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# **Variety-seeking meal choice in business canteens**

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## **Abstract**

Sustainable meal choices in the out-of-home catering market are inevitable to attain the SDGs. This study surveys relevant factors of consumers' choice in company canteens. A choice experiment and an online questionnaire were conducted with 401 German employees. Examined attributes were menu variety, menu type, ordering system, ingredients and price. Results reveal that consumers expect a wide range of different food choices and thus menu variety in company canteens. Moreover, they prefer spontaneous choice over pre-ordering. Both preferences hamper sustainable production and consumption in the catering sector.

## **Keywords:**

**out-of-home catering, sustainable nutrition, food, variety seeking, company canteens**

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## 1. Introduction

The out-of-home catering market is the second biggest food branch in Germany with 11.7 billion guests per year in 2017. On average, each guest used the services of the out-of-home catering market more than 140 times a year (BVE 2018). The out-of-home catering market consists of four big segments: hotel and restaurant catering, fast-food catering, event catering and company catering. In 2017 alone, German employees spent 7.4 billion euros for their meals at work. The sector of company catering was able to report growth rates of about three to four percent per year with further growth potential (BVE 2016, 2017, 2018). Improving the sustainability of the dishes offered and ensuring that the more sustainable offers are also chosen by the guests are relevant means to reach the Sustainable Development Goals by 2030. In this regard, company canteens need to know those factors determining consumers' meal choice at business lunch.

Research illustrates that in general consumers' eating habits can be influenced by different means, such as System 1-Nudges (e.g. default options), System 2-Nudges (e.g. information or label) or participation activities (Diliberti et al. 2004; Kahneman 2011; Goeminne et al. 2012; Morizet et al. 2012; Fenger et al. 2015; Lorenz&Langen 2017; Ohlhausen et al. 2018). Meal choice in particular is shown to be affected by the social and cultural background of the consumer, such as personal lifestyle or group dynamics while eating (Brunsø et al. 2004; Grunert 2006; Cruwys et al. 2012; Stok et al. 2012). The search (e.g. price, nutritional composition), experience (e.g. taste) and credence characteristics (e.g. organic production) of the food processed and offered also determine meal choice (Honkanen et al. 2006; Wahlen et al. 2012; Nordström&Thunström 2015; Price et al. 2016). Convenience has further been mentioned as another factor possibly determining consumers choice of the location and the meal to eat (Blanck et al. 2009). Knowledge and importance of personal nutrition play an essential role in meal choice as well (Tepper et al. 1997; Wardle et al. 2000). Furthermore, age and gender are able to influence meal choice (Nu et al. 1996; Westenhoefer 2005). While getting older, the individual food choices change; in general diet quality increases and overall consumption declines (Morley 2001; Thiele et al. 2004). The elderly eat less energy-dense sweets, less fast food and more fruits and vegetables (Drewnowski&Shultz 2001), while younger people prefer snack-related foods (Nu et al. 1996; Wansink et al. 2003). Other studies reveal no significant differences between age groups (Wardle et al. 2000; Oakes&Slotterback 2002). Awareness and knowledge of ethical and nutritional principles such as type and amount of meat consumed, organic ingredients, quantity of fruits and vegetables eaten and fat intake differ across gender (Beardsworth 2002; Oakes&Slotterback 2002; Baker&Wardle 2003; Wardle et al. 2004; Urena et al. 2008).

Our study contributes to this research field by focusing on the meal choice determinants that are of particular relevance in a business context and impact overall sustainability. The variety of dishes offered every day counts insofar as sustainability issue as the amount of food waste resulting from preparation and overproduction is often positively correlated with the range of dishes offered at the same time (Halloran et al. 2014; Heikkilä et al. 2016; Pirani&Arafat 2016). The ordering system also contributes to the predictability of demand. Pre-orders help the kitchen staff to better plan product purchase and cooking and thus reduces the amount of food produced but not consumed (Heikkilä et al. 2016; Miroso et al. 2016). Organic production and vegetarianism, in contrast to meat production, are factors that reduce CO<sup>2</sup>-emission and the amount of pesticides used at the level of the agricultural production (Honkanen et al. 2006; Wahlen et al. 2012; Muller et al. 2017). They can also be considered as relevant for their ethical reasons (Foresight 2011; FAO 2014).

We proceed as follows: First, we present study design, empirical context and methods applied. Then survey results are presented and discussed focusing on both, consumer and producer behavior impacting sustainability performance of business catering.

## 2. Study Design

A choice experiment in combination with an online questionnaire allowed us to assess the relevance of five meal attributes in canteens for employees. In total, 401 respondents working in three ministries of a heavily urbanized region in Western Germany took part in our online survey in autumn 2017. The choice experiment was generated with Balanced Overlap and a Full-Profile-Design. It was evaluated with a choice-based conjoint analysis, the Hierarchical Bayes module (CBC-HB) and a Willingness-To-Pay analysis (WTP). The data set was evaluated by the Utility Scaling Method Zero-Centered Differences (ZC-Diffs) as a result of the Hierarchical Bayes module.

A total of eight random tasks per respondent were collected in the choice experiment. For each choice task, four randomized choice sets and an additional no-choice alternative (None-option) were available for selection (see Appendix Figure 1). The choice experiment was created with five attributes and three levels each (see Table 1). The attributes tested in the choice experiment included the number of desired menu variety each day (one dish offered, two dishes offered, two dishes offered plus salad buffet), whether offered dishes were vegan, vegetarian or not (one vegetarian dish daily, one vegan dish daily, one meat dish daily), the preferred ordering system (pre-order until the end of the previous week, pre-order by 9 a.m. at the day of eating, spontaneous choice possible) and desired ingredients (organic, local, seasonal). Price (4.50 €, 5.50 €, 6.50 €) was included for analyzing WTP as well. To interpret the data, we divided the data set based on relevant factors influencing meal choice (see literature above) into the following four clusters: I) type of canteen user (canteen users, own food, potential guests), II) age (under 25, between 25 and 34, between 35 and 44, between 45 and 54 and above 54), III) gender (female, male) and IV) individually attached relevance regarding nutritional aspects of the personal diet (low to medium relevance, high relevance, really high relevance). Nutrition relevance was asked with a continuous visual scale from 1 = ‘not at all important’ to 101 = ‘very important’.

**Table 1: Attributes and Levels of the Choice Experiment.**

Attribute	Level 1	Level 2	Level 3
<b>Menu variety</b>	One dish offered	Two dishes offered	Two dishes offered plus salad buffet
<b>Menu type</b>	One vegetarian dish daily	One vegan dish daily	One meat dish daily
<b>Ordering system</b>	Pre-order (previous week)	Spontaneous choice	Pre-order by 9 a.m.
<b>Ingredients</b>	Organic	Local	Seasonal
<b>Price</b>	4.50 €	5.50 €	6.50 €
<b>None</b>			

Source: Authors' table.

### 3. Results

#### 3.1 Results for Cluster I: Type of Canteen User

Table 2 displays the results of the Hierarchical Bayes module (Utility= $\beta$ , Standard Deviation=SD) and the Willingness-To-Pay (WTP) analysis for the cluster type of canteen user. After separating data into the three user types, A) canteen users, B) employees who bring their own food to work and C) potential guests (mix of the other two categories, not hungry at lunch, eating in the evening), we found that all three user types shared the same general preferences. A closer look into details however revealed notable differences.

For the attribute *menu variety*, the possibility of only ‘one dish offered’ per day was strongly rejected by the whole sample (A:  $\beta=-58.86$ , SD=27.94; B:  $\beta=-51.31$ , SD=25.54; C:  $\beta=-63.35$ , SD=28.01). The second possibility, ‘two dishes offered’ per day, was a decent choice for all clusters (A:  $\beta=10.82$ , SD=15.98; B:  $\beta=9.57$ , SD=17.06; C:  $\beta=12.92$ , SD=18.22) while most favorable with high utilities was the high variety option ‘two dishes offered plus salad buffet’ (A:  $\beta=48.04$ , SD=28.35; B:  $\beta=41.73$ , SD=23.41; C:  $\beta=50.43$ , SD=22.77).

Regarding the attribute *menu type*, the level ‘one vegetarian dish daily’ was preferred by all clusters over the other two attribute levels (A:  $\beta=28.12$ , SD=31.33; B:  $\beta=24.28$ , SD=31.47; C:  $\beta=19.41$ , SD=30.25). Vegan and meat dishes on a daily basis were not preferred, but ‘one meat dish daily’ was tolerable for the canteen users and the potential guests (A:  $\beta=-3.88$ , SD=48.13; C:  $\beta=1.13$ , SD=51.11).

The highest utilities for this cluster type of canteen users occurred in the attribute *ordering system*. The level ‘spontaneous choice’ was strongly preferred (A:  $\beta=98.34$ , SD=50.89; B:  $\beta=87.46$ , SD=49.79; C:  $\beta=85.51$ , SD=59.92). In contrast, ‘pre-ordering in the previous week’ was strongly rejected (A:  $\beta=-82.47$ , SD=33.64; B:  $\beta=-105.23$ , SD=51.53; C:  $\beta=-79.04$ , SD=42.74). ‘Pre-ordering by 9 a.m.’ at the day of eating was acceptable only for employees who normally bring their own food to work (B:  $\beta=17.77$ , SD=22.36). Canteen users and potential guests were disenchanted with this ordering system (A:  $\beta=-15.87$ , SD=25.16; C:  $\beta=-6.47$ , SD=34.81).

Looking at the *ingredients*, organic food was slightly preferred (A:  $\beta=10.05$ , SD=33.82; B:  $\beta=6.44$ , SD=29.28; C:  $\beta=10.61$ , SD=27.26) over local food (A:  $\beta=1.97$ , SD=24.15; B:  $\beta=1.71$ , SD=19.84; C:  $\beta=4.43$ , SD=19.70) for all clusters. A meal with seasonal ingredients was rejected by all groups (A:  $\beta=-12.02$ , SD=16.87; B:  $\beta=-8.15$ , SD=16.87; C:  $\beta=-15.04$ , SD=16.92).

Employees who bring their own food to work had the highest *price sensitivity*. Thus, they wanted to spend between 50 cents and one euro less for their most wanted attribute levels ‘two dishes offered plus salad buffet’ and ‘spontaneous choice’ than the other groups A and C. One potential reason could be the perceived dissatisfaction with actual meals offered in the canteens. Consequently, group B and C more often used the no-choice option instead of choosing one of the dishes presented in the choice experiment.

Overall, the results indicated that all groups from canteen users over employees bringing their own food to potential guests had the highest importance scores within the attribute *ordering system*. Here, they preferred the option ‘spontaneous choice’ with the highest caused utilities. The second most important attribute for all respondents was the *menu variety*, with a demanded selection of dishes offered plus a salad buffet.

**Table 2: Results of the Choice Experiment (CBC-HB) for the Cluster I: Type of canteen user.**

Attributes		Cluster I: Type of canteen user								
		A) Canteen users			B) Own food			C) Potential guests		
		$\beta$	SD	WTP [€]	$\beta$	SD	WTP [€]	$\beta$	SD	WTP [€]
Menu Variety	One dish offered	-58.86	27.94	-1.86	-51.31	25.54	-1.27	-63.35	28.01	-2.05
	Two dishes offered	10.82	15.98	0.34	9.57	17.06	0.24	12.92	18.22	0.42
	Two dishes offered plus salad buffet	48.04	28.35	1.52	41.73	23.41	1.03	50.43	22.77	1.64
Menu Type	One vegetarian dish daily	28.12	31.33	0.89	24.28	31.47	0.60	19.41	30.25	0.63
	One vegan dish daily	-24.24	29.76	-0.77	-8.73	28.57	-0.22	-20.55	35.65	-0.67
	One meat dish daily	-3.88	48.13	-0.12	-15.55	42.66	-0.39	1.13	51.11	0.04
Ordering System	Pre-order (previous week)	-82.47	33.64	-2.61	105.23	51.53	-2.61	-79.04	42.74	-2.56
	Spontaneous choice	98.34	50.89	3.12	87.46	49.79	2.17	85.51	59.92	2.77
	Pre-order by 9 a.m.	-15.87	25.16	-0.50	17.77	22.36	0.44	-6.47	34.81	-0.21
Ingredients	Organic	10.05	33.82	0.32	6.44	29.28	0.16	10.61	27.26	0.34
	Local	1.97	24.15	0.06	1.71	19.84	0.04	4.43	19.70	0.14
	Seasonal	-12.02	16.87	-0.38	-8.15	16.87	-0.20	-15.04	16.92	-0.49
	Price	-31.57	22.12	-	-40.38	24.90	-	-30.84	33.11	-
	None	16.17	113.81	-	52.54	111.03	-	59.50	85.50	-
	Pct. Cert.		0.726			0.751			0.759	
	RLH		0.643			0.670			0.678	
	N		119			155			127	
	Interaction Effect 1		Menu Type x Price			Menu Variety x Menu Type			Menu Variety x Price	
	Interaction Effect 2		-			Menu Variety x Ingredients			-	

Source: Authors' table.

Note: Significant interaction effects are included in the model. For more data of the interaction effects see appendix table 8.

### 3.2 Results for Cluster II: Age

Table 3 displays the results of the Hierarchical Bayes module and the WTP analysis for the cluster age. The survey comprised the five following age spans: A) under 25, B) between 25 and 34, C) between 35 and 44, D) between 45 and 54 and E) above 54. In this cluster, there were some attribute level outliers regarding utilities and WTP, especially in the attributes menu type and ingredients.

Within the attribute *menu variety*, all age spans rejected the option of ‘one dish offered’ (e.g. A:  $\beta=-34.89$ ,  $SD=30.19$ ; D:  $\beta=-60.65$ ,  $SD=27.88$ ) and tended to having at least ‘two dishes offered’ (e.g. A:  $\beta=-5.20$ ,  $SD=27.84$ ; D:  $\beta=19.31$ ,  $SD=20.60$ ). The favorite of all age spans was the option of ‘two dishes offered plus salad buffet’ (e.g. B:  $\beta=47.49$ ,  $SD=22.58$ ; E:  $\beta=38.85$ ,  $SD=18.06$ ).

Survey participants in the age of 25 and older preferred for the attribute *menu type* the level ‘one vegetarian dish daily’ (e.g. B:  $\beta=20.76$ ,  $SD=30.41$ ; E:  $\beta=21.54$ ,  $SD=34.96$ ). Only the youngest survey participants wanted to have ‘one vegan dish daily’ in their meal offer (A:  $\beta=5.23$ ,  $SD=41.11$ ), employees above 54 years strictly rejected this vegan offer (E:  $\beta=-30.45$ ,  $SD=25.64$ ). For the older generation above 54 years, it was a fair choice to have ‘one meat dish daily’ in their company canteen (E:  $\beta=8.92$ ,  $SD=49.39$ ).

There was a clear preference for ‘spontaneous choice’ within the attribute *ordering system*, with steadily growing values of utility regarding age spans. Younger participants tended to prefer ‘spontaneous choice’ (A:  $\beta=63.64$ ,  $SD=35.03$ ; B:  $\beta=71.67$ ,  $SD=39.96$ ) but with growing age this level gained even more importance (C:  $\beta=86.78$ ,  $SD=41.36$ ; D:  $\beta=94.56$ ,  $SD=65.72$ ; E:  $\beta=106.07$ ,  $SD=55.46$ ). ‘Pre-ordering in previous week’ was strongly rejected (e.g. A:  $\beta=-48.27$ ,  $SD=19.21$ ; E:  $\beta=-92.05$ ,  $SD=50.62$ ). ‘Pre-order by 9 a.m.’ at the day of eating was tolerable for the age spans 25-34 and 45-54 (B:  $\beta=15.81$ ,  $SD=17.46$ ; D:  $\beta=3.20$ ,  $SD=25.99$ ), the other age spans were disenchanted (e.g. A:  $\beta=-15.38$ ,  $SD=32.09$ ; E:  $\beta=-14.03$ ,  $SD=23.64$ ).

Organic meals were the preferred *ingredients* for employees up to 54-year-olds (e.g. A:  $\beta=8.37$ ,  $SD=31.86$ ; D:  $\beta=14.56$ ,  $SD=23.67$ ). Only the older generation above 54 years wanted to enjoy local food in their lunch break (E:  $\beta=15.75$ ,  $SD=29.63$ ). Seasonal food was, with the exception of younger survey participants (A:  $\beta=3.91$ ,  $SD=21.57$ ), not an option for meal ingredients (e.g. B:  $\beta=-6.79$ ,  $SD=21.32$ ; D:  $\beta=-13.20$ ,  $SD=15.20$ ).

As assumed, younger generations were more sensitive to price than older generations. The utility of the ZC-Diffs ranged from a high *price sensitivity* of  $\beta=-65.31$ ,  $SD=30.37$  for Employees under 25 to a low price sensitivity of  $\beta=-21.37$ ,  $SD=19.31$  for employees above 54. Group E was willing to pay four euros more for their most wanted attribute level ‘spontaneous choice’ and around 70 cents more for ‘two dishes offered plus salad buffet’ in comparison to group A, the youngest generation. Regarding the no-choice option, age spans under 25 years and between 45 and 54 years had the hardest time to select their favorable choice (A:  $\beta=73.46$ ,  $SD=60.91$ ; D:  $\beta=62.32$ ,  $SD=81.61$ ).

Altogether, nearly all age spans preferred the most the attribute *ordering system* with its ‘spontaneous choice’ and the highest caused utilities. Only the youngest generation was looking for the lowest price possible and prioritized *price* before the ordering system. Employees older than 25 years assessed the *menu variety* with ‘two dishes offered plus salad buffet’ as the second most important attribute.



Table 3: Results of the Choice Experiment (CBC-HB) for the Cluster II: Age.

Attributes		Cluster		Cluster II: Age														
				A) Age < 25			B) Age 25 - 34			C) Age 35 - 44			D) Age 45 - 54			E) Age > 54		
				$\beta$	SD	WTP [€]	$\beta$	SD	WTP [€]	$\beta$	SD	WTP [€]	$\beta$	SD	WTP [€]	$\beta$	SD	WTP [€]
Menu Variety	One dish offered	-34.89	30.19	-0.53	-62.18	31.34	-1.26	-62.73	22.95	-1.44	-60.65	27.88	-2.14	-48.27	26.75	-2.26		
	Two dishes offered	-5.20	27.84	-0.08	14.69	16.93	0.30	2.10	18.00	0.05	19.31	20.60	0.68	9.41	14.89	0.44		
	Two dishes offered plus salad buffet	40.09	53.00	0.61	47.49	22.58	0.96	60.63	21.90	1.39	41.34	30.78	1.46	38.85	18.06	1.82		
Menu Type	One vegetarian dish daily	-3.77	31.32	-0.06	20.76	30.41	0.42	20.67	23.75	0.48	29.14	30.89	1.03	21.54	34.96	1.01		
	One vegan dish daily	5.23	41.11	0.08	-13.47	36.42	-0.27	-2.35	32.44	-0.05	-12.28	22.91	-0.43	-30.45	25.64	-1.42		
	One meat dish daily	-1.46	68.98	-0.02	-7.30	41.88	-0.15	-18.32	44.17	-0.42	-16.86	44.74	-0.59	8.92	49.39	0.42		
Ordering System	Pre-order (previous week)	-48.27	19.21	-0.74	-87.48	38.00	-1.77	-77.48	26.82	-1.78	-97.76	50.28	-3.45	-92.05	50.62	-4.31		
	Spontaneous choice	63.64	35.03	0.97	71.67	39.96	1.45	86.78	41.36	1.99	94.56	65.72	3.33	106.07	55.46	4.96		
	Pre-order by 9 a.m.	-15.38	32.09	-0.24	15.81	17.46	0.32	-9.30	27.10	-0.21	3.20	25.99	0.11	-14.03	23.64	-0.66		
Ingredients	Organic	8.37	31.86	0.13	7.32	31.10	0.15	18.24	24.03	0.42	14.56	23.67	0.51	-1.05	39.05	-0.05		
	Local	-12.28	33.24	-0.19	-0.53	15.54	-0.01	-7.52	14.34	-0.17	-1.36	19.20	-0.05	15.75	29.63	0.74		
	Seasonal	3.91	21.57	0.06	-6.79	21.32	-0.14	-10.72	18.57	-0.25	-13.20	15.20	-0.47	-14.69	21.18	-0.69		
	Price	-65.31	30.37	-	-49.45	27.34	-	-43.51	25.85	-	-28.37	27.43	-	-21.37	19.31	-		
	None	73.46	60.91	-	39.51	89.02	-	27.47	81.65	-	62.32	81.61	-	30.14	135.66	-		
	Pct. Cert.	0.664			0.754			0.796			0.745			0.746				
	RLH	0.583			0.673			0.720			0.664			0.664				
	N	10			97			51			92			107				
	Interaction Effect 1	-			Menu Variety x Ingredients			Menu Type x Ordering System			Menu Variety x Price			-				
	Interaction Effect 2	-			Ingredients x Price			-			-			-				

Source: Authors' table.

Note: Significant interaction effects are included in the model. For more data of the interaction effects see appendix table 8.

### 3.3 Results for Cluster III: Gender

Table 4 displays the results of the Hierarchical Bayes module and WTP analysis for the cluster gender, with A) female respondents and B) male respondents. Overall, the two genders shared the same main preferences except for the attribute ingredients, but looking further into detail, there were some notable differences.

Women as well as men preferred the level ‘two dishes offered plus salad buffet’ the most within the attribute *menu variety* (A:  $\beta=51.70$ ,  $SD=23.61$ ; B:  $\beta=39.25$ ,  $SD=26.74$ ). Both genders also accepted ‘two dishes offered’ (A:  $\beta=9.73$ ,  $SD=15.44$ ; B:  $\beta=13.01$ ,  $SD=15.22$ ). Only the level ‘one dish offered’ was rejected (A:  $\beta=-61.43$ ,  $SD=25.08$ ; B:  $\beta=-52.26$ ,  $SD=31.47$ ).

For the attribute *menu type* both genders wanted to have ‘one vegetarian dish daily’ in their meal choice (A:  $\beta=26.48$ ,  $SD=25.00$ ; B:  $\beta=18.26$ ,  $SD=37.71$ ). The vegan option was declined by both genders, however male respondents (B:  $\beta=-24.10$ ,  $SD=27.12$ ) declined it even more than their female counterparts (A:  $\beta=-8.61$ ,  $SD=32.76$ ). Within their canteen meal choice, male employees were fine with ‘one meat dish daily’ (B:  $\beta=5.84$ ,  $SD=52.39$ ), in contrast to the female employees (A:  $\beta=-17.87$ ,  $SD=42.22$ ).

With the highest caused utilities compared between all attributes, female as well as male survey participants wished to have ‘spontaneous choice’ as their *ordering system* (A:  $\beta=91.00$ ,  $SD=50.41$ ; B:  $\beta=88.55$ ,  $SD=59.07$ ). In contrast, ‘pre-ordering in previous week’ was strongly rejected by both genders (A:  $\beta=-100.35$ ,  $SD=46.16$ ; B:  $\beta=-81.13$ ,  $SD=47.18$ ). The last level within this attribute ‘pre-order by 9 a.m.’ was acceptable for women (A:  $\beta=9.36$ ,  $SD=23.61$ ) but less for men (B:  $\beta=-7.42$ ,  $SD=30.15$ ).

Both genders did not like to consume their meals made from seasonal *ingredients*, for women (A:  $\beta=-13.97$ ,  $SD=13.59$ ) even worse than for men (B:  $\beta=-6.61$ ,  $SD=20.19$ ). Female respondents liked to eat organic dishes the most (A:  $\beta=12.42$ ,  $SD=25.54$ ), followed by local dishes (A:  $\beta=1.56$ ,  $SD=17.60$ ). For male respondents, local ingredients were the first choice (B:  $\beta=5.46$ ,  $SD=22.11$ ) after organic ingredients (B:  $\beta=1.14$ ,  $SD=34.51$ ).

With regard to *price sensitivity*, women were likely to spend more money in canteens (A:  $\beta=-31.62$ ,  $SD=21.71$ ) than men (B:  $\beta=-40.41$ ,  $SD=30.30$ ). For the addition of the salad buffet as well as for ‘spontaneous choice’, women were willing to spend around 60-70 cents more than men in their lunch breaks. Male respondents had more problems finding the right meal offer in our choice experiment (B:  $\beta=53.50$ ,  $SD=95.84$ ).

Overall, female and male survey participants were most interested in the attribute *ordering system* and its level ‘spontaneous choice’. The second most important factor for both genders while choosing their canteen meal was the *menu variety*, with ‘two dishes offered plus salad buffet’.

Table 4: Results of the Choice Experiment (CBC-HB) for the Cluster III: Gender.

Attributes \ Cluster		Cluster III: Gender					
		A) Female			B) Male		
		$\beta$	SD	WTP [€]	$\beta$	SD	WTP [€]
Menu Variety	One dish offered	-61.43	25.08	-1.94	-52.26	31.47	-1.29
	Two dishes offered	9.73	15.44	0.31	13.01	15.22	0.32
	Two dishes offered plus salad buffet	51.70	23.61	1.64	39.25	26.74	0.97
Menu type	One vegetarian dish daily	26.48	25.00	0.84	18.26	37.71	0.45
	One vegan dish daily	-8.61	32.76	-0.27	-24.10	27.12	-0.60
	One meat dish daily	-17.87	42.22	-0.57	5.84	52.39	0.14
Ordering system	Pre-order (previous week)	-100.35	46.16	-3.17	-81.13	47.18	-2.01
	Spontaneous choice	91.00	50.41	2.88	88.55	59.07	2.19
	Pre-order by 9 a.m.	9.36	23.61	0.30	-7.42	30.15	-0.18
Ingredients	Organic	12.42	25.54	0.39	1.14	34.51	0.03
	Local	1.56	17.60	0.05	5.46	22.11	0.14
	Seasonal	-13.97	13.59	-0.44	-6.61	20.19	-0.16
	Price	-31.62	21.71	-	-40.41	30.30	-
	None	24.11	119.60	-	53.50	95.84	-
	Pct. Cert.		0.731			0.706	
	RLH		0.649			0.623	
	N		226			174	

Source: Authors' table.

Note: No significant interaction effects were found.

### 3.4 Results for Cluster IV: Nutrition Relevance

Table 5 displays the results of the Hierarchical Bayes module and the WTP analysis for the cluster nutrition relevance. Nutrition relevance was assessed using a continuous visual scale from 1 = 'not at all important' to 101 = 'very important'. Respondents were sorted into groups: A) 1 - 60 for low to medium relevance, B) 61 - 80 for high relevance and C) 81 - 101 for really high relevance. Altogether, the different nutrition relevance groups shared similar preferences except for the attribute menu type.

Within the first attribute *menu variety*, the level 'one dish offered' was strongly rejected by all nutrition relevance groups (A:  $\beta=-54.86$ ,  $SD=30.26$ ; B:  $\beta=-57.41$ ,  $SD=28.30$ ; C:  $\beta=-59.12$ ,  $SD=25.85$ ). 'Two dishes offered' were acceptable during lunch break (A:  $\beta=18.99$ ,  $SD=18.83$ ; B:  $\beta=8.90$ ,  $SD=14.71$ ; C:  $\beta=9.84$ ,  $SD=15.89$ ), but the addition of a salad buffet was most preferred by all groups. Nevertheless, employees with a higher stated nutrition relevance preferred this addition even more (A:  $\beta=35.87$ ,  $SD=25.73$ ; B:  $\beta=48.51$ ,  $SD=21.03$ ; C:  $\beta=49.28$ ,  $SD=27.52$ ).

For the attribute *menu type*, vegan dishes in canteens were rejected by all three cluster types, but the higher the nutrition relevance, the less negative the utility rating (A:  $\beta=-21.23$ ,  $SD=37.10$ ; B:  $\beta=-20.60$ ,  $SD=26.92$ ; C:  $\beta=-10.65$ ,  $SD=30.67$ ). Employees who care about their nutrition wanted to have 'one vegetarian dish daily' in their menu choice (B:  $\beta=26.79$ ,  $SD=33.27$ ; C:  $\beta=27.04$ ,  $SD=27.23$ ), employees with low to medium nutrition relevance preferred 'one meat dish daily' (A:  $\beta=15.72$ ,  $SD=55.54$ ).

'Pre-order in previous week' was strictly rejected by all cluster types (A:  $\beta=-85.55$ ,  $SD=34.56$ ; B:  $\beta=-83.35$ ,  $SD=43.22$ ; C:  $\beta=-95.12$ ,  $SD=49.67$ ). 'Pre-ordering by 9 a.m.' at the day of eating was a fair choice for employees who stated a really high nutrition relevance (C:  $\beta=10.46$ ,  $SD=20.51$ ) and was tolerable for the group with high nutrition relevance (B:  $\beta=-5.46$ ,  $SD=26.55$ ). Nevertheless, 'spontaneous choice' dominated the attribute *ordering system* with high utilities in each segment (A:  $\beta=104.92$ ,  $SD=56.20$ ; B:  $\beta=88.82$ ,  $SD=56.28$ ; C:  $\beta=84.66$ ,  $SD=50.11$ ).

All nutrition relevance groups preferred organic *ingredients* the most (A:  $\beta=2.08$ ,  $SD=28.68$ ; B:  $\beta=8.05$ ,  $SD=30.50$ ; C:  $\beta=11.18$ ,  $SD=29.29$ ), followed by local ingredients (A:  $\beta=1.75$ ,  $SD=21.23$ ; B:  $\beta=-1.45$ ,  $SD=21.19$ ; C:  $\beta=5.22$ ,  $SD=20.65$ ) and seasonal ingredients (A:  $\beta=-3.82$ ,  $SD=20.21$ ; B:  $\beta=-6.60$ ,  $SD=16.14$ ; C:  $\beta=-16.39$ ,  $SD=18.57$ ).

Survey participants who stated a high nutrition relevance had the highest *price sensitivity* inside this cluster (B:  $\beta=-39.83$ ,  $SD=28.05$ ). Group A was willing to spend the most for 'spontaneous choice'. Regarding the no-choice option, employees with a higher stated nutrition relevance found it easier to select their attribute combination in our choice experiment. The reason for this could be a greater interest in surveys with nutrition background. They might have clarified important nutrition attributes for their own personal nutrition as well, what could have simplified their priority setting in our choice experiment.

In general, regardless of nutrition relevance, the most important factors for choosing meals in the lunch break were the *ordering system* with its level 'spontaneous choice' and the *menu variety* with the level 'two dishes offered plus salad buffet'.

Table 5: Results of the Choice Experiment (CBC-HB) for the Cluster IV: Nutrition relevance.

Attributes \ Cluster		Cluster IV: Nutrition relevance								
		A) Low to medium			B) High			C) Really high		
		$\beta$	SD	WTP [€]	$\beta$	SD	WTP [€]	$\beta$	SD	WTP [€]
Menu Variety	One dish offered	-55.09	31.31	-1.68	-57.41	28.30	-1.44	-59.12	25.85	-1.71
	Two dishes offered	19.35	18.75	0.59	8.90	14.71	0.22	9.84	15.89	0.28
	Two dishes offered plus salad buffet	35.74	25.38	1.09	48.51	21.03	1.22	49.28	27.52	1.43
Menu type	One vegetarian dish daily	6.84	32.29	0.21	26.79	33.27	0.67	27.04	27.23	0.78
	One vegan dish daily	-22.29	35.91	-0.68	-20.60	26.92	-0.52	-10.65	30.67	-0.31
	One meat dish daily	15.45	54.60	0.47	-6.19	43.00	-0.16	-16.40	45.82	-0.47
Ordering system	Pre-order (previous week)	-85.68	35.05	-2.61	-83.35	43.22	-2.09	-95.12	49.67	-2.75
	Spontaneous choice	104.46	54.74	3.18	88.82	56.28	2.23	84.66	50.11	2.45
	Pre-order by 9 a.m.	-18.78	35.15	-0.57	-5.46	26.55	-0.14	10.46	20.51	0.30
Ingredients	Organic	3.12	28.71	0.09	8.05	30.50	0.20	11.18	29.29	0.32
	Local	1.41	21.75	0.04	-1.45	21.19	-0.04	5.22	20.65	0.15
	Seasonal	-4.53	19.77	-0.14	-6.60	16.14	-0.17	-16.39	18.57	-0.47
	Price	-32.85	29.32	-	-39.83	28.05	-	-34.58	24.24	-
	None	68.19	94.94	-	56.59	79.93	-	15.71	125.67	-
	Pct. Cert.	0.673			0.742			0.711		
	RLH	0.591			0.661			0.628		
	N	70			123			208		

Source: Authors' table.

Note: No significant interaction effects were found.

### 3.5 Results of Clusters I - IV

Tables 6 and 7 display the results of the four clusters: type of canteen user, age, gender and nutrition relevance with the highest caused utilities per attribute.

**Table 6: Highest utility ratings per attribute for Clusters I & II: Type of canteen user and Age.**

Attributes \ Clusters	Cluster I: Type of canteen user			Cluster II: Age				
	A) Canteen users	B) Own food	C) Potential guests	A) Age: < 24	B) Age: 25 - 34	C) Age: 35 - 44	D) Age: 45 - 54	E) Age: > 54
<b>Menu variety</b>	2 Meals/Salad (48.04)	2 Meals/Salad (41.73)	2 Meals/Salad (50.43)	2 Meals/Salad (40.09)	2 Meals/Salad (47.49)	2 Meals/Salad (60.63)	2 Meals/Salad (41.34)	2 Meals/Salad (38.85)
<b>Menu type</b>	Vegetarian (28.12)	Vegetarian (24.28)	Vegetarian (19.41)	Vegan (5.23)	Vegetarian (20.76)	Vegetarian (20.67)	Vegetarian (29.14)	Vegetarian (21.54)
<b>Ordering system</b>	Spontaneous (98.34)	Spontaneous (87.46)	Spontaneous (85.51)	Spontaneous (63.64)	Spontaneous (71.67)	Spontaneous (86.78)	Spontaneous (94.56)	Spontaneous (106.07)
<b>Ingredients</b>	Organic (10.05)	Organic (6.44)	Organic (10.61)	Organic (8.37)	Organic (7.32)	Organic (18.24)	Organic (14.56)	Local (15.75)
N	119	155	127	10	97	51	92	107

Source: Authors' table.

**Table 7: Highest utility ratings per attribute for Clusters III & IV: Gender and Nutrition relevance.**

Attributes \ Clusters	Cluster III: Gender		Cluster IV: Nutrition Relevance		
	A) Female	B) Male	A) low to medium	B) high	C) really high
<b>Menu variety</b>	2 Meals/Salad (51.70)	2 Meals/Salad (39.25)	2 Meals/Salad (35.87)	2 Meals/Salad (48.51)	2 Meals/Salad (49.28)
<b>Menu type</b>	Vegetarian (26.48)	Vegetarian (18.26)	Meat (15.72)	Vegetarian (26.79)	Vegetarian (27.04)
<b>Ordering system</b>	Spontaneous (91.00)	Spontaneous (88.55)	Spontaneous (104.92)	Spontaneous (88.82)	Spontaneous (84.66)
<b>Ingredients</b>	Organic (12.42)	Local (5.46)	Organic (2.08)	Organic (8.05)	Organic (11.18)
N	226	174	70	123	208

Source: Authors' table.

Across all characteristics examined in the choice experiment, respondents had a preference for first, spontaneous choice and second, a huge variety of dishes available each day in their company canteens. Besides, it became obvious that vegetarian dishes were desired in canteens, only employees with low to medium nutrition relevance preferred one meat dish daily and the youngest generation under 25 years preferred vegan dishes. With respect to other food characteristics, our results reveal that seasonal ingredients were not favored while for the majority of respondents, organic food was preferred over local food. In line with classical preference assumptions, lower meal prices were preferred over higher prices. One group, canteen guest over 54 years of age, were willing to spend more for their lunch than the other age groups.

Regarding WTP, the highest caused values were reached within the attribute *ordering system* and the level ‘spontaneous choice’. The majority of employees was willing to spend two to three euros for spontaneous choice instead of pre-ordering. Only the youngest and oldest survey participants were willing to spend notable smaller or bigger amounts. The second most valued attribute regarding WTP was the *menu variety* with the level ‘two dishes offered plus salad buffet’. On average employees were willing to spend around one euro more for the addition of the salad buffet. The third most valued attribute was the *menu type* with a vegetarian offer on a daily basis. To have this vegetarian offer in their lunch break, employees were willing to spend around 50 cents more. Employees wanted to pay around 20 cents more for having the offer of organic food, as opposed to other meal *ingredients* such as local food.

#### **4. Discussion**

Our findings, especially the need for a huge variety of meals offered each day and the spontaneous choice of food could impede the goal to make out-of-home catering more sustainable. As previous research shows, the desired variety of meals as well as the preference for spontaneous choice increase the amount of kitchen food waste and plate leftovers (Halloran et al. 2014; Heikkilä et al. 2016; Pirani&Arafat 2016). A pre-ordering system combined with reduced meal variety per day would allow kitchen staff to better plan the meal quantities required (Heikkilä et al. 2016; Miroso et al. 2016). The finding that consumers prefer to choose their meal out of huge variety of meals offered could be explained with the concept of variety seeking behavior. This concept assumes that consumers tend to change their commonly used products, even if they are satisfied with them, just because the new experience is a benefit on its own (McAlister&Pessemier 1982; Simonson 1990; Van Trijp&Steenkamp 1992; Kahn&Isen 1993).

The statement “Better planning reduces food waste and therefore saves (natural and monetary) resources. In the best case, the saved monetary resources could be used to improve meal quality and not only business revenues” sounds do plausible. So why do consumers not react accordingly and do not include the overall benefit for sustainability when choosing in advance and from a smaller offer into their personal utility function? The present bias or hyperbolic discounting could be a reason for this (Laibson 1997; O’Donoghue&Rabin 1999). Present bias or hyperbolic discounting describes the finding that consumers prefer benefits they gain today by a current behavior from possible benefits of a different behavior but less attractively today. Pre-ordering could be a solution. Stites et al. (2015) revealed that consumers tend to make healthier choices while pre-ordering their meals for lunch break. Although the spontaneous choice has prevailed in our choice experiment, the option of pre-ordering (until 9 a.m.) was perceived as a possibility by some cluster groups.

Our analysis indicates that group pricing or third-degree price differentiation can be recommended. Younger guests had the lowest WTP for spontaneous choice. It could be assumed that a price discount offered for each meal pre-ordered (until 9 a.m.) would attract younger guests’ attention.

A possible trade-off between indicated consumer demands and sustainable consumption could be the possibility of pre-ordering (until 9 a.m.) one ‘most sustainable’ vegetarian dish daily, which is offered for a cheap price as well, to lure consumers with the low price and the positive sustainability impact. This offer could especially address potential guest as well as employees who bring their own food, because both groups prefer vegetarian dishes as well as affordable offers. This vegetarian offer would appeal all age spans above 25 year-olds. Regarding ingredients, the canteen staff could alternate between organic and local ingredients to address the clusters differentiated in this study.

Another trade-off variant could be achieved by pre-ordering (until 9 a.m.) the main component of the meal (e.g. meat and processed food) and spontaneously choosing side dishes, for example in buffet style e.g. salads, vegetables, noodles and rice, with their lower health and sustainability impact. This variant has to be tested in future studies to reveal which of the two ordering systems is responsible for satisfying the urge of consumers' variety seeking.

Other possibilities to strengthen sustainable meal choice are System 1-Nudges, System 2-Nudges or participation strategies. While System 1-Nudges address fast, automatic and emotional thinking, System 2-Nudges focus on slow, exhausting and logical thinking (Kahneman 2011). If company canteens decide to allow spontaneous choice, with its fast, automatic and emotional characteristics, we would advise to use System 1-Nudges (e.g. default options) to nudge for more sustainable meal choices. If company canteens decide to offer pre-ordering and want to enhance its attractiveness we advise to use System 2-Nudges (e.g. information for pre-ordering at the counter or displaying label while pre-ordering) to further boost sustainable meal choices.

## **5. Conclusion**

Regarding our goal to assess the extent to which consumers would accept different means to improve the sustainability of meals offered in company canteens, we tested four aspects in an online choice experiment. Two of these aspects were directly related to meals (local, organic and seasonal production labelled as well as vegan, vegetarian or meat dishes) while the other two aspects were related to the service (pre-ordering systems vs. spontaneous choice and the number of different dishes offered per day and thus variety of meals available).

The most obvious conclusion to be drawn from our data is that no matter how respondents are clustered they show a clear preference for menu variety and spontaneous choice. Vegetarian offers and organic ingredients were preferred by the majority of respondents as well. As illustrated above especially the clear preference for spontaneous choice and huge menu variety hamper sustainable production and consumption in the catering sector.



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## Appendix

**Stellen Sie sich vor, es ist Mittagszeit und Sie haben Hunger.  
Welches der folgenden Angebote sagt Ihnen am meisten zu?  
Wählen Sie das beste Angebot per Klick aus:**

<b>Menülinien</b>	Zwei angebotene Gerichte	Zwei angebotene Gerichte und Salatbuffet	Ein angebotenes Gericht	Zwei angebotene Gerichte
<b>Angebotene Gerichte</b>	Täglich ein veganes Gericht	Täglich ein veganes Gericht	Täglich ein vegetarisches Gericht	Täglich ein Gericht mit Fleisch
<b>Bestellsystem</b>	Verbindliche Vorbestellung bis 9 Uhr am Tag des Essens	Spontane Wahl möglich	Verbindliche Vorbestellung bis Freitag der Vorwoche	Spontane Wahl möglich
<b>Zutaten</b>	Saisonal	Bio	Regional	Bio
<b>Preis</b>	4,50 €	6,50 €	5,50 €	6,50 €
	Select	Select	Select	Select

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**Figure 1: Example of a random task of the Choice Experiment (executed in German language).**  
Source: Authors' figure.

**Table 8: Interaction effects of the Choice Experiment (CBC-HB) for the Clusters I and II.**

Attributes \ Cluster		Cluster I: Type of canteen user									Cluster II: Age								
		A) Canteen users			B) Own food			C) Potential guests			B) Age 25 - 34			C) Age 35 - 44			D) Age 45 - 54		
		$\beta$	SD	WTP [€]	$\beta$	SD	WTP [€]	$\beta$	SD	WTP [€]	$\beta$	SD	WTP [€]	$\beta$	SD	WTP [€]	$\beta$	SD	WTP [€]
<b>Interaction effects</b>	One vegetarian dish daily x Price	0.87	16.79	0.03															
	One vegan dish daily x Price	-14.24	15.22	-0.45															
	One meat dish daily x Price	13.37	11.42	0.42															
	One dish offered x One vegetarian dish daily				-3.06	13.84	-0.08												
	One dish offered x One vegan dish daily				-3.28	11.43	-0.08												
	One dish offered x One meat dish daily				6.34	8.46	0.16												
	Two dishes offered x One vegetarian dish daily				4.79	9.98	0.12												
	Two dishes offered x One vegan dish daily				-11.37	9.43	-0.28												
	Two dishes offered x One meat dish daily				6.58	8.65	0.16												
	Two dishes offered plus salad buffet x One vegetarian dish daily				-1.73	14.49	-0.04												
	Two dishes offered plus salad buffet x One vegan dish daily				14.65	13.96	0.36												
	Two dishes offered plus salad buffet x One meat dish daily				-12.92	9.49	-0.32												
	One vegetarian dish daily x Organic				-3.83	10.24	-0.09												
	One vegetarian dish daily x Local				4.11	7.33	0.10												
	One vegetarian dish daily x Seasonal				-0.28	8.25	-0.01												
	One vegan dish daily x Organic				7.71	14.94	0.19												
	One vegan dish daily x Local				-2.36	8.48	-0.06												
	One vegan dish daily x Seasonal				-5.35	12.99	-0.13												
	One meat dish daily x Organic				-3.88	10.87	-0.10												
	One meat dish daily x Local				-1.75	9.46	-0.04												
	One meat dish daily x Seasonal				5.63	9.41	0.14												

One dish offered x Price	15.79	9.91	0.51									21.72	9.44	0.77
Two dishes offered x Price	-1.22	13.05	-0.04									-5.54	10.24	-0.20
Two dishes offered plus salad buffet x Price	-14.57	12.10	-0.47									-16.18	9.52	-0.57
One dish offered x Organic								-6.87	17.89	-0.14				
One dish offered x Local								-16.67	11.29	-0.34				
One dish offered x Seasonal								23.53	14.12	0.48				
Two dishes offered x Organic								-3.27	18.12	-0.07				
Two dishes offered x Local								11.04	11.72	0.22				
Two dishes offered x Seasonal								-7.77	14.39	-0.16				
Two dishes offered plus salad buffet x Organic								10.14	15.14	0.21				
Two dishes offered plus salad buffet x Local								5.63	8.46	0.11				
Two dishes offered plus salad buffet x Seasonal								-15.77	12.54	-0.32				
Organic x Price								11.56	18.16	0.23				
Local x Price								-5.27	15.25	-0.11				
Seasonal x Price								-6.30	15.86	-0.13				
One vegetarian dish daily x Pre-order (previous week)												-28.27	10.81	-0.65
One vegetarian dish daily x Spontaneous choice												9.41	12.63	0.22
One vegetarian dish daily x Pre-order by 9 a.m.												18.86	10.43	0.43
One vegan dish daily x Pre-order (previous week)												22.75	7.92	0.52
One vegan dish daily x Spontaneous choice												-15.87	10.15	-0.36
One vegan dish daily x Pre-order by 9 a.m.												-6.88	8.40	-0.16
One meat dish daily x Pre-order (previous week)												5.51	12.34	0.13
One meat dish daily x Spontaneous choice												6.46	13.43	0.15
One meat dish daily x Pre-order by 9 a.m.												-11.98	7.47	-0.28

Source: Authors' table.