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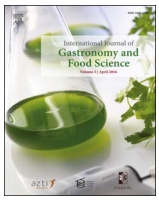

Scientific paper

Consumers with high education levels belonging to the millennial generation from Denmark, Greece, Indonesia and Taiwan differ in the level of knowledge on food waste

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ABSTRACT

The objective of the study was to identify how consumers' level of knowledge and awareness on food waste differed among four countries: Denmark (DK), Greece (GR), Indonesia (IDN) and Taiwan (TWN). The study was conducted online through SurveyXact and, in total, 610 respondents were used for the data analysis. The majority of respondents from all four countries were young (18–35), had medium to high education and we consider at the present study that our respondents belong to the millennial generation. The results of our study showed significant differences in the level of knowledge and awareness on food waste among the four different countries. Respondents from all four countries appeared to be concerned about food waste and related issues, but did not know the level of their own contribution in generating food waste. TWN was the country that showed the highest level of knowledge on consumer-generated food waste.

Introduction

Food waste, defined as food discarded even though appropriate for human consumption, accounts for one-third of food produced for human consumption, equal to 1.3 billion tons of food per year (Gustavsson et al., 2011).

Studies on the quantification of food waste have been conducted in several regions, including Europe and in the United States (Monier et al., 2010; Gustavsson et al., 2011; Thyberg et al., 2015; Neff et al., 2015; Stenmarck et al., 2016). Studies conducted to measure the food waste generated at the consumer level in several countries, suggest that the main reasons for food waste behavior include shopping (Porpino, 2016; Stancu et al., 2016; Parfitt et al., 2010), packaging (Williams et al., 2012), eating habits (Aschemann-Witzel et al., 2015; Stancu et al., 2016), and household food management (Thyberg and Tonjes, 2016; Aschemann-Witzel et al., 2015; Parfitt et al., 2010).

Food waste can be explained by different perspectives through socio-demographic, cultural, political, and economic values on the issue (Thyberg and Tonjes, 2016). Food waste differs among countries and areas and can occur all along the food supply chain, from agricultural production, post-harvest handling and storage, processing, distribution, to final consumption (Gustavsson et al., 2011; Thyberg et al., 2015). In the developed countries of medium to high income (i.e. Europe, North America, Oceania and Industrialized Asia), food waste occurs at the consumption stage (amounting to 53% of total food waste in Europe (Stenmarck et al., 2016) and appr. ⅓ of total food waste in Industrialized Asia (Gustavsson et al., 2011)), whereas in developing countries (i.e. Sub-Saharan Africa and South and Southeast Asia), food waste is mainly generated from agricultural production to distribution (amounting to appr. 90% of total food waste, leaving appr. 10% at the consumer level out of total amount of food wasted (Gustavsson et al., 2011)) due to the lack of proper infrastructures, packaging, and marketing systems, and limitations in harvesting techniques (Gustavsson et al., 2011; Grethe et al., 2011). With regards to awareness of food waste and development of initiatives targeting food waste, especially TWN and DK are at the forefront: TWN, a country with high population density and little room for landfills, has been praised for innovative solutions in managing waste (Thi et al., 2015) while DK can boast of having one of the most influential Non-Governmental Organisations involved in food waste reduction, "Stop Wasting Food" ("Stop Spild af Mad").

Apart from the country of origin, consumer attitudes differ regarding food waste, influenced by their specific demographic characteristics. In regard to gender, women waste more than men, even though women are more willing to reduce food waste than men (Secondi et al., 2015). Moreover, age is important for the extent of food wastage, as

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young people waste much more than elderly do and consumers of high education, income, and living in urban areas are also reported to be responsible for more food waste (Secondi et al., 2015; Canali et al., 2017).

Knowledge and attitudes can vary across gender, education, income, living area and household size. In the context of climate change and food waste, it is important to know where consumers stand in reducing food waste (i.e. their attitude) as well as how aware they are of their own role and contribution to this global problem. Thus, the present research aims to identify how the level of knowledge and awareness of food waste differ among consumers in Denmark (DK), Greece (GR), Indonesia (IDN) and Taiwan (TWN). This will provide a better understanding of consumers perception of food waste as an issue and can be used to develop future green initiatives.

Methodology

Questionnaire development

A questionnaire was developed in order to gather the information about our consumers. This questionnaire consisted of 5 sections. The first included demographic variables (gender, level of education, occupation, age, country of residence, living area, household size, and percentage of monthly income allocated for food). Dependent variables were divided into questions regarding general concerns (C1-C4; environment, health and nutrition, food safety and food security), awareness (A1-A4; on food waste and initiatives targeting food waste), subjective knowledge (SK1-SK5; environmental, economic and ethical implications of food waste) and objective knowledge (OK1-OK3; on global and consumer-generated food waste and the Sustainable Development Goals (SDG)). General concern and subjective knowledge questions were answered on a likert scale while awareness section included a mixture of statements answered by a likert scale and “yes”/”no”/”don’t know” questions. Questions A2-A4 were conditioned; if respondents answered “no” they did not receive the following awareness-question (i.e. “no” to A2 did not get A3 and A4, “no” to A3 did not get A4). The objective knowledge questions were given as multiple choices consisting of different estimations (%). The questions are presented in Appendix 1. The survey was completed in English and then translated into four other languages: Chinese, Indonesian, Greek, and Danish, to target the respondents from TWN, IDN, GR and DK. The questionnaire was pretested by 30 people who provided their answers and feedback on the understandability, layout, and length of the questionnaire.

Data collection

The four countries were selected based on affiliation of four of the authors with regard to these countries. An online survey platform, SurveyXact was used to develop the questionnaire. The link was posted on various social and electronic media outlets using the author's social networks: Facebook, email, Whatsapp. The final sample was a combination of convenience and snowball sampling and data collection was open for a week.

Data management

During the data cleaning process, only fully completed questionnaires were included. The objective knowledge questions were scored as “don’t know”, “underestimate”, “correct”, “overestimate” depending of the level of food waste in each specific country (information for TWN and IDN was taken from Gustavsson et al. (2011) while the more recent report from the EU-funded FUSIONS-project (Stenmarck et al., 2016) was used for DK and GR). The number of the initiatives respondents were aware of were added and coded as "Initiative.sum".

Data analysis

Descriptive statistics were used to describe the proportions to the independent variables. Data was visually inspected in histograms and tested for normality using Shapiro-Wilkes test and it was concluded that none of the variables were normally distributed. The medians and interquartile ranges were provided for likert scales/ordinal scores. Cluster-analysis was performed to check for groupings both within countries (separate analyses of each country) and with all respondents (with countries as grouping variable and with no grouping variable). Principal Components Analysis (PCA) was performed to check for defining variables again both on separate countries and countries combined. In order to test for differences between groups, Pearson chi-square was used for proportions and Kruskal Wallis, the non-parametric alternative to ANOVA, was used for ordinal data. The statistical analyses were done in SPSS v24.0 and Excel and a p-value < 0.05 was considered statistically significant.

Results

A total of 769 respondents completely finished the questionnaire, but only 610 were retained as those not residing in the four countries in question were removed. The respondents were distributed among the countries as follows: DK – 174, GR – 98, IDN – 179, TWN – 159.

Initial cluster-analysis yielded no distinct groups in the data (data not shown). Similarly, PCA indicated that no clear correlations existed between independent (age, gender, education, household size and income) and dependent (awareness, concern, knowledge) variables (data not shown). The data was then analysed using simple descriptive statistics and comparative methods as appropriate.

Table 1 presents the demographics of the four different countries. The number of female respondents varied between 52.20% and 78.60% among the four countries. Most respondents had a university degree or higher and were employed. There were no respondents with education level “primary school or lower” (category excluded from Table 1). The majority of respondents were between the ages 18–35, living in the city in households with two or more people (including the respondents) without any children. Compared to the other countries, respondents from DK reported using the smallest amount of their monthly income on food.

Median answers with interquartile ranges for questions on general concerns, awareness and subjective knowledge on food waste are presented in Table 2. Respondents from the four countries generally replied “agree”-” strongly agree” to being aware of food waste and concerned about the environment, health and nutrition. Respondents from DK were slightly less worried about food safety, and generally not concerned about food security, while respondents from GR and TWN were neutral about food security and respondents from IDN generally worried about obtaining enough food. When asked whether they had seen, read or heard anything about food waste (A2), respondents from DK showed the highest level of agreement while TWN, IDN and GR followed in ascending order. A similar pattern was seen for responses to question A3 (In the past 12 months have you seen, read or heard anything about initiatives targeting household food waste?). Respondents from DK knew the most initiatives against food waste while GR knew very few initiatives. All countries’ respondents generally did not consider themselves to have more knowledge about food waste than their peers, but all agreed that food waste is an environmental and ethical issue that leads to the loss of economic and natural resources.

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