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Abstract

A dairy products manufacturer wishing to expand into university foodservice operations collaborated with a graduate marketing class to research student preferences regarding the Company's products. Baseline and follow-up stated choice surveys and conditional logit analyses were conducted at a land-grant university where the Company's products were introduced. Brand awareness grew but remained low during the study period. Average WTP estimates for the Company's most popular product approximated the retail price and resembled WTP for a competing brand. Average WTP for the Company's other products, however, was considerably lower than the retail price. Significant WTP differences existed among some consumer segments.

Keywords

Willingness-to-Pay, Consumer Segment, University Foodservice, Conjoint analysis

Introduction

Studies in consumer's preferences and willingness-to-pay (WTP) for food attributes have been increasingly attracting attention of researchers. One of methods used in the studies is to identify consumer segments. University foodservice is one of the special categories in food service industry where includes places, institutions, and companies responsible for any meals prepared outside the home. However, limited studies have been

done regarding university as manufacture of food services.

The project is originated from a real world company's business plan which is a large refrigerated dairy products processor, primarily puddings. The company wishes to expand its existing customer base to include university foodservice operations of its new product. To do so, it requires knowledge of student preferences, brand awareness, willingness-to-pay (WTP) for its products relative to competing products, and estimates of price sensitivity.

Then, this study examines student purchase behavior and WTP for the Company's refrigerated grab-n-go pudding products, as well as a new dairy-based grab-n-go breakfast cereal that resembles oatmeal. A conjoint experiment survey approach is adopted of a representative sample in the target consumer segment where is a land-grant university of over 24,000 students. Choice-based Conjoint Analysis (CBC) is applied to assess student consumer acceptance and WTP's of products associated to product attributes and interaction terms with respondents' characteristic variables.

Related Studies

Consumer segmentation was first developed by brand marketers in the mid twentieth century along with the availability of data. Since then, trends in consumer segmentation have been changing over time and many approaches to segmentation have been developed as well. The primary purpose is to identify segments that differ in consumer's purchasing power, aspirations and market behavior (Allenby et al., 2002; Hoek, Gendall and Esslemont, 1998; Yankelovich and Meer, 2006).

Most segmentation studies have been relying on one-off data collection, in which respondents self report statements to form the core data set (Hoek, Gendall and Esslemont, 1998; Wind, 1978). There are ways to categorize consumer segments based on consumer acceptance and WTP to identify segments for six blueberry products (Hu, Woods and Bastin, 2009). In the research of consumer characteristics and policy implication for food products of genetically modified organisms, segments identified base on socio-demographic characteristics of age, education, and income (Baker and Burnham, 2002). Another approach to segments is to identify preferences for food safety attributes (Baker and Crobie, 1993). By splitting consumers into segments with distinctive perception and attitudes, (Kaneko and Chern 2006) emphasize the importance of consumer segments for the study of consumer preferences and the estimation of the distribution of sample willingness to pay.

This study is concentrated on consumer preferences and WTP for Breakfast, Snacks, and Desserts in university foodservice setting. As many other previous studies, this research illustrates the use of conjoint based analysis (CBA) to provide an understanding of the structure of consumer's preferences and to evaluate new products and product attributes. However, unlike past researches, this study has distinctive characteristics. Although several studies have been conducted on the demand for breakfast or yogurt, they focus on the role of retail services or on the analysis of nutrition aspects such as Chidmi, Lopez, and Cotterill (2005) in the research of a supermarket-level analysis of demand for breakfast cereals.

This study instead goes into the consumer level by identifying consumer segments according to their preferences for specific breakfast, snack and dessert product attributes.

Moreover, it focuses on the university consumer segment where the large numbers of potential customers are students and this number is stable during school year rather than the market consumer segment of other researches. These studies concentrate on customers in the market in general but ignore those customers who are students at universities account for a large proportion of market structure. This study contributes to the academic literature because it is, to our knowledge, the first CBC analysis of consumer behavior in an institutional foodservice setting. The university context is interesting because many of the consumers are just beginning to make all of their food purchase decisions independently.

Conjoint Experiment Setting

For purpose for the project of the company, two surveys were conducted during typical academic semester periods. First baseline survey was conducted before the company's promotion program. It was designed to provide information about students' consumption behavior of breakfast, snack products and in further brand awareness. Based on knowledge obtained from baseline survey, follow-up survey focuses much more on the company's products and alternative snack and breakfast products options on campus shelters.

Considering attributes (product name associated with favor, size, healthiness and prices) of the products and competing products as control options, the conjoint experiment was design into six stated choice scenarios. The approach of conjoint analysis has been widely applied to elicit respondents' stated choice behavior (Carlsson, Frykblom, and Lagerkvist 2007b) and has proven to be a useful tool in food choices (Hu,

Veeman, and Adamowicz; Hu, Cox, and Edwards; Darby et al.; Carlsson, Frykblom, and Lagerkvist 2007a; and Lusk, Fields, and Prevatt).

In each scenario three attributes were used in the design: brand, size, health benefits (natural, low-fat, organic, none) and price. Pairing is among products of different favors from the company and different products from the company and its competing companies. A group including the 5 pairs which involved the Company's pudding products of different favors: refrigerated chocolate, soy organic chocolate, and rice puddings, along with competing brand of shelf-stable chocolate pudding, branded examples of yogurt, a salty snack, and a sweet snack that were currently sold in the study venues. Another group compared the Company's breakfast product, and branded examples of oatmeal and cold breakfast cereal. Consumer WTP for each type of product (and each attribute associated) may vary across individuals. The range of prices used in the conjoint experiment should be wide enough to cover the potential WTP (Hanemann and Kanninen). Prior to the implementation of follow-up survey, baseline survey was conducted as market evaluation to ensure that both lower and higher end possible prices were included.

Four attributes (brand is considered as associated with favor) choices sets were constructed with each set containing two alternatives resembling two products with pairing attributes. A third "empty" choice was added to each choice set, the alternative which when chosen allows the respondents to express that they would not choose either one of the first two pairs. And, respondents were instructed to choose one and only one alternative with each choice set. Figure 1 gives a sample choice task used in follow-up survey. Since this study contained a heavy load of attributes and different products, it is

time consuming and tedious task for survey. Split sample strategy was adopted in the survey process in which respondents were randomly assigned to evaluate under two scenarios (with instructions concentrated on healthiness and tastes separately). Thus each person only needs to indicate six choice occasions of their preferences.

Survey Design and Data Collection

Both baseline and follow-up surveys were conducted in or near the facilities on campus selling the company's products and on average took about 5 minutes for respondents to fill out the questionnaire. Intercept survey approach was adopted with an inducement that a \$3 per survey donation to a children's hospital considering of logistical convenience and helping avoid endowment and agreement bias.

Baseline survey

The baseline survey was designed before the company's promotion program to gather information of students' brand awareness of the product and competing products as along with students' consumption habits. 241 usable complete questionnaires were returned for this study.

According to the results, over 40 percent of the respondents did not have a university meal plan, and thus paid all items a la carte, meanwhile only 33 percent bought breakfast food on campus. Furthermore, for these student respondents, tastes, price, and avoiding waiting in lines were top priorities, ahead of healthiness. However these findings gave more incentives for healthier product promotion of the company around college campus, though as now fewer than 5% of the respondents were familiar with the

company's products, in contrast to over 70% for other dairy product brands such as Dannon and Breyers.

In addition, the baseline survey provided an opportunity to practice writing discrete choice WTP questions, coding the data appropriately, and performing choice-based conjoint analysis prior to the follow-up survey. The theoretical foundation was a random utility model in which indirect utility was expressed as a function of various products and their prices. When operationalized as a series of hypothetical choices between pairs of products and a third choice to purchase neither product, the resulting data can be empirically estimated as a conditional logit model. Relative to a selected base product or attribute, WTP estimates are the marginal utility (i.e., the regression coefficient) for a product or attribute, divided by the absolute value of the marginal utility of money (i.e., the coefficient on the price attribute). Most importantly for the Company's purposes, interaction terms between product attributes and consumer characteristics can identify observed preference heterogeneity among consumer segments.

Follow-up Survey

Six versions of choices set were administered to introduce variation in product prices and pairings in the context of follow-up survey. This survey returned 308 usable responses, and showed that brand awareness had grown from 5% to 18% during the semester, and that about one third of those who saw the Company's pudding and/or breakfast products had tried them. About one quarter of the respondents had eaten pudding and/or a hot breakfast cereal (any brand) within the last week.

Follow-up survey focuses on the company product and compared with established brand products on shelter at campus. In the setting of the survey questionnaire,

respondents are asked for their priority in health, taste and price of products. Also, respondents' purchase preference of snacks, dessert and breakfast products. In further, the questionnaire concerned respondents' awareness and familiarity with the company product during the promotion program between the baseline survey and follow-up survey.

Table 1 represents variable definitions included in the follow-up survey. Product variables include all products in the pairing groups and prices, also an alternative "buynothing" option. Survey information type represents survey versions and location. The third group asks the respondents the purchase preference about frequency and priority level in health, taste and price. In further, another group focuses on the company type, indicating how the respondents are familiar with the company product at campus in last typical month before the survey. At last, demographic variables are included in the questionnaire. The next section describes models that can be used to analyze the choice data suggested by the conjoint experiment in the previous section.

Theory framework

Random utility theory states that indirect utility (U_{ij}) is associated with alternative j for individual i in the t-th choice set as (McFadden):

$$U_{ijt} = X_{ijt} * \beta + e_{jt} \quad (1)$$

Where it supposes when individual i faces a choice alternative j (the pudding product in the study) in the t-th choice set with attribute levels represented by vector X_{ij} , the individual will choose alternative j as preferred alternative if and only if the utility associated with alternative j is larger than others. β is unknown parameter vector, and e_{jt}

is the error term. If the error term is assumed to be iid maximum extreme value type I distribution, the utility maximization problem is fit for the conditional logit model form:

$$P_{ijt} = \frac{\exp(\beta X_{ijt})}{\sum_{k=1}^J \exp(\beta X_{ikt})} \quad (2)$$

Beyond the product attribute variables, other factors, for example, respondent individual characteristics, would also contribute for determining utilities associated with various products. Then, interaction terms can be created between respondent characteristic variables and attribute variables, and these interaction terms can be included with vector X (Colombo, Calatrava-Requena and Hanley).

Relative to a selected base product or attribute, WTP estimates are the marginal utility (i.e., the regression coefficient) for a product or attribute, divided by the absolute value of the marginal utility of money (i.e., the coefficient on the price attribute).

In further, WTP can be measured by looking at marginal values associated with various attributes while considering along with respondents' preference and characteristic variables (purchase habit, gender, etc.) using a conditional logit model with interaction term . And following is the calculation formula for with interaction terms:

$$\text{Marginal Vaule} = s - \frac{\beta_{\text{attribute}} + \beta_D * D}{\beta_{\text{price}}} \quad (3)$$

Where $\beta_{\text{attribute}}$ and β_{price} are coefficients associated with an attribute and the price variable; $\beta_D * D$ represents interaction term. The goal of marginal value analysis is to find how different consumers may value the attributes differently when they are associated with different products.

Choice Model Results

Table 2 and Table 3 report estimation results from conditional logit model without and with interaction terms separately. In the context of a conditional logit model, one can not directly report the coefficient parameters estimated by magnitude, but by the signs and significance. First of all, in both table, the price variables present a negative significant coefficient, indicating that, holding all other factors constant, respondents will be less likely to choose the product when its price is higher.

Variable BuyNothing is the specific constant representing the third alternative option in the sample choice set, in which respondents could indicate that they would not chose either of the first two options. And, the negative and significant parameter estimated associated with this variable suggests that if the respondents are not able to choose any of these products offered, their utility will be significantly reduced. This result indicates that consumers in general are likely to purchase any of these products, and this reduction in utility is a signal of the relative tradeoffs consumers will make when evaluating the attributes of different products. In all choice set, if the consumers are not desirable to choose any of the first two combination, they have the chance to choose the BuyNothing option.

In Product variables indicating the company products and established brands are estimated. As showed from the results, among the company pudding products and products of established brand, Rice pudding and Organic Soy pudding from this company are significant at 1% and 5% level separately. However, Chocolate Pudding and the breakfast product don't reveal to be significant in this survey sample. Based on the significant results, the result is not promising to the company for having negative sign for

both puddings, in which suggests respondents are less likely to purchase snacks of this company brand as compared to alternatives on shelf already. This finding is, however, consistent to its low brand awareness in the baseline survey results. WTP information is also provided in table 2, the last column. On average, respondent is more likely to buy yogurt product compared to the company pudding product, and willing to pay 55 cents more. Both rice pudding and soy organic present negative WTP.

Table 3 presents estimation results from further analysis applying conditional logit model with interaction terms. In line with results from previous conditional logit results, price has negative coefficient and the same for buying nothing, for both increasing price and having nothing would decreasing respondent's utility in some extent. In the product variables group, two out of three of the company pudding products have significant but negative parameters at 0.01 level, which is consistent with the basic conditional logit estimation results. Chocolate pudding product and breakfast product don't reveal to be significant, though.

The first type is interacting with the survey version with company promotion information: focusing on taste and health. As showed in the results, if the respondent completing the survey question in a *health* version, he/she is more likely to purchase the company soy organic pudding product and the coefficient is significant at a 0.1 level. However, the negative WTP for buying it is -\$1.005, the negative magnitude is less than without the interaction term. It's also the same for in the *taste* version, which indicating the company promotion program had impact on purchase behavior but not strong due to the short time period.

In addition, rice pudding interacting with whether the person bought pudding product in the last month presents a 1% significantly positive impact on increasing utility. It is indicating that a respondent is more likely to purchase the company pudding product, rice pudding product specially, if he/she bought pudding product in last month. And, in further, a person is also more likely to choose rice pudding if he/she has a highest priority in health. It is also found that female respondent in this survey sample would be more likely to buy the soy organic pudding. Only who has high priority in health as the result showed will be more likely to buy the company breakfast product, and be willing to pay 98 more cents.

Conclusions

The analysis demonstrated the challenges of launching a new product line into an established marketplace, in this case a university foodservice setting. Are university students a promising audience for the Company's products? Few would associate pudding with traditionally popular student fare, but about 20 percent of survey respondents reported eating pudding in the previous week. While brand awareness remained lower than 20 percent during the study period, most of those who tried the Company's products reported liking them.

An internet search will return media items about growing demands by university students for organic and healthier foods. Such preferences should work to the Company's advantage, given its organic products and its marketing emphasis on simple, natural ingredients. The surveys, however, suggested that health-conscious consumers were a minority niche on campus. Not unlike preferences observed in the general

population, taste and price were dominant concerns. Conditional logit results suggested that WTP was highest, relative to retail price, for familiar snack and breakfast products without special health attributes.

The other side of the coin is that by gradually building familiarity among students with its products, the Company may obtain the same benefits enjoyed by currently entrenched products, primarily among a health-conscious, less price-sensitive niche of students. Thus, an overall recommendation to the Company is to continue sampling promotions to build brand awareness, and initially offer only popular products like chocolate pudding until awareness builds to support further products. Based on the survey results, the breakfast product appears least likely to succeed in the university foodservice setting.

Young adults have a reputation for being critical interpreters of advertising, and the split-sample surveys containing promotional material on taste versus health seemed to induce skepticism among respondents. If the Company continues to pursue university foodservice markets, a recommendation is to hire in promotional design firms that can demonstrate success among young adult audiences.

As a model for university-industry engagement, the project was mutually beneficial. The Company received consulting services for a fraction of the usual cost, and the graduate student investigators gained real-world experience in project design, survey design, choice-based conjoint analysis, and writing for both business and academic audiences.

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Table 1. Variable Definitions

Variable	Label	Definition
<i>Product</i>		
BuyNothing	BuyNothing	Alternative option of buying nothing
Price	Price	product price in \$/unit
Choc	Chocolate Pudding	1, if choose the Company's chocolate pudding
Yogurt	Yogurt	1, if choose Yoplait yogurt
Soyorg	Soy Organic Pudding	1, if choose the Company's soy organic pudding
Rice	Rice Pudding	1, if choose the Company'rice pudding
Hunts	Hunts	1, if choose Hunts chocolate pudding
Cheezit	Cheezit	1,if choose Cheezit crackers
Oreo	Oreo	1,if choose Oreo cookies
Breakf Product	Breakf Product	1, if choose the Company's breakfast product
Oatmeal	Oatmeal	1, if choose Quaker oatmeal
Cornflakes	Cornflakes	1, if choose Cornflakes
<i>Survey information</i>		
Infotast	Taste version	1, if survey version with Company promotion of taste
infohealth	Health version	1, if survey version with Company promotion of health
Loc	Location	Dining hall vs. campus convenience store
<i>Purchase Preference</i>		
Health	Priorityhealth	priority on health 3=high, 2=medium,1=low
Price	Priorityprice	priority on price 3=high, 2=medium,1=low
Taste	Prioritytaste	priority on taste 3=high, 2=medium,1=low
Breakfast	Breakfasteater	1, if buy breakfast more than once per week on campus
Snack	Snack	1, if buy snacks or desserts at campus dining facilities or campus convenience stores more than once per week
Yogurt	Yogurt	Frequency of eating yogurt in last month, 0=0 times, 1=1-3 times, 3=more than 3
Pudding	Pudding	Frequency of eating pudding in last month, 0=0 times, 1=1-3 times,3=more than 3
Orgc	Organic	Frequency of eating organic food in last month, 0=0 times,1=1-3 times, 3=more than 3
Cereal	Cereal	Frequency of eating breakfast cereal in last month,0=0 times, 1=1-3 times, 3=more than 3
Lacto	Lactose	1, if lactose intolerant

Table 1. Variable Definitions (cont.)

Variable	Label	Definition
<i>Familiar with the company product</i>		
Seep	Seep	1,have ever seen the company pudding product at campus
Tryp	Tryp	1,have ever tried the company pudding product at campus
Likep	Likep	1, liked the company pudding product at campus
Seec	Seec	1,have ever seen breakfast cereal product at campus
Tryc	Tryc	1,have ever tried breakfast product at campus
Likec	Likec	1, liked breakfast product at campus
<i>Demographic Variables</i>		
Female	Female	1, if the respondent is female
Student	Student	1,if the respondent is student
Noplan	Noplan	1,if the respondent has no meal plan on campus
Mealplan	Mealplan	1, if the respondent has either 5, 10, or 21 meals/week + Flex Dollars
Flexplus	FlexPlus	1, if the respondent has meal plan as Flex Dollars or Plus Account only

Table 2. Conditional Logit Model Estimation Results, No Interaction Terms

Variable	Coeff.		Std. Err.	WTP
BuyNothing	-1.6524	***	0.5315	
Price	-0.8415	**	0.3617	
Chocolate Pudding	0.1524		0.1676	
Yogurt	0.4653	***	0.1783	\$ 0.55
Rice Pudding	-0.658	***	0.1577	\$ -0.78
Soy Organic Pudding	-0.3388	**	0.1709	\$ -0.40
Cheezit	0.7030	***	0.1800	\$ 0.84
Oreo	0.6084	**	0.2659	\$ 0.72
Breakf Product	0.4352		0.5634	
Oatmeal	0.8530	***	0.2488	\$ 1.01
Cornflakes	1.0158		0.6007	

n=1837

*, **, *** represent statistical significance at the 10%, 5% and 1% level, respectively

Table 3. Conditional Logit Model Estimation Results with Interaction Terms

Variable	Coefficient		Std. Err.	WTP
BuyNothing	-1.6037	***	0.5454	
Price	-0.7945	**	0.3715	
Chocolate Pudding	0.0983		0.229	
Yogurt	0.4738	***	0.1828	\$ 0.60
Rice Pudding	-0.9046	***	0.1913	\$ -1.14
Soy Organic Pudding	-1.3937	***	0.3396	\$ -1.75
Cheezit	0.716	***	0.1832	\$ 0.90
Oreo	0.6229	**	0.2719	\$ 0.78
Breakf product	1.0678		0.7131	
Oatmeal	0.8113	***	0.2541	\$ 1.02
Cornflakes	0.905		0.6154	
<i>Interaction with Taste version</i>				
Chocolate Pudding*Taste	-0.3505		0.1879	
Soy Organic Pudding* Taste	0.5891	*	0.3106	\$ -1.013
<i>Interaction with Health version</i>				
Chocolate Pudding *Health	-0.2346		0.1857	
Soy Organic Pudding*Health	0.5952	*	0.3108	\$ -1.005
Rice Pudding*Pudding	0.5524	***	0.1367	\$ -0.44
Rice Pudding*Yogurt	0.3191	**	0.124	\$ -0.74
Rice Pudding*Seep	-0.0510		0.1577	
Rice Pudding *Priorityhealth	0.4300	***	0.1308	\$ -0.60
Rice Pudding *Priorityprice	-0.2353	*	0.1250	\$ -1.43
Soy Organic Pudding*Female	0.5656	**	0.2482	\$ -1.04
Soy Organic Pudding*Organic	0.4288	*	0.2458	\$ -1.21
Soy Organic Pudding*Lactos	-0.3393		0.4683	
Breakf Product*Priorityhealth	0.7822	**	0.3187	\$ 0.98
Breakf Product *PriorityPrice	-0.2466		0.3155	
Breakf Product *PriorityTaste	-0.6148		0.3535	
Breakf Product *Breakfasteater	0.0880		0.3182	
Breakf Product *Seec	-0.2294		0.4922	
Breakf Product *Cereal	-0.5177		0.3571	
Breakf Product *Female	-0.3696		0.3034	

*, **, ***represent statistical significance at the 10%, 5% and 1% level, respectively

Figure 1. Sample Choice Task in Follow-Up Survey

	Option A	Option B	Option C
Size	'The Company brand' Chocolate Pudding 6 oz	Yoplait mixed- berry Yogurt 6 oz	I would NOT choose either A or B
Health benefits	natural	low-fat	
Price	\$1.79	\$1.55	
I would choose...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Note: in the survey, the Company's real name was displayed.