportionately large numbers of GHG emissions attributed to this item on the new menu.

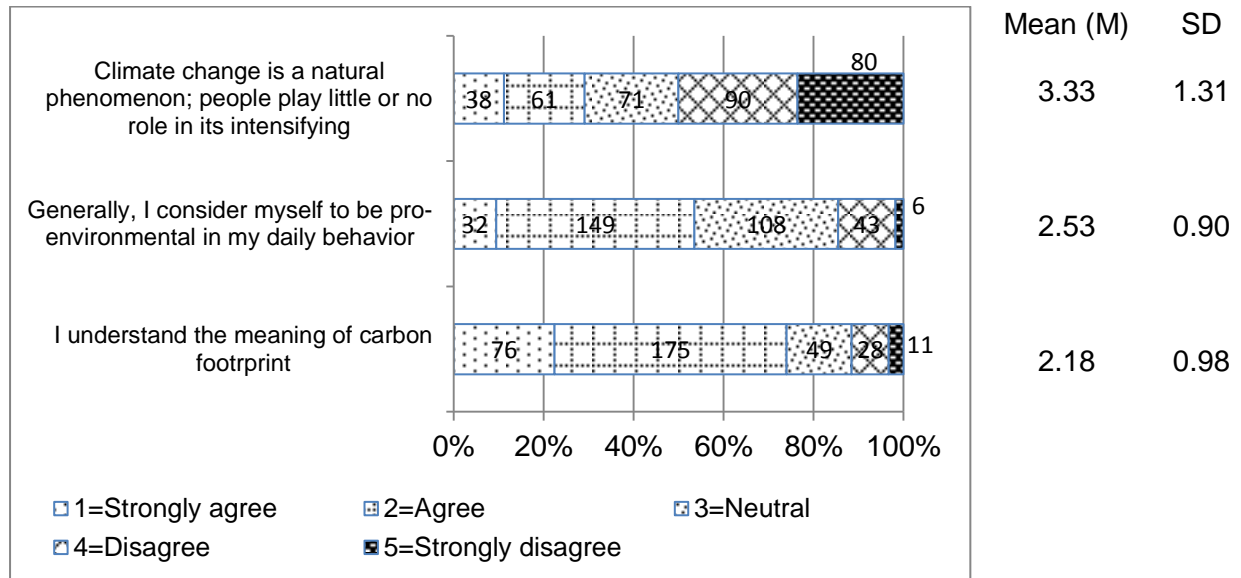


Figure 5. Environmental and climate change awareness of respondents.

5. Conclusions

Facilitation of more societally- and environmentally-benign food choice among restaurant visitors is critical to enhance the long-term sustainability of the catering services sector within the hospitality industry. Restaurateurs have a crucial role to play as architects of consumer choice as they can employ menus to effectively intervene into customer decision-making process. The menus can be re-designed so that they ‘nudge’ restaurant visitors and pinpoint them in the direction of food choices that are of benefit to society and the environment. While ‘nudging’ holds significant potential, evidence of its application in private food service provision has been scarce and, subsequently, little has been known about the effectiveness of such an intervention. This study contributed to knowledge with a survey of restaurant visitors where the role of an innovative menu containing a range of food-related information blocks, including its societal (health) and environmental (local produce and carbon) attributes, was tested as a means to impact on consumer choice.

The study demonstrated that nutritional values of foodstuffs alongside the provenance of ingredients represent determinants of consumer choice when dining out. Restaurateurs should therefore consider displaying these information blocks on a menu, whenever possible, to enable more societally- and environmentally-beneficial food choices. The key for success is to present the nutrition-related numerical values sparingly and in a concise form, preferably with the help of labels and via colour coding. Such simplified presentation can better appeal to the public and facilitate better understanding and broader acceptance given the history of its successful implementation in the UK grocery retail sector. Food calorific values were found to play less important role in consumer choice and yet their display on restaurant menus may be valued by certain customer categories, most notably female diners.

While displaying the food carbon intensity values was well perceived by the public, the future for their adoption by restaurateurs as an established menu item remains unclear. Given the large number of diners who remained undecided on whether or not the carbon footprint of ingredients would drive their food selection, more research is required to further test the feasibility of carbon intensity values as a means to affect consumer choice. To capture the diversity and the breadth of customer views, future research should be undertaken in food service provision enterprises that cater to the different audiences, such as fast food, casual dining and fine dining. Managerial opinions should also be sought to investigate the potential of this prospective menu item alongside other menu items that this survey has pinpointed as drivers of consumer choice when eating out. This is because managerial commitment represents a key success factor for the implementation of sustainability initiatives in restaurants (Dolmage *et al.* 2016; Hu *et al.* 2010). Lastly, waiting staff attitudes should be examined given they are in the forefront of the customer-to-business interaction and may therefore possess first-hand knowledge and experience on what restaurant visitors want in terms of menu preferences and how these can be architected.

A substantial gap in public understanding of the inter-linkages between local/imported produce and its carbon footprint was revealed. Although being well-educated, this study's respondents did not appreciate that the GHG emissions of many locally produced foodstuffs could be substantial due to the differences in national energy generation balances and climatic conditions between the source and consumption markets. It would be interesting to explore variations in consumer perception of the climate change related qualities of foodstuffs originating from different countries and/or regions. This also outlines an area for policy-making and managerial intervention which should aim at enhancing public knowledge on this important discourse. Managerial and policy-making actions are also required to educate the public about the health and climate significance of their food choices. As demonstrated in this study, menu 'nudges' may represent a viable instrument calling for closer attention given the operational feasibility and the relative simplicity of deployment.

This study has a number of limitations that concurrently represent promising research opportunities. First, future research should aim at examining the role of menu design in (re-)shaping food choice of evening diners. Indeed, the drivers for consumer choice at lunch may substantially differ from those taken into consideration by evening clients (Mintel 2016). It is fair to assume that the nutritional value of food, its price and service speed may better appeal to lunch customers, while the environmental qualities of food may play a secondary role. Second, future research should look at upscale (such as fine dining) catering establishments and investigate the application of 'nudging' to their clientele. There is evidence that affluent customers tend to pay more attention to the environmental and health credentials of food (Namkung and Jang 2013). Lastly, future research should strive to compare determinants of customer choice and the role of pro-environmental 'nudging' in different socio-cultural and political contexts. There is evidence showing that individualistic societies, such as the UK or the Netherlands (The Hofstede Centre 2015), assign more importance to the food-related values that are perceived as beneficial on a *personal* level, such as health and nutrition. In contrast, collectivistic societies, such as China or Venezuela (The Hofstede Centre 2015), prefer those food attributes that are of more benefit to the

society as a whole, such as the environmental / climate change credentials of food ingredients (Namkung and Jang 2013; Schwartz and Bilsky 1987; Sedghi 2015; Tarkiainen and Sundqvist 2009). This topic requires further careful exploration as it can enhance understanding of how menu design could be more effectively utilised with an aim to facilitate more responsible consumer choice in food service provision across the world.

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