Brief Report

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A study on yogurt consumption: A case of industry-academia collaboration in Fukushima and Tokyo

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Summary **This paper proposes a new product development of yogurt project based on industry-academia collaboration between Teikyo University and Tohoku Kyodo Milk Industry and discusses the possible economic impact of this project on the Tohoku region as well as the Tama area in Tokyo. We also introduce a preliminary survey to partially clarify the consumption patterns for yogurt among students at Teikyo University. The survey reveals that most of our respondents consume yogurt regularly. The stated reason for yogurt consumption is to enjoy yogurt as a dessert rather than as a health food. We also find that the most significant determinant factors for purchasing yogurt are taste, price, and quantity. Based on the data, respondents are willing to pay between 100 JPY and 145 JPY for yogurt. In response to these findings, we discuss some additional surveys that need to be conducted in the future.**

Keywords: Innovation, industry-academia collaboration, consumer analysis

1. Introduction

Approximately one century has passed since Schumpeter (1912) started discussing the importance of innovation (*1*). The manner by which innovation is carried out has changed throughout the century, but regardless, innovation is necessary for nations and companies. In recent years, innovation has been carried out through collaboration between universities, which require academic success, and companies, which demand economic performance. Universities and companies aim to put this type of innovation into practical use by formalizing industry-academia collaboration. This paper investigates the current state of industry-academia collaboration from economic and business perspectives based on the case example of the "Yogurt Project Launched by Teikyo University," which was conducted by Teikyo University in Tokyo and Tohoku Kyodo Milk Industry in Fukushima.

The "Yogurt Project Launched by Teikyo University" aims to commercialize yogurt made with Leuconostoc, which has a high natural immunity, developed and discovered primarily by Professor Kazuhisa Sekimizu at the Teikyo University (professor emeritus at the University of Tokyo), as "Teikyo University Yogurt" (See Ishii *et al*. (2017) for further details (*2*)). Specifically, "Genome Pharmaceuticals Institute" established by Professor Sekimizu uses a unique technique to produce and supply Leuconostic to Tohoku Kyodo Milk Industry. Leuconostic was developed by conducting a muscle contraction assay on silkworms. This lactobacillus is used to produce yogurt. Teikyo University decided to name the product "Teikyo University Yogurt". The Faculty of Economics at Teikyo University including the author and the author's seminar students (the "Mitsunami Seminar") are currently discussing and creating business models for marketing and package design for the yogurt. This is therefore a planning and development project to produce yogurt by collaboration between Teikyo University, Tohoku Kyodo Milk Industry, and Genome Pharmaceuticals Institute. Since Tohoku Kyodo Milk Industry is located in Koriyama City in Fukushima Prefecture, this project is expected to contribute to recovery efforts following the March 2011 earthquake in Japan. Based on previous results, the author and his seminar students determined the following two purposes of this project. The first purpose is to provide assistance to recovery efforts for the Tohoku region

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and Fukushima Prefecture. The earthquake, which occurred on March 11, 2011, brought about radioactive contaminants resulting from the Fukushima Daiichi nuclear disaster caused by earthquake and tsunami damage. According to Tohoku Kyodo Milk Industry, the reputation of milk produced in Fukushima has still not recovered even after seven years since the earthquake disaster, despite the fact that the milk is now safe to consume. Given this situation, we expect to directly contribute to recovery efforts following the earthquake disaster by encouraging consumers to buy this yogurt, since yogurt is widely believed to be less harmful than milk, and therefore, might soften consumers' attitudes. The second purpose of this project is regional development in the Tama area where Teikyo University is located. The Tama area has seen a declining economy as compared to central Tokyo, although it is located within the Tokyo metropolitan area. Based on an overall view of the industry, however, the Tama area seems to have considerable potential not only because of agriculture but also due to an active brewing industry, as well as many tourist attractions. Therefore, if the Tama area, which has such facets, can collaborate with Teikyo University to produce "Teikyo University Yogurt," the product is expected to connect consumers with the industry and sources in the area, thereby contributing to regional development. The project has the potential to activate regional economies not only in the Tama area but also in the Tohoku region and Fukushima Prefecture.

2. Materials and Methods

2.1. *Survey method*

In January 2018, the author's seminar students conducted a survey aimed at university students belonging to the Faculty of Economics at Teikyo University, pertaining to consumers' lifestyle and yogurt consumption. The aim of this survey is to conduct a preliminary study regarding commercialization of yogurt and a trial sale (planned at Teikyo University), and to collect basic information for a subsequent study on yogurt consumption. Specifically, the survey was conducted from January 9 to 15, 2018 for 754 students at Teikyo University (male 561; female 193) who attended the author's lectures.

2.2. *Survey design*

The survey consists of two parts: (*i*) the university students' life-style and (*ii*) their yogurt consumption behavior. The first part collected the following items: family structure, place to buy food, dietary habits, use of SNS, and recognition of tourist attractions at the university's location, and so on. The second part collected the following items: frequency and timing of yogurt purchases, the brand name of the yogurt, actual purchaser, purchase reason, willingness to pay, and determinant of purchase. Yogurt consumption is not determined only by preference or frequency, but rather it involves the individual's lifestyle as a subject of consumption. For example, some university students who live with his/her parents may consume more yogurt rather than others living alone because their parents habitually purchase yogurt. Thus, since some university students living with their parents have no custom of buying yogurt themselves, they are regarded as having no potential to be customers, even if yogurt is sold at the university. Therefore, because various kinds of individual attributes affect yogurt consumption behavior, the first part of the survey includes not only a decision factor for buying yogurt, but also individual lifestyle.

In the second part, we asked about the frequency and timing of yogurt purchases, the brand name of the yogurt, actual purchaser, purchase reason, willingness to pay, and determinant of purchase. In terms of yogurt product marketing, the price that a customer must pay to purchase yogurt, that is, their willingness to pay and the determinant of purchase action is critical information. Regarding the determinant of purchase action, we asked the following items in a ranking format based on priority to collect the data that are most important for the university students to buy yogurt: reputation, price, quantity, taste, ingredient, and package design. For example, when many students respond with "quantity," the "quantity" is regarded as more important than others are, such as "price or "taste." The following section analyzes the results of the second part of the survey.

3. Results and Discussion

The results of the survey are briefly summarized and presented as follows. The results from the data show that the number of students who typically eat yogurt was 491 and the number who do not typically eat yogurt was 253 in the sample. This indicates that approximately 66% of the students out of 744 valid responses consume yogurt. Respondents who habitually eat yogurt broke down as follows: 17 students who eat yogurt more than once a day, 94 students who eat yogurt once a day, 132 students who eat yogurt once every few days, 238 students who eat yogurt once a week, and 238 students who eat yogurt less often than that. The rate of university students who consume yogurt habitually (at least once every few days) was 51% of valid responses. Therefore, this tells us that there are a considerable number of students at Teikyo University who regularly consume yogurt.

The number of students who purchase yogurt broke down as follows: 245 students who purchase yogurt themselves, and 235 students whose parents or others purchase yogurt for them. This indicates that half of

the students buy yogurt on their own. The students who habitually eat yogurt and purchase it themselves were asked to fill in what they thought would be a reasonable price for yogurt (single serving). Results indicate that the average price considered to be reasonable was 145 JPY, the median was 120 JPY, and the mode was 100 JPY (28% answered, and there were 228 valid responses). We expect from the data that students feel that around 100 JPY is reasonable and that a range of prices between 100 JPY and 145 JPY is not too expensive. However, we need a more detailed study for pricing the yogurt when we sell it outside of the Teikyo University campus. We would like to leave this issue open for future research.

Regarding the determinant factors for buying yogurt, 59% of students consider taste to be the most important factor, while 68% consider the package design of the yogurt not to be an important factor. Price (second priority) was considered important by 64% of students and quantity (third priority) was considered important by 62% of students. It is hard to perform an analysis based only on these results and numerical values; however, it can still be ascertained that taste as well as price and quantity are important factors for university students. The number of students who have detailed knowledge of the ingredients of yogurt is limited. Furthermore, the tendency of Japanese people to prefer large-scale producers (brands) was not seen in students at Teikyo University.

This preliminary survey partially clarified the current status of yogurt consumption among students at Teikyo University. It reveals that the majority of our respondents consume yogurt on a regular basis and that the respondents' purpose in consuming yogurt is to enjoy it as a dessert rather than as a health food. We also found that the most significant determinant factor in buying yogurt is taste, followed by price and quantity. We also observed that respondents would be willing to pay between 100 JPY and 145 JPY for yogurt. These findings contributed in several ways to our understanding of consumer behavior among university students and provided a basis for an idea of a further survey as follows.

Firstly, an advanced survey design can be introduced. When people make purchasing decisions for goods, there is a trade-off among some attributes such as price, quality or brand. Therefore, we need to give respondents a hypothetical situation in the survey in which they are faced with a decision of whether to purchase a yogurt product. A choice experiment is one survey method. In a choice experiment, respondents are shown multiple choices and each choice has different characteristics. In such a situation, respondents are faced with a trade-off among different attributes and are required to select one of the choices according to their preferences. A related study used choice experiment questions and revealed that respondents are more likely to purchase yogurt that has labels indicating "Vitamin Enhanced", "Nutrition Info", or "Probiotic", while respondents are unlikely to purchase yogurt with a higher price and fat content (*3*). Our preliminary survey identified important factors for purchasing yogurt among university students, and they could be employed as attributes in choice experiment questions. Additionally, by using an advanced econometric model such as a latent class model, we can group respondents by preferences as well as quantitatively explain the difference in preferences by sociodemographic information or social beliefs. Since it is naturally expected that there is heterogeneity of preferences among university students, such an analysis could be useful in identifying the important factors for each specific group.

Secondly, packaging design could be important from a marketing standpoint. Some studies (*4,5*) showed that nutritional information did not affect the acceptability of yogurt. However, Bayarri *et al*. (2010) also suggested that different responses to information were observed among people with different individual characteristics, which suggests that university students could be affected by product information (*4*). Also, we know that corporate social responsibility has a positive impact on the image and sales of a product. For example, Managi *et al*. (2008) showed that the image of environmental friendliness in the production process positively affected consumers' purchasing decisions (*6*). In this regard, the possible economic impact on Fukushima and the Tama area could be positively correlated to the product value. In order to know exactly the extent to which this project affects their economies, input-output analysis can be employed. Another task would be to study how to advertise such information on packaging for effective marketing strategies.

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