Master's Thesis of Economics

# Factors Influencing the Consumption of Plant-based Alternative Beverages

## 식물성 대체 음료의 소비에 영향을 미치는 요인

February 2023

Graduate School of
Agricultural Economics and Rural Development
Seoul National University
Regional Information Studies Major

Hyeonjeong Lee

# Factors Influencing the Consumption of Plant-based Alternative Beverages

Examiner Junghoon Moon

Submitting a master's thesis of Economics

February 2023

Graduate School of
Agricultural Economics and Rural Development
Seoul National University
Regional Information Studies Major

Hyeonjeong Lee

Confirming the master's thesis written by
Hyeonjeong Lee
February 2023

Chair _____(Seal)
Vice Chair _____(Seal)
Examiner _____(Seal)

# Abstract

As the recent trend of interest in environmental impact and sustainability, personal health, and animal welfare issues has grown, plant-based alternative beverages have become increasingly popular and sophisticated. This study examines the key factors that influence the consumption of plant-based alternative beverages. Essay 1 aims to investigate how the consumption situations, consumer characteristics, and food pairing patterns differ based on milk selection, namely cow milk and plant-based milk. To accomplish the aim of the essay 1, food diary data with 117,728 cases were used for the main study and the follow-up tests. The main study investigated the consumer characteristics and drinking situations of milk and plant-based milk using the probit model. The follow-up tests investigated what kinds of food were mainly taken with milk and plant-based milk through decision tree analysis. The results show consumers who drink plant-based milk are more likely to be older, female, have fewer family members, have adult children than younger children, have lower incomes and live in the capital area, compared to consumers who drink milk. Compared to the drinking situation of milk, the drinking situation of plant-based milk is more likely to take place on the move. When people drink plant-based milk, they are likely to have eggs, bananas, sweet potatoes and nuts, while when people drink milk, they are likely to have cereals, bananas, and various types of bread. These findings provide marketers and retailers a stepping stone for developing an account for marketing strategies associated with plant-based milk. This study is the first empirical study to compare food pairing patterns between milk and plant-based milk, which extends the scope of food pairing studies with new method. Essay 2 aims to find the factors affecting consumer intention to purchase lattes using alternative milk from plant-based sources, and to compare the links between the factors and purchase intentions depending on two labels, "vegan latte" and "plant-based latte." Based on a literature review, it proposes antecedent factors influencing the purchase intention of plant-based lattes, such

as perceived health/sustainability/reputational benefits, food snobbery, food curiosity, food variety-seeking, and vegetarian stigma. An online and scenario-based experiment was conducted with a between-subjects design, followed by a survey. Two different labels were used in the experiment: a plant-based label and a vegan label. In both groups, the results show that the perceived benefits have a significantly positive effect on purchase intention, but the perceived barrier (i.e., vegetarian stigma) does not. Perceived benefits and preference are higher when showing a "plant-based latte" label focusing on the presence of plant-based ingredients than when showing a "vegan latte" label focusing on the absence of animal-based ingredients. However, there is no significant difference between purchase intentions depending on the label. For the label "vegan latte," even if consumers are non-vegan, the higher their food curiosity, food snobbery, and food variety-seeking tendency, the higher their purchase intention. Therefore, vegan certifications can also work in marketing. We suggest to marketers and menu developers what needs to be highlighted and which consumers to target in order to boost sales of latte using alternative milk. The findings also emphasize the potential for labels to promote the purchase intention of lattes using alternative milk, offering a strategy for changing consumer behavior.

**Keyword :** Plant-based milk, Vegan, Consumption behavior, Labeling communication, Food pairing, Bivariate probit model, Decision tree, Structural equation modeling
**Student Number :** 2021-29641

# Table of Contents

## List of Figures



## List of Tables

# I. Essay 1: Understanding the consumption of plant-based milk : Drinking situations and food pairings

## 1. Introduction

In recent years, there has been an increasing demand for plant-based alternative protein sources that could potentially replace animal proteins. In this growing market of alternative protein sources, it is reported that the dairy alternatives market is valued at $27.3 billion in 2022 and will reach $44.8 billion by 2027, growing at a compound annual growth rate of 10.4%. Plant-based milk accounts for about 67% of dairy alternatives and is made from different kinds of plant-based ingredients, such as soybeans, almonds and coconuts (Markets and Markets, 2022). According to the Good Food Institute's report (2022), the sales of plant-based milk have recently accounted for 16% of all sales of retail milk products. Based on the fact that sales of plant-based milk are increasing compared with decreasing sales of cow's milk, it can be said that plant-based milk has begun to replace cow's milk (Chiorando, 2018).

To help cater to consumers' needs for plant-based milk more efficiently, many studies have been conducted on intrinsic factors, including perceived benefits and barriers to drinking plant-based milk (e.g. Haas et al., 2019; Boaitey and Minegishi, 2020; Basu, 2022; Pointke et al., 2022). Plant-based milk is consumed for a variety of reasons, including health and environmental concerns. Plant-based milk is generally preferred over cow milk by consumers who are lactose-intolerant or allergic to milk proteins (Cruz et al., 2007). Additionally, it has low calories and no cholesterol, so those who are concerned about their health prefer plant-based dairy alternatives (Tuso et al., 2013). Health-promoting ingredients such as minerals, dietary fibre, vitamins and antioxidants have recently made alternative milk recognized as a functional food (Das et al., 2012).

When it comes to environmental issues, the original dairy industry produces a large amount of greenhouse gases (Karwacka et al., 2020), and the carbon and water footprints are larger from milk industry than from plant-based milk industry (Clune et al., 2017).

Even though consumption behaviours are influenced by both intrinsic and extrinsic factors (Belk, 1975; Blissett and Fogel, 2013; Font-i-Furnols and Guerrero, 2014), previous studies on plant-based milk consumption mostly focused on only the intrinsic factors related to perceived benefits and barriers mentioned earlier. It is known that situational factors and contextual factors, which are included in extrinsic factors, influence consumer's food and beverage preferences and choices (Marshall and Bell, 2003; Shukla, 2009; Giacalone et al., 2015; Skoczek-Rubińska and Bajerska, 2021). According to Belk (1975), situational factors are classified into five groups: physical surroundings, social surroundings, temporal perspective, task definition and antecedent states. Physical surroundings are the characteristics of a situation, including geographical location, sound, lighting and weather. Social surroundings include the existence of others, their characteristics and their roles. The temporal perspective is the dimension of a situation that can be specified in units, ranging from the time of day to the season of the year. Task definition includes the intention or requirement to purchase. Antecedent states represent momentary moods and momentary conditions rather than chronic personal characteristics. These situational factors can affect the consumption of plant-based milk.

According to Lahne (2019), food pairing can be considered a contextual factor that influences food and beverage consumption. Since a consumer's perception of one food or one drink in a pair changes dramatically because of the presence of the second in the eating and drinking context, food pairings are very basic "context effects". Food pairing suggests that what food people eat, as a contextual factor, affects what drink they choose. Previous studies showed customers' selection of beverage changes based on the type of food eaten (e.g. Loose and Jaeger, 2012; Eschevins et al., 2019).

Pairing makes individual food and beverage taste better when combined (Eschevins et al., 2018; Galmarini, 2020), and people tend to maintain their choice patterns of food and beverage (Spence, 2020). Providing a good sensory experience is a way of boosting the willingness to choose a specific food and beverage (Rozin and Hormes, 2011). In addition, consumers are likely to choose beverages based on the food they consume (Spence, 2020). This suggests that food paired with plant-based milk can be considered a contextual factor in consumption.

Combined with situational and contextual factors, individual characteristics, such as sociodemographic factors, should be considered together because the drinking situation has a complex influence on beverage selection along with sociodemographic causes (Babin and Harris, 2012; Park and Moon, 2022). This suggests that consumer characteristics and drinking contexts need to be investigated together. The situational variables serve as an important predictor of purchasing new or sustainable foods (e.g. Lee, 2016; Dominici et al., 2021). In an increasingly competitive market, food marketers need to develop innovative marketing strategies to build a strong presence, and understanding consumption situations makes this possible (Gehrt, 2000). Understanding consumers' characteristics also helps establish customized marketing strategies to target specific segments or reach potential buyers (Dominici et al., 2021).

In this regard, situational and contextual factors and sociodemographic factors related to plant-based milk should be investigated to understand plant-based alternative milk consumption patterns and to establish more effective marketing strategies and policies. Consumption patterns for milk and plant-based milk also need to be compared because milk is known to be a substitute for plant-based milk (Sethi, Tyagi and Anurag, 2016). There is, however, a lack of serious studies on who drinks plant-based milk, in what situations plant-based milk is consumed and what kind of food is more likely to be paired with plant-based milk. Moreover, very little has been done to compare these plant-based milk

consumption patterns to those of milk.
This study aims (1) to investigate the differences in consumption situations and consumer characteristics between milk and plant-based milk and (2) to compare food pairing patterns between milk and plant-based milk. The findings of this research will provide practical implications for marketing strategies for plant-based milk and academic implications for expanding the scope of the external factors of beverage consumption by examining plant-based milk consumption patterns.

# 2. Literature review

## 2.1 Drinking situations of milk and plant-based milk

Eating and drinking occur and are affected by situational factors (Feunekes et al., 1998; Stroebele and De Castro, 2004). According to Belk (1975), various situational factors influencing consumer behaviour are composed of five factors: physical surroundings (location, sounds, aromas, weather, etc.), social surroundings (other persons present, their apparent roles, their characteristics, etc.), temporal perspective (time of day, season of the year, etc.), task definition (intent or requirement to consume or purchase) and antecedent states (momentary moods, such as anxiety and excitation and momentary conditions, such as fatigue and illness). Many studies have shown that beverage choices can vary depending on situational factors (e.g. Liu, Han and Cohen, 2015; Calvo-Porral and Levy-Mangin, 2019; Lunardo, Jaud and Jaspers, 2022). Consumers in the United States, New Zealand and Norway are reported to drink milk and plant-based milk for breakfast (Loose and Jaeger, 2012; Paulsen, Myhre and Andersen, 2016; Rime, 2020). Americans and New Zealanders consume both milk and plant-based milk the most at home. (Loose and Jaeger, 2012; Liu, Han and Cohen, 2015; Rime, 2020). With the exception of “home”, milk and plant-based milk are consumed at grocery stores, followed by restaurants for milk and

on-the-go for plant-based milk (Rime, 2020). Milk tends to be consumed more on weekdays than on weekends, especially on a daily basis (Thompson, Larkin and Brown, 1986; Haas et al., 2019). However, the drinking situation for milk and plant-based milk has been studied mainly in Western countries and less in Asia. There has not been much research on the drinking situation of plant-based milk compared to milk as well, so fundamental information related to these situational factors needs to be developed.

## 2.2 Food pairing patterns of milk and plant-based milk

Since consumption of drinks and food is not separated but consumed together, the pattern of food pairing varies depending on the type of drinks (Spence, 2020). What to eat basically affects what to drink; paired food has a contextual effect on beverage selection (Lahne, 2019). For this reason, food pairing can be considered a contextual factor that affects beverage choices. Food pairing is the consumption of food and drink together, making the sensory experience better than when each is consumed alone (Rune, Münchow and Perez-Cueto, 2021). In recent years, food and beverage combinations have been investigated from various angles, mainly from a sensory perspective, to find the best gustatory combination (e.g. Bastian, Collins and Johnson, 2010; Eschevins et al., 2019; Makinei and Hazarika, 2022). However, Scander et al. (2018) showed that the combination of daily life is not always so sophisticated and is more affected by availability, lifestyle, consciousness and nutritional advice than the optimal flavour combination. In other words, by studying beverage–food combination patterns, it is possible to understand why people combine food and drink in terms of consciousness, such as health and pleasure. Because people tend to decide what to drink based on what they eat (Spence, 2020), menus eaten with plant-based milk can be considered factors that influence plant milk choices. Therefore, knowing the food pairing patterns of plant-based milk needs to be studied, but there have been few studies related to this. In Sweden,

when people drink milk, they eat cheese, pizza, sandwiches and sweets or desserts more, while they eat fish, Asian food and spicy food less (Scander et al., 2018). However, there have not been studies analysing food pairing related to plant-based milk. Pairing information should be studied to understand consumer behaviour by comparing the differences between dietary patterns containing milk and plant-based milk.

2.3 Consumer segmentation of milk and plant-based milk

Demographic profiles in consumption have helped to better understand consumption situations and contexts (Dominici et al., 2021). Many studies have been conducted to show that the consumption of sustainable foods differs according to individual characteristics (e.g. Verain et al., 2012; Sultan, Wong and Sigala, 2018; Su et al., 2019), and, this has been used for new product development and marketing strategies, targeting segmented consumers to sell products more efficiently (Sparke and Menrad, 2009). Plant-based milk has been established as a substitute for milk around the world, but differences in their consumer demographic properties have been mainly studied in Western countries (Aydar, Tutuncu and Ozcelik, 2020). Wolf, Malone and McFadden (2020), in the United States, compared the properties of respondents by dividing them into respondents from dairy households who usually drink milk, those from flexible households who drink milk and plant-based milk together and those from plant-based households who mainly drink plant-based milk. Consumers of dairy households were older than other households, and the size of flexible and plant-based households was larger than that of dairy households. Flexible families were also most likely to have children under the age of 12. Schiano et al. (2022) showed that people who have children are generally less likely to purchase plant-based milk. However, one study showed that gender and income did not affect the consumption of plant-based milk in the United States (Schiano et al., 2020). In the United Kingdom and Ireland, according to Beacom, Bogue and Repar (2021), women and people living in urban areas were more likely to consume plant-based milk. However, studies on the consumer segmentation

of plant-based milk have barely been conducted in Asia. Therefore, research related to the difference in consumer segmentation between plant-based milk and milk in Asian countries can be used as a useful and important marketing source.

## 2.3 Consumer segmentation of milk and plant-based milk

Demographic profiles in consumption have helped to better understand consumption situations and contexts (Dominici et al., 2021). Many studies have been conducted to show that the consumption of sustainable foods differs according to individual characteristics (e.g. Verain et al., 2012; Sultan, Wong and Sigala, 2018; Su et al., 2019), and, this has been used for new product development and marketing strategies, targeting segmented consumers to sell products more efficiently (Sparke and Menrad, 2009). Plant-based milk has been established as a substitute for milk around the world, but differences in their consumer demographic properties have been mainly studied in Western countries (Aydar, Tutuncu and Ozcelik, 2020). Wolf, Malone and McFadden (2020), in the United States, compared the properties of respondents by dividing them into respondents from dairy households who usually drink milk, those from flexible households who drink milk and plant-based milk together and those from plant-based households who mainly drink plant-based milk. Consumers of dairy households were older than other households, and the size of flexible and plant-based households was larger than that of dairy households. Flexible families were also most likely to have children under the age of 12. Schiano et al. (2022) showed that people who have children are generally less likely to purchase plant-based milk. However, one study showed that gender and income did not affect the consumption of plant-based milk in the United States (Schiano et al., 2020). In the United Kingdom and Ireland, according to Beacom, Bogue and Repar (2021), women and people living in urban areas were more likely to consume

plant-based milk. However, studies on the consumer segmentation of plant-based milk have barely been conducted in Asia. Therefore, research related to the difference in consumer segmentation between plant-based milk and milk in Asian countries can be used as a useful and important marketing source.

# 3. Main study

The main study was conducted to investigate how consumption situations and consumer characteristics differ based on the selection of milk and plant-based milk. It focuses on exploring when, where, in what situations and who drinks milk and plant-based milk compared to other beverages (soda, fruit juice, coffee, etc.).

## 3.1 Materials and methods

To investigate the general information of food and beverage consumption, food diary data, established by 'Opensurvey', was used. For the data, the respondents recorded all the food and drinks they had during the week in real time using their smartphones. This includes four seasons, weekdays and weekends. The responses also contain sociodemographic characteristics (age, gender, family size, marital status, employment status, residence, parental status, child age and monthly household income) and contextual information (the number of people they eat or drink with, place, day of the week and time). Regarding drinking and eating, the respondents additionally recorded the meal context (daily; social time with family, colleagues and friends; events including anniversary, wedding and working or studying).

A total of 500 respondents were recruited by gender and age at the end of each month using quota sampling. Since it was difficult to control effective samples before completing the data collection, quota sampling was used instead of a random sampling method. The age of the respondents ranged from their 20s to their 60s, all of whom were

legally capable of agreeing to participate. Prior to the survey, every participant was told that the data collected through the survey were confidential and used for research purposes only, and only those who agreed to participate were surveyed. The data collected from participants cannot be identified to specific individuals.

In the main study, we used data collected from March 2019 to May 2022 (39 months in total). A total of 117,728 out of 286,148 cases, including (1) drinking-only and (2) drinking-and-eating situations, were analysed. In other words, 168,420 cases of the eating-only situation were excluded from the data since these cases do not have information about beverages at all. The data used were collected from 14,298 respondents. The demographic information of 6,141 respondents who drank milk and 1,846 respondents who drank plant-based milk is presented in Table 1, which includes gender, age, monthly household income, family size, parental status and employment status. In both groups, the proportions of men and women were almost the same, and the participants' ages were almost evenly distributed across all ages. Over 90 percent of the participants earned a monthly household income of more than $1,404 (the exchange rate at the time of the study USD 1 = KRW 1,425.5). The participants were recruited to be less than 2%, similar to the demographic distribution in Korea (Park and Moon, 2022). Therefore, the results of this study can be said to represent the consumption behaviour of food and beverages in Korean adults.

Table 1. Participant properties of Case 1

| | | All beverage (n = 14,298) | | Milk (n = 6,141) | | Plant-based milk (n = 1,846) | |
|---|---|---|---|---|---|---|---|
| | | n | Proportion (%) | n | Proportion (%) | n | Proportion (%) |
| Sex | Male | 6838 | 47.8% | 2690 | 43.8% | 772 | 41.8% |
| | Female | 7460 | 52.2% | 3451 | 56.2% | 1074 | 58.2% |
| Age | 20s | 3367 | 23.5% | 1406 | 22.9% | 386 | 20.9% |
| | 30s | 3432 | 24.0% | 1577 | 25.7% | 485 | 26.3% |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 40s | 3819 | 26.7% | 1655 | 27.0% | 481 | 26.1% |
| | Above 50s | 3680 | 25.7% | 1503 | 24.5% | 494 | 26.8% |
| Monthly household income (1 million in KRW) | Up to $1,403 (KRW up to 199) | 1072 | 7.5% | 443 | 7.2% | 129 | 7.0% |
| | $1,404–2,807 (KRW 200–399) | 4347 | 30.4% | 1835 | 29.9% | 574 | 31.1% |
| | $2,808–4211 (KRW 400–599) | 4404 | 30.8% | 1921 | 31.3% | 571 | 30.9% |
| | Above $4,212 (KRW 600 and above) | 4490 | 31.4% | 1941 | 31.6% | 572 | 31.0% |
| Family size | 1 | 1708 | 11.9% | 645 | 10.5% | 243 | 13.2% |
| | 2 | 2626 | 18.4% | 1097 | 17.9% | 370 | 20.0% |
| | 3 | 4003 | 28.0% | 1754 | 28.6% | 525 | 28.4% |
| | 4 | 4774 | 33.4% | 2111 | 34.4% | 570 | 30.9% |
| | Above 5 | 1187 | 8.3% | 534 | 8.7% | 138 | 7.5% |
| Parental status | Having a child | 11294 | 79.0% | 4917 | 80.1% | 1381 | 74.8% |
| | Not having a child | 3004 | 21.0% | 1224 | 19.9% | 465 | 25.2% |
| Residence | Capital area | 6857 | 48.0% | 2990 | 48.2% | 929 | 50.2% |
| | Non-capital area | 7441 | 52.0% | 3212 | 51.8% | 923 | 49.8% |
| Employment | Employed | 10366 | 72.5% | 4257 | 69.3% | 1353 | 73.3% |
| | Unemployed | 3932 | 27.5% | 1884 | 30.7% | 493 | 26.7% |

Notes: n = number of respondents who drank all beverages, milk and plant-based milk. Exchange rate at the time of the study: USD 1 = KRW 1,425.5

To compare the consumer characteristics and drinking situations of milk and plant-based milk, they were analysed by bivariate probit regression models using R version 4.1.3. The models are represented as follows:

$$\textit{Case 1: } Pr(Milk) = \Phi(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_5 X_5 + u)$$

$$\textit{Case 2: } Pr(Milk) = \Phi(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_4 X_4 + \beta_5 X_5 + u)$$

$$\textit{Case 1: } Pr(Plant\text{-}based\ Milk) = \Phi(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_5 X_5 + u)$$

$$\textit{Case 2: } Pr(Plant\text{-}based\ Milk) = \Phi(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_4 X_4 + \beta_5 X_5 + u)$$

The dependent variable is the probability of drinking milk or plant-based milk among all beverages. If a respondent drinks milk or plant-based milk, it is "1"; otherwise, it is "0". In Case 1, the independent variables are X1, X2, X3 and X5. In Case 2, the independent variables are X1, X2, X4 and X5. X1 represents sociodemographic consumer characteristics, such as age, gender, family size, marital status, employment status, residence area, parental status, child age and monthly household income. X2 indicates contextual information, such as the number of people the respondents eat or drink with, place, day of the week and time. If they have a beverage with food, X3 is "1"; otherwise, it is "0". X4 contains the types of situations in which the participants eat and drink. X5 represents the external effect control, such as trend, seasonality and external events. We used month and year as dummy variables to control for the effects of seasonality and trends. We also used monthly COVID-19 new cases to control the external effects caused by the pandemic, as there have been many studies showing that COVID-19 affects food consumption behaviour (e.g. Chenarides et al., 2021; Güney and Sangün, 2021; Hassen et al., 2021). Finally, u represents the error term assumed to be a standard normal distribution. Therefore, Case 1 was analysed for all situations, including both drinking-only situations and drinking-and-eating situations, and Case 2 was analysed for drinking-and-eating situations.

To sum up, the variables shown in Table 2 were used for analysis based on previous studies. Descriptions of the frequency of occurrence according to each variable are shown in Tables 3 and 4. Table 3 shows the frequency of occurrence according to various contextual and contextual variables in Case 1, including both

drinking-only and drinking-and-eating situations. Table 4 shows the frequency of occurrence according to the situational variable of Case 2, including only the drinking-and-eating situation with food pairing.

Table 2. Literature review of socio-demographic, situational, and contextual factors affecting beverage consumption behaviour

| Previous literatures | Factors | Sub-factors | Variables in models |
|---|---|---|---|
| Yilmaz-Ersan, Ozcan and Akpinar-Bayizit (2020) | Socio-demographic factors | | Age, family size, gender, marital status, employment status, residence area, child status, monthly household income |
| Belk (1975), Parmar and Rathod (2020) | Situational factors | Physical surroundings | Place |
| | | Social surroundings | Social status |
| | | Time perspective | Day of the week, time, Year, Month, Monthly covid19 new cases |
| | | Task definition | Meal situation |
| Lahne (2019) | Contextual factor | Food pairing | Pairing status |

Table 3. Frequency of consumption by situation and context in Case 1

| | | All beverage (n = 117,728) | | Milk (n = 14,531) | | Plant-based milk (n = 3,941) | |
|---|---|---|---|---|---|---|---|
| | | n | Proportion (%) | n | Proportion (%) | n | Proportion (%) |
| Social status | With someone | 58866 | 50.0% | 5740 | 39.5% | 917 | 23.3% |
| | Without someone | 58862 | 50.0% | 8791 | 60.5% | 3024 | 76.7% |
| Day of the week | Weekdays | 87077 | 74.0% | 10891 | 75.0% | 792 | 20.1% |
| | Weekends | 30651 | 26.0% | 3640 | 25.0% | 3149 | 79.9% |
| Time | 6am-10am | 35442 | 30.1% | 6838 | 47.1% | 2014 | 51.1% |
| | 10am-2pm | 36638 | 31.1% | 3119 | 21.5% | 839 | 21.3% |
| | 2pm-6pm | 18673 | 15.9% | 1624 | 11.2% | 411 | 10.4% |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 6pm−10pm | 23651 | 20.1% | 2413 | 16.6% | 576 | 14.6% |
| | 10pm−2am | 2993 | 2.5% | 476 | 3.3% | 89 | 2.3% |
| | 2am−6am | 331 | 0.3% | 61 | 0.4% | 12 | 0.3% |
| Place | Home | 47701 | 40.5% | 10925 | 75.2% | 2142 | 54.4% |
| | Outside | 1836 | 1.6% | 98 | 0.7% | 21 | 0.5% |
| | Restaurant/café | 43104 | 36.6% | 2154 | 14.8% | 864 | 21.9% |
| | Workplace/School | 22128 | 18.8% | 1138 | 7.8% | 787 | 20.0% |
| | Transportation | 2959 | 2.5% | 216 | 1.5% | 127 | 3.2% |
| Food Pairing | With food | 74498 | 63.3% | 11168 | 76.9% | 2481 | 63.0% |
| | Without food | 43230 | 36.7% | 3363 | 23.1% | 1460 | 37.0% |

Table 4. Frequency of consumption by situation in Case 2

| | | All beverage (n = 74,498) | | Milk (n = 11,168) | | Plant−based milk (n = 2,481) | |
|---|---|---|---|---|---|---|---|
| | | n | Proportion (%) | n | Proportion (%) | n | Proportion (%) |
| Meal situation | Daily meal | 50629 | 79.9% | 8862 | 94.0% | 2021 | 94.9% |
| | Social time | 7551 | 11.9% | 217 | 2.3% | 31 | 1.4% |
| | Events/Trip | 3908 | 6.2% | 202 | 2.1% | 23 | 1.1% |
| | Working/Studying /Business meeting | 1298 | 2.0% | 148 | 1.6% | 54 | 2.5% |

When the dependent variable is binary, probit and logit models are most commonly used. In this study, since the probit model had a higher log−likelihood, the study was conducted through probit regression analysis (Cameron and Trivedi, 2010). Since the bivariate probit model has been widely used in food consumption behaviour studies (Deng and Hu, 2019; Hallak, Lee and Onur, 2019) and has been specifically used to investigate factors that determine food consumption (Hallak, Lee and Onur, 2019; Seo and Hwang, 2022), this analysis helps to identify the factors that cause milk and plant−based milk to be consumed.

## 3.2 Results

To compare the determinants of milk and plant-based milk, including consumer characteristics and drinking situations, bivariate probit regression was conducted. The probit model and marginal effects for milk consumption are presented in Table 5, and those for plant-based milk consumption are presented in Table 6. Seasonality and trend were controlled by adding year and month as dummy variables, but these were not reported in the tables.

First, the results of Case 1, analysing (1) drinking-only and (2) drinking-and-eating situations, are as follows. According to the probit model for milk consumption, the younger consumers were; the more likely they were to be men than women; the larger their family sizes and the more the number of unmarried consumers, the higher the probability of them drinking milk than other beverages. In addition, consumers with children aged 0–11 or with no children were more likely to drink milk than consumers with children aged over 18, and employed consumers were more likely to drink milk than other beverages. New monthly COVID-19 cases and residential areas did not significantly affect milk consumption probability. In terms of drinking situations, consumers were more likely to have milk in the morning (6–10 am) than in other time zones, on weekdays, when alone, at workplace or school and at home instead of outside, at restaurants or cafés and on transportation (on the move). Finally, there was a higher probability of drinking milk than other beverages when paired with food (Pseudo R2 = 0.125, Wald $\chi 2$ = 6897.5, $p < 0.01$). According to the probit model for plant-based milk consumption, the probability of drinking plant-based milk compared to other beverages increased when the respondents' family size was small, when they were unmarried, when they were employed and when they had children aged 0–18. New monthly COVID-19 cases, gender and residence area did not significantly affect plant-based milk consumption probability. In drinking situations, the probability of

drinking plant-based milk was higher than that of other beverages on weekdays and in the morning (6–10 am) than in other time zones. It was also higher when having it alone, at workplace or school, at home instead of outside, at restaurants or cafés and with food (Pseudo R2 = 0.084, Wald $\chi 2$ = 1908.4, $p < 0.01$).

In (1) drinking-only and (2) drinking-and-eating situations, the difference between the determinants that increase the probability of drinking milk and plant-based milk statistically significantly was mainly consumer characteristics, such as age, gender, family size and children's age.

Next, the results of Case 2, analysing (2) the drinking-and-eating situation, are as follows. According to the probit model for milk consumption, the determinants that increased the probability of drinking milk over other beverages were almost the same as in Case 1. However, consumers with higher monthly incomes (above $4,212) were more likely to drink milk than consumers with lower monthly incomes (up to $1,403). In the food pairing situation, the probability of drinking milk was higher in daily meals than in other situations, such as social time with family, colleagues or friends; events; and trips (Pseudo R2 = 0.138, Wald $\chi 2$ = 5113.2, $p < 0.01$). According to the probit model for plant-based milk consumption, the older consumers were; the more the number of unmarried consumers; the more the number of them living in non-capital areas and the more the number of people who had children over 18 years old than those who did not have children, the higher the probability of drinking plant-based milk than other beverages. New monthly COVID-19 cases, gender, marital status, employment status and income did not affect this result. In the drinking situation, the consumption patterns of plant-based milk were almost the same as in Case 1, but the probability of drinking it on transportation was higher than at home. In the added food situation, the probability of drinking plant-based milk was higher in daily meals than in other situations, such as social time with family, colleagues or friends; events; and trips (Pseudo R2 = 0.094, Wald $\chi 2$ = 1323.0, $p < 0.01$).

To sum up, in drinking-and-eating situations, factors statistically

significantly influencing the probability of milk and plant-based milk consumption were consumer characteristics, such as age, family size, income level and residential areas. In addition, the probability of drinking plant-based milk was higher in transportation than in other places. The number of new monthly COVID-19 cases did not significantly affect the probability of milk and plant-based milk consumption in all models.

Table 5. Probit results: Determinants of milk consumption

| Variables | Case1 | | Case2 | |
|---|---|---|---|---|
| | Estimates (SE) | Marginal effects | Estimates (SE) | Marginal effects |
| Constant | −0.785*** (0.043) | −0.146 | −0.287*** (0.051) | −0.061 |
| External events | | | | |
| New monthly COVID-19 cases (in millions) | −0.001 (0.005) | −0.000 | −0.004 (0.006) | −0.001 |
| Sociodemographic characteristics | | | | |
| Age | −0.003*** (0.001) | −0.001 | −0.004*** (0.001) | −0.001 |
| Family size | 0.030*** (0.006) | 0.006 | 0.030*** (0.007) | 0.006 |
| Gender (Female = 1, Male = 0) | −0.066*** (0.011) | −0.012 | −0.096*** (0.013) | −0.020 |
| Marital status (Married = 1, Unmarried = 0) | −0.089*** (0.022) | −0.017 | −0.063** (0.026) | −0.013 |
| Employment status (Employed = 1, Unemployed = 0) | 0.021* (0.012) | 0.004 | 0.019 (0.014) | 0.004 |
| Residence area (Capital area = 1, Non-capital area = 0) | −0.001 (0.010) | 0.000 | −0.003 (0.012) | −0.001 |
| Child status - Base: Child 1 (over 18 years old) | | | | |
| Child 2 (12-18 years old) | 0.017 (0.020) | 0.003 | 0.039* (0.024) | 0.008 |
| Child 3 (6-11 years old) | 0.079*** (0.020) | 0.015 | 0.140*** (0.024) | 0.029 |
| Child 4 (0-5 years old) | 0.150*** (0.021) | 0.028 | 0.207*** (0.025) | 0.043 |
| Child 5 (No child) | 0.047** (0.021) | 0.009 | 0.041 (0.025) | 0.009 |
| Monthly household income - Base: Income 1 (Up to $1403) | | | | |
| Income 2 ($1,404-$2,807) | −0.025 (0.020) | −0.005 | 0.021 (0.024) | 0.004 |
| Income 3 ($2,808-$4,211) | −0.024 (0.021) | −0.004 | 0.030 (0.025) | 0.006 |

| | | | | |
|---|---|---|---|---|
| Income 4<br>(Above $4,212) | −0.004<br>(0.021) | −0.001 | 0.051**<br>(0.025) | 0.011 |
| Drinking situation | | | | |
| Social status<br>(Together = 1, Alone = 0) | −0.235***<br>(0.011) | −0.044 | −0.270***<br>(0.013) | −0.057 |
| Day of the week<br>(Weekend = 1, Weekday = 0) | −0.071***<br>(0.012) | −0.013 | −0.063***<br>(0.014) | −0.013 |
| Time − Base: Time 1 (6 am–10 am) | | | | |
| Time 2<br>(10 am–2 pm) | −0.407***<br>(0.013) | −0.076 | −0.470***<br>(0.016) | −0.099 |
| Time 3<br>(2 pm–6 pm) | −0.337***<br>(0.016) | −0.063 | −0.402***<br>(0.020) | −0.085 |
| Time 4<br>(6 pm–10 pm) | −0.449***<br>(0.015) | −0.084 | −0.522***<br>(0.017) | −0.110 |
| Time 5<br>(10 pm–2 am) | −0.222***<br>(0.029) | −0.041 | −0.359***<br>(0.037) | −0.076 |
| Time 6<br>(2 am–6 am) | −0.126***<br>(0.083) | −0.023 | −0.284**<br>(0.105) | −0.060 |
| Place − Base: Place 1 (Home) | | | | |
| Place 2<br>(Outside) | −0.465***<br>(0.049) | −0.087 | −0.443***<br>(0.068) | −0.094 |
| Place 3<br>(Restaurant/café) | −0.666***<br>(0.018) | −0.124 | −0.602***<br>(0.023) | −0.127 |
| Place 4<br>(Workplace/school) | 0.102***<br>(0.022) | 0.019 | 0.131***<br>(0.029) | 0.028 |
| Place 5<br>(Transportation) | −0.391***<br>(0.036) | −0.073 | −0.421***<br>(0.062) | −0.089 |
| Food pairing context | | | | |
| Pairing status<br>(with food = 1, without food = 0) | 0.457***<br>(0.012) | 0.085 | − | − |
| Meal situation − Base: Situation 1 (Daily meal) | | | | |
| Situation 2<br>(Social time) | − | − | −0.394***<br>(0.056) | −0.083 |
| Situation 3<br>(Event/Trip) | − | − | −0.257**<br>(0.106) | −0.054 |
| Situation 4<br>(Working/Studying) | − | − | 0.010<br>(0.041) | 0.002 |
| Overall model fit | | | | |
| # Observations | 117728 | | 74497 | |
| Log likelihood | −39983.0 | | −28421.9 | |
| Pseudo R2 | 0.125 | | 0.138 | |
| Wald $\chi 2$ | 6897.5*** | | 5111.9*** | |

Notes: *, ** and ***Significant at the 10, 5 and 1 percent levels, respectively. Standard errors are indicated in parentheses.

Table 6. Probit results: Determinants of plant-based milk consumption

| Variables | Case1 | | Case2 | |
|---|---|---|---|---|
| | Estimates (SE) | Marginal effects | Estimates (SE) | Marginal effects |
| Constant | −1.487*** (0.096) | −0.104 | −1.543*** (0.078) | −0.106 |
| External events | | | | |
| New monthly COVID-19 cases (in millions) | −0.008 (0.007) | −0.001 | 0.004 (0.009) | 0.000 |
| Sociodemographic characteristics | | | | |
| Age | 0.001 (0.001) | 0.000 | 0.006*** (0.001) | 0.000 |
| Family size | −0.025** (0.008) | −0.002 | −0.012 (0.011) | −0.001 |
| Gender (Female = 1, Male = 0) | 0.012 (0.016) | 0.001 | −0.024 (0.020) | −0.002 |
| Marital status (Married = 1, Unmarried = 0) | −0.057* (0.071) | −0.004 | −0.136*** (0.040) | −0.009 |
| Employment status (Employed = 1, Unemployed = 0) | 0.067*** (0.019) | 0.005 | 0.018 (0.023) | 0.001 |
| Residence area (Capital area = 1, Non-capital area = 0) | 0.008 (0.015) | 0.001 | 0.047** (0.019) | 0.003 |
| Child status - Base: Child 1 (over 18 years old) | | | | |
| Child 2 (12–18 years old) | −0.057* (0.030) | −0.004 | 0.013 (0.038) | 0.001 |
| Child 3 (6–11 years old) | −0.066** (0.032) | −0.005 | 0.003 (0.040) | 0.000 |
| Child 4 (0–5 years old) | −0.054* (0.032) | −0.004 | 0.042 (0.040) | 0.003 |
| Child 5 (No child) | 0.088** (0.030) | 0.006 | 0.149*** (0.037) | 0.010 |
| Monthly household income - Base: Income1 (Up to $1403) | | | | |
| Income 2 ($1,404–$2,807) | −0.033 (0.029) | −0.002 | −0.026 (0.036) | −0.002 |
| Income3 ($2,808–$4,211) | −0.019 (0.030) | −0.001 | −0.042 (0.038) | −0.003 |
| Income 4 (Above $4,212) | −0.015 (0.030) | −0.001 | −0.025 (0.038) | −0.002 |
| Drinking situation | | | | |
| Social status (Together = 1, Alone = 0) | −0.412*** (0.018) | −0.029 | −0.392*** (0.021) | −0.027 |
| Day of the week (Weekend = 1, Weekday = 0) | −0.095*** (0.019) | −0.007 | −0.100*** (0.023) | −0.007 |
| Time - Base: Time 1 (6 am–10 am) | | | | |

| | | | | |
|---|---|---|---|---|
| Time 2<br>(10 am–2 pm) | −0.271***<br>(0.019) | −0.019 | −0.249***<br>(0.024) | −0.017 |
| Time 3<br>(2 pm–6 pm) | −0.301***<br>(0.025) | −0.021 | −0.260***<br>(0.033) | −0.018 |
| Time 4<br>(6 pm–10 pm) | −0.278***<br>(0.022) | −0.019 | −0.229***<br>(0.027) | −0.016 |
| Time 5<br>(10 pm–2 am) | −0.297***<br>(0.049) | −0.021 | −0.317***<br>(0.065) | −0.022 |
| Time 6<br>(2 am–6 am) | −0.301**<br>(0.133) | −0.021 | −0.059<br>(0.151) | −0.004 |
| Place – Base: Place 1 (Home) | | | | |
| Place 2<br>(Outside) | −0.310***<br>(0.086) | −0.022 | 0.057<br>(0.102) | 0.004 |
| Place 3<br>(Restaurant/café) | −0.759***<br>(0.041) | −0.053 | −0.600***<br>(0.049) | −0.041 |
| Place 4<br>(Workplace/school) | 0.628***<br>(0.044) | 0.044 | 0.679***<br>(0.052) | 0.047 |
| Place 5<br>(Transportation) | 0.026<br>(0.044) | 0.002 | 0.183**<br>(0.078) | 0.013 |
| Food pairing situation | | | | |
| Pairing status<br>(with food = 1, without food = 0) | 0.164***<br>(0.017) | 0.011 | – | – |
| Meal situation – Base: Situation 1 (Daily meal) | | | | |
| Situation 2<br>(Social time) | – | – | −0.471***<br>(0.128) | −0.032 |
| Situation 3<br>(Event/Trip) | – | – | −0.441***<br>(0.193) | −0.030 |
| Situation 4<br>(Working/Studying) | – | – | −0.024<br>(0.068) | −0.002 |
| Overall model fit | | | | |
| # Observations | 117728 | | 74497 | |
| Log likelihood | −15994.1 | | −9982.1 | |
| Pseudo R2 | 0.084 | | 0.094 | |
| Wald $\chi 2$ | 1908.4*** | | 1334.5*** | |

Notes: *, ** and ***Significant at the 10, 5 and 1 percent levels, respectively. Standard errors are indicated in parentheses.

# 4. Follow−up tests

Follow−up tests were conducted to examine how food pairing patterns differed based on the selection of milk and plant−based milk. They showed what kinds of food were mainly taken with milk and plant−based milk, which provided the sources for the food pairing comparison.

## 4.1 Material and methods

For the purpose of the follow-up tests, the data were limited to cases of drinking-and-eating situations. Among the total cases used in the main study, 74,498 cases of only-drinking situations were extracted. After removing the cases that had very little portion, such as health supplements, medicines, powder products and sauces, 72,583 meal records were used for analysis. The menus respondents ate were grouped into 197 menus for the decision tree analysis (e.g. cooked white rice, fried chicken, soup, dessert, ramen, salad, roasted pork, hamburger, apple, cereal, sandwich and pizza). In the decision tree model, the dependent variable was "1" for milk and plant-based milk and "0" for other beverages. The independent variable was also set to "1" if a specific menu appeared and "0" otherwise.

The different food pairing patterns were examined using classification and regression trees (CART), one of the most common data mining methods. CART (Breiman et al., 1984) has been used to generate models to analyse collected data and answer research questions (Song and Ying, 2015). This method has been widely used in previous studies of food consumer behaviour (e.g. Bozkir and Sezer, 2011; Aday and Yener, 2015; Jovanović et al., 2017). Because it is used to indicate the probability of a particular menu appearing in a meal (Gorgulho et al., 2017), it is considered a suitable method for showing the probability of a menu appearing with milk and plant-based milk. In this study, decision trees were created based on the following criteria: minimum number of cases: parent node 100; child node 50; maximum tree depth: 5; impurity measure: Gini; maximum number of surrogate variables: one less than the number of independent variables.

## 4.2 Results

To examine the food pairing patterns of milk and plant-based milk, a CART analysis was conducted. Figure 1 shows the results for milk, and Figure 2 shows the results for plant-based milk. The classifier recognition rate (accuracy) between the training data and verification data was 83.9% for the milk model and 96.6% for the plant-based milk model. Both models accurately classify more than 80% of the data, so they can be considered valid for the analysis and interpretation of relationships between variables. Nodes provide the number and percentage of cases classified into milk or plant-based milk and other beverages. This represents the result of a set of classification rules generated by checking the presence of each food in the meal and showing the combination that best distinguishes the two groups.

Milk has an 18.6% chance of appearing in drinking-and-eating situations. Food combinations classified with a higher probability of being with milk were cereal without nuts (83.9%); cereal with nuts (59.7%); banana without cereal (44.7%); plain bread without cereal and banana (37.3%); toast including other ingredients without cereal, banana and plain bread (35.9%); and flavoured bread without cereal, banana, plain bread and toast including other ingredients (31.4%). In contrast, as shown in Figure 2, plant-based milk has a 3.4% chance of appearing in drinking-and-eating situations. Food combinations classified with a higher probability of being with plant-based milk were boiled or smoked egg (10.9%); banana without boiled or smoked egg (11.5%); sweet potato without banana and boiled or smoked egg (8.5%); and nuts without sweet potato, banana and boiled or smoked egg (9.6%). Therefore, it can be interpreted that there is a difference between the food pairing patterns of milk and plant-based milk.

Figure 1. Decision tree classification of food pairing with milk

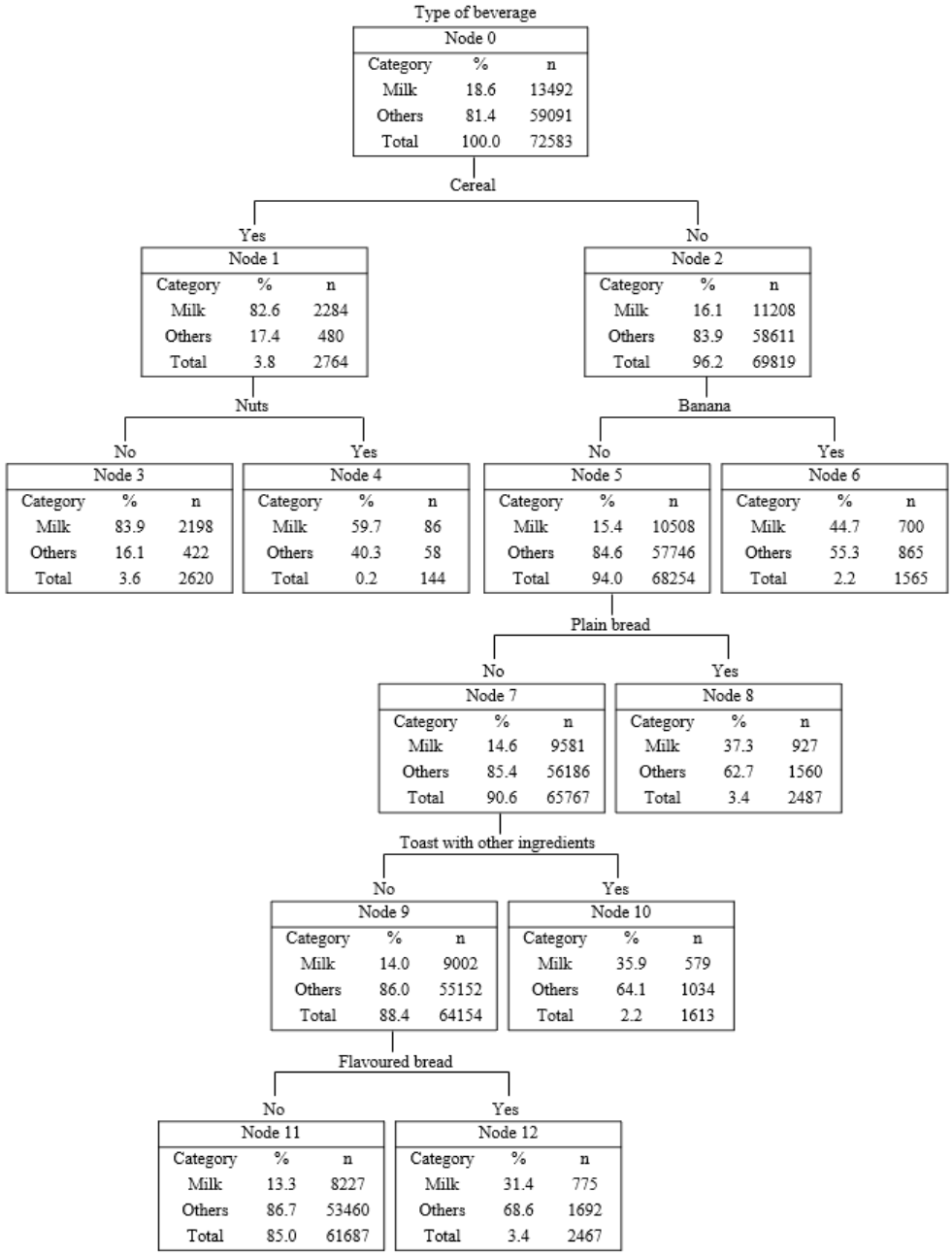
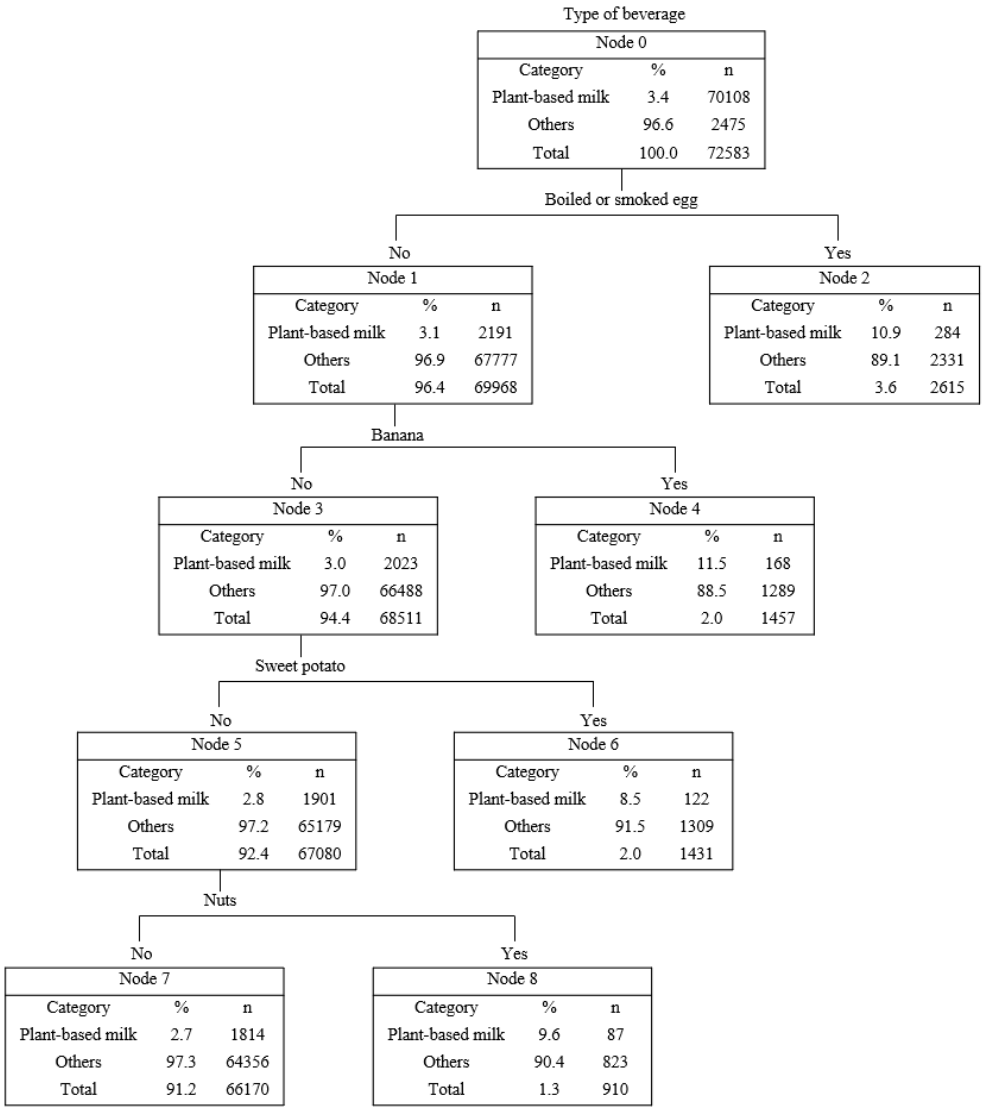



Figure 2. Decision tree classification of food pairing with plant-based

milk




# 5. Discussion

Currently, the market size of plant-based milk is growing rapidly around the world, but research on consumer characteristics, drinking situations and food pairing patterns on plant-based milk, having different properties from milk, is limited. This is the first empirical study to compare consumer characteristics and drinking situations between milk and plant-based milk and to compare food pairing

patterns between milk and plant-based milk. The results of the main study showed consumers who drink plant-based milk tend to be older, be female, have fewer family members, have adult children rather than young children, have lower incomes and live in the capital area, compared to consumers who drink milk. Compared to the drinking situation of milk, people usually drink plant-based milk on the move. The results of the follow-up tests showed that when people drink plant-based milk, they are likely to have boiled or smoked eggs, bananas, sweet potatoes and nuts with it, while when people drink milk, they are likely to have cereals, bananas and different types of bread.

## 5.1 Practical implications

The results of this study provide new insights into plant-based milk consumption and suggest practical implications. First, marketers of plant-based milk should clarify the target consumer group. Considering that plant-based milk is consumed the most with eggs, one of the animal-based foods, it is better to target people who are health conscious than only vegans. People drink plant-based milk with boiled or smoked eggs, sweet potatoes and nuts, all of which are representative foods eaten by consumers who are health conscious or trying to reduce body weight (Kritchevsky and Kritchevsky, 2000; Sabaté, 2003; Vander Wal et al., 2008; Kim et al., 2011; Jackson and Hu, 2014; Mwanga et al., 2017). This suggests that expanding the target consumer group of plant-based milk to those who are concerned about their health or who want to take lower calories may be more effective in product sales. In addition, it is necessary to focus on the main consumer group of plant-based milk, which has sociodemographic characteristics distinct from the main consumer group of conventional cow's milk. The results of the main study showed that the consumers of plant-based milk and milk differed in terms of age, gender, family size, child age, income and residence area. Since identifying and targeting the main consumer segmentation

are effective marketing strategies (Cahill, 1997; Su et al., 2019), many studies have studied the consumer characteristics of sustainable food products (Verain, Dagevos and Antonides, 2015; Singh and Verma, 2017; Wilkinson et al., 2018; Pandey, Ritz and Perez-Cueto, 2021). Our results point to people who should be targeted for plant-based milk consumption, especially in Asian countries, which have hardly been studied but have been drinking plant-based milk for a relatively long time (Liu, 1997; Prabhakaran, Perera and Valiyaveettil, 2005).

Second, marketers of plant-based milk should advertise, focusing on the relatively high portability of plant-based milk. The main study proved that plant-based milk tends to be consumed more "on the move" than milk, which suggests that targeting this aspect can be a selling point. Plant-based milk products have been drunk with fewer limitations. Compared to milk, plant-based milk has a longer shelf life and needs less strict temperature management to retain its quality (JOI, 2020; Scientific American, 2008; Koutsoumanis et al., 2010; Mercier et al., 2017). In particular, in the Korean market, most cow's milk products are pasteurized and are being distributed at cold temperatures, but most of the soy milk products are also pasteurized and are distributed at room temperature for a long time (The Food and Beverage News, 2021; Seoul Economy, 2009; Kyunghyang News, 2022). Since food marketers' suggestion of places and occasions for consumption helps increase purchases (Berni, Begalli and Capitello, 2005; Liu, Han and Cohen, 2015), promoting that plant-based milk is easier to carry and easier to drink on the go, unlike milk, can help increase purchases.

Finally, nutritionists or nutrition-related organizations that provide healthy nutrition guidelines can recommend eating calcium-rich eggs when drinking calcium-deficient plant-based milk. In particular, the elderly are at an age when calcium intake is considered more important, but they are the group that consumes the most plant-based milk. Plant-based milk has the disadvantage of lacking calcium despite its advantages of low calories and high saturated fat. The follow-up tests showed that plant-based milk is consumed the most

with boiled eggs, which are known to have a relatively high calcium content. In other words, plant-based milk and eggs can be considered a good combination that complements each other's nutritional value. These results provide useful implications for nutrition-related practitioners who provide healthy dietary guidelines.

## 5.2 Academic implications

The results of this study contribute to extending the scope of the literature on food pairing in terms of conventional consumption behaviour. The concept of food pairing has been studied to find the optimally flavoured combination mainly from the perspective of a sensory (e.g. Ahn et al., 2011; Galmarini, 2020; Spence, 2020; Rune et al., 2022). Previous studies have mainly investigated the food pairing of alcoholic beverages and have suggested the composition of a set menu in luxury restaurants (Terrier and Jaquinet, 2016; Bhanu and Kumar, 2019), but little research has been done on pairing patterns in daily food and beverage combinations. In other words, our study investigated food pairing from a conventional perspective rather than a sensual perspective. This study has contributed to expanding food pairing into everyday drinks following Scander et al.'s (2018) study, which showed food and beverage combinations on a daily basis among Swedish people. This is the first study to investigate daily food pairing patterns in plant-based milk.

Next, this study expanded the external factors to be explored when analysing beverage intake patterns by adding an element called food pairing as a contextual factor. Previous studies mainly focused on situational factors when examining external factors affecting food consumption (Calvo-Porral and Levy-Mangin, 2019; McNaughton et al., 2020), and food pairing has been studied separately as context variables (Lahne, 2019). However, the food that a consumer eats becomes a trigger that has an important influence on the choice of drinks and is selected in different situations, so food pairing needs to be considered at the same time. Therefore, this paper extended the

scope of external factors affecting beverage consumption patterns to include contextual factors by analysing situational and contextual variables together for the first time.

Finally, this study demonstrated that the drinking situations of milk and plant-based milk are very similar, which proves that these two types of milk can be consumed as substitutes, as presented before (Sethi, Tyagi and Anurag, 2016). Plant-based milk has been developed to replace milk and has been called "alternative milk", but almost no research has been conducted on whether these two types of milk are being consumed in similar situations. This is the first study to prove this using data from what people actually had. This study can be considered to have high validity in consumer behaviour since it uses 39 months of long-term data rather than days of short-term data and more than 100,000 records that are actually consumed by 14,298 panels.

## 5.3 Limitations and future research

Even though the results of this study provide marketers and retailers with guidelines for effective marketing strategies of plant-based milk by examining the difference in consumer profiles, drinking situations and food pairing patterns between milk and plant-based milk, this study also has limitations. First, in South Korea, the market size of plant-based milk, excluding soy milk, is not yet large. In 2020, the domestic plant-based milk market was 563 billion KRW, but excluding soy milk, it was only 43 billion KRW (The Food and Beverage News, 2021). For this reason, the number of collected samples was insufficient to analyse the consumption patterns that depended on different types of plant-based milk, such as coconut milk, oat milk and almond milk. However, as the market size of other types of plant-based milk has been rapidly growing recently (News1, 2022), it will be possible to analyse consumer behaviour by dividing plant-based milk by various types in future studies for more sophisticated and fragmented marketing strategies. Second, this

study focuses on adults, which means that we did not examine the drinking behaviour of consumers under the age of 18, one of the main consumers of milk and plant-based milk (Boaitey and Minegishi, 2020; Schiano et al., 2022). Since parents often purchase food for children who are minors (Baldassarre, Campo and Falcone, 2016), children's consumption through parents' consumption can be assumed by proxy. However, for more accurate consumption prediction, understanding the difference between consumer behaviour on milk and plant-based milk of consumers under the age of 18 will be needed in the future. Finally, because we used the data that people reported themselves, the problems associated with accuracy could be pointed out. Previous studies have shown that over- or under-estimation of intake is a problem related to self-reported data (Lillegaard and Andersen, 2005; Pendergast et al., 2017). Therefore, more work should be conducted to improve the consistency and accuracy of food diary data collection methods.

# 6. Conclusions

This study examined the differences in consumption situations and consumer characteristics between milk and plant-based milk and compared food pairing patterns between milk and plant-based milk. The results showed consumers who drink plant-based milk are more likely to be older, be female, have fewer family members, have adult children rather than younger children, have lower incomes and live in the capital area, compared to consumers who drink milk. Compared to the drinking situation of milk, people usually drink plant-based milk on the move. When people drink plant-based milk, they are likely to have eggs, bananas, sweet potatoes and nuts with it, while when people drink milk, they are likely to have cereals, bananas and different types of bread. These findings provide practitioners with a stepping stone for developing an account of marketing strategies associated with plant-based milk. This is also the first empirical study to compare food pairing patterns between milk and plant-based

milk, which extends the scope of food pairing studies with actual intake data.

# II. Essay 2: Purchasing vegan latte or plant-based latte

: Label communications toward sustainability

# 1. Introduction

As the recent trend of interest in environmental impact and sustainability, personal health, and animal welfare issues has grown, plant-based alternatives have become increasingly popular and sophisticated (He et al., 2020). Plant-based foods are a large market in the United States, with high growth in many categories. Among these categories, milk alternatives showed total sales of $2.5 billion and meat alternatives showed $1.4 billion in 2020 (Good Food Institute, 2021). Although the market size for plant-based milk is much larger compared to the market size for plant-based meat, most studies have been conducted focusing on acceptance, sensorial properties, and purchasing behavior regarding plant-based meat (e.g., Bakhsh et al., 2021; Hwang et al., 2020; Kyriakopoulou et al., 2019; Michel et al., 2021; Rubio et al., 2020; Tziva et al., 2020). Few studies have been conducted on plant-based milk.

Plant-based milk is a fast-growing category in the development of functional and special drinks worldwide, with greater demand than ever before (Sethi et al., 2016). Research on alternative milk has been conducted for a long time (Chalupa-Krebzdak et al., 2018; Jeske et al., 2017; Tangyu et al., 2019), and relevant research on alternative yogurt and cheese has also been conducted (Boeck et al., 2021; Grasso et al., 2020, 2021; Greis et al., 2020; Martinelli & De Canio, 2021; Pandey et al., 2021). However, little research on coffee products using milk alternatives has been conducted. The growth of plant-based milk has affected the coffee industry. The coffee industry faces a diversification of demand, which has led to latte products using alternative milk appearing in many markets (e.g., Nestle, 2019; Starbucks, 2020).

A latte using alternative milk is a beverage that reflects consumers' diverse tastes for coffee (Labbe et al., 2015). It has the properties

of a plant-based substitute; thus, for the concepts in this study, studies on the purchase behavior for coffee products and alternative milk products were referred to in order to figure out the mechanism affecting the purchase intention of latte products using alternative milk. As a result, we consider perceived health benefits, perceived sustainability benefits, perceived reputational benefits, food snobbery, food curiosity, food variety-seeking, vegetarian stigma, and preference as the factors influencing the purchase intention of lattes using alternative milk (e.g., Rosenfeld & Tomiyama, 2020; Schiano et al., 2020)

Consumer expectations of food are influenced by external information, which includes labels (Grunert, 2002). When purchasing food, consumers encounter a number of differentiated products with different attributes (Sharp, 2018); labels can be used as clues to assess sustainability (Lazzarini et al., 2017). According to Rosenfeld et al.' s (2022) study, plant-based foods are mainly labeled "vegan/vegetarian" and "plant-based", and they analyzed different consumer behavior purchasing burgers labeled as "vegan" vs. "plant-based". However, few studies have been conducted on alternative dairy-related products with these two labels. This study could help expand the scope of the labeling research on alternative food and beverage products.

This is one of the first studies to address what affects latte purchase intention by using alternative milk on two different labels. The purposes of this study are as follows: (i) to find the factors influencing consumer intention to purchase lattes using alternative milk from plant-based sources and (ii) to compare the associations between the factors and purchase intentions depending on two labels, namely "vegan latte (VGL)" and "plant-based latte (PBL)." To achieve these goals, a scenario-based online experiment was conducted with a between-subjects survey. The results of this study will make contributions to the literature on plant-based alternative beverages and inform marketers and new product developers.

# 2. Literature review and hypothesis development

The research framework and hypothesized relationships are presented in Fig. 3. Specifically, the research model is designed to examine the effects of eight main factors proposed as influencing the purchase intention of lattes using alternative milk.

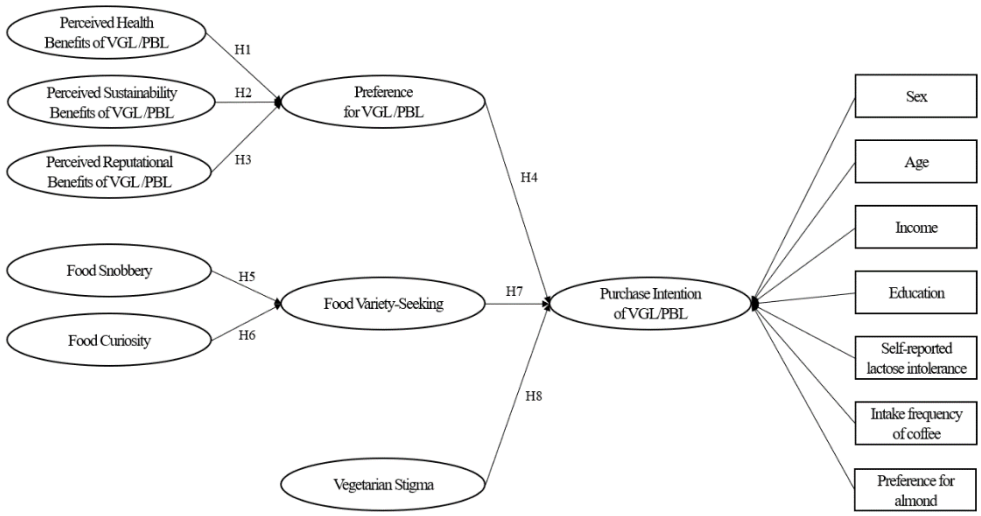



Fig. 3. Research model and hypothesized relationships. Abbreviations: VGL, Vegan latte; PBL, Plant-based latte.

## 2.1. Perceived benefits and preference for vegan/plant-based lattes

The health benefits of plant-based dairy have been investigated for many years. Since plant-based milk products have no lactose and no milk proteins, they are preferred over cow's milk by consumers who are lactose-intolerant or allergic to milk proteins (Cruz et al., 2007). Plant-based dairy products also have no cholesterol and are low in calories, so people who want to avoid high blood pressure, diabetes, cardiovascular disease, hypercholesterolemia, or obesity tend to choose plant-based dairy alternatives over animal-based ones (Tuso et al., 2013). Recently, the presence of health-promoting

ingredients such as minerals, dietary fiber, vitamins, and antioxidants has made plant-sourced products recognized as functional foods (Das et al., 2012). Many plant-based beverages contain functionally active components with health-promoting properties that attract health-conscious consumers (Sethi et al., 2016). Many studies have shown that perceived health benefits can affect consumers' choice of plant-based alternative products (e.g., Graça et al., 2015; E. J. Lea et al., 2006; E. Lea & Worsley, 2003).

Plant-based products are also considered more sustainable than animal-based foods (Van Loo et al., 2017). From an environmental perspective, the dairy market is one of the largest producers of greenhouse gases in agriculture (Karwacka et al., 2020). The carbon and water footprints of milk are larger than those of plant milk (Clune et al., 2017). In other words, the consumption of plant milk is much more sustainable than the consumption of cow milk. Vainio et al. (2016) investigated motivations in replacing animal-based proteins with plant-based proteins and showed that the main motivation for the change was interest in environmental issues. Previous studies have reported that animal welfare is the main reason for the pursuit of vegetarianism (e.g., Lazzarini et al., 2017; Schiano et al., 2020; Radnitz et al., 2015), and it applied to alternative milk products (Boaitey & Minegishi, 2020; Haas et al., 2019). Animal welfare contributes to ecological, ethical, social, and economic sustainability (Vinnari & Tapio, 2012). In this reason, perceived sustainability benefits can affect the purchase intention of lattes using alternative milk.

The perceived reputational benefits of consuming lattes using plant-based milk can affect purchase intentions. A "reputational benefit" is known as a factor that positively influences food consumer behavior (e.g., Kimura et al., 2012; van de Grint et al., 2021). This can apply to coffee purchase behavior. Sophisticated coffee consumption no longer serves simply to quench one's thirst; indeed, it also contributes to a prestigious reputation (Lin, 2012). Consuming plant-based alternative products is also known to relate to altruistic motives (Schiano et al., 2020). Several studies on altruistic behavior

have suggested that altruistic or generous behavior can be enhanced by other people's signals and potential reputation outcomes (Pinto et al., 2019). Therefore, the consumption of lattes using alternative milk can be perceived as obtaining reputational benefits for the reasons mentioned above, which can affect consumers' intention to purchase.

The literature review found that the perceived benefits affect attitudes in plant-based food consumption based on the theory of planned behavior (Arnaudova et al., 2022; Schiano et al., 2020). Fishbein and Ajzen (2011) said that "attitude" means a latent disposition or tendency to respond with a degree of favorableness or unfavorableness to a psychological object. It refers to the positive or negative evaluation of the outcome associated with performing a given behavior, such as purchasing a latte using alternative milk. In many studies, the perception and purchase intention of plant foods have been investigated and compared to existing animal-based foods, since the former are the substitute for the latter (e.g., Charlebois et al., 2019; Çınar et al., 2022; Cliceri et al., 2018; Duchene & Jackson, 2019). "Preference" is defined as a greater liking of one alternative over another, which requires a comparison between two objects (Szmukler, 2019). For this reason, preference can be a suitable concept for attitude to compare a vegan/plant-based latte with a general animal-based latte. Therefore, we hypothesize the following:

*H1a/b: Perceived health benefits of VGL/PBL has a positive effect on preference for VGL/PBL.*
*H2a/b: Perceived sustainability benefits of VGL/PBL has a positive effect on preference for VGL/PBL.*
*H3a/b: Perceived reputational benefits of VGL/PBL has a positive effect on preference for VGL/PBL.*
*H4a/b: Preference for VGL/PBL has a positive effect on purchase intention of VGL/PBL.*

## 2.2. Food snobbery, curiosity, and variety-seeking

Coffee is the most consumed beverage worldwide (Farah, 2009), and the coffee industry has catered to individuals' sophisticated tastes with diverse products (Adams, 2012; de Almeida & Zylbersztajn, 2017; Maciejewski et al., 2019). A latte using alternative milk is a new option for coffee made using soy, almond, or oat milk, which are known to have different sensory characteristics compared to a conventional latte using cow milk (Demïr et al., 2021; Gupta & Bisla, 2019; Kundu et al., 2018). In other words, this can be considered a new type of latte having different attributes for consumers who seek variation in coffee. Several studies have shown that a variety-seeking tendency has a significant effect on food consumption and purchase intention (Ellis & Mattison Thompson, 2018; Legohérel et al., 2012; Xuhui et al., 2019), so it can be considered that the higher the food variety-seeking propensity consumers have, the higher their intention to purchase a latte using alternative milk.

One of the most important drives to a variety-seeking tendency is curiosity. This is an integral concept of the variety-seeking motive (Dember & Earl, 1957; Hoyer & Ridgway, 1984; Trijp et al., 1996). UEDA (2017) defined the concept of food curiosity as the "eater's ability to know everything about food, whether it is in the stage of production, processing, or consumption." As a trigger to consume plant-based milk, curiosity was cited as the main factor (Haas et al., 2019). Curiosity regarding plant-based drinks is especially about taste, and most people who have tried plant-based alternative drinks are looking for something they can enjoy drinking, not something similar to standard drinks. In other words, they consider drinking them an opportunity to expand their diet, which is associated with learning that is open to new tastes focused on diversifying (Adamczyk et al., 2022). Since coffee is also a beverage category that stimulates consumers' sensual curiosity (Bhumiratana et al., 2014; Mirkovic, 2005), it is logical that a higher level of food curiosity would be more likely to drive food variety-seeking in the purchasing context.

Food snobbery is a trait of being knowledgeable about a certain

category of drink and makes it more likely to find and try new products (Ellis & Mattison Thompson, 2018). In particular, it helps people make a good impression through purchases exhibiting a stronger variety-seeking tendency since this propensity is more likely to appear favorable to others (Ratner & Kahn, 2002). In restaurant reviews, food programs, and dining-out situations, consumers place a lot of emphasis on individuality and uniqueness in what they drink, and food snobbery has become prevalent, which makes people get interested in new, exotic, or trendy products (Ashley et al., 2004; Bauman, 2005). Food snobbery gets people to purchase trendy products, not traditional ones, to show their sophistication and uniqueness (Spiller, 2012). It is based on the thought that being a gourmet is a relatively inexpensive way to represent social and capital status (May, 1996). As mentioned above, a latte product using alternative milk can be seen as attractive as a new and trendy type of latte product. Thus, the following hypotheses are advanced:

*H5a/b: Food snobbery has a positive effect on food variety-seeking in the VGL/PBL group.*
*H6a/b: Food curiosity has a positive effect on food variety-seeking in the VGL/PBL group.*
*H7a/b: Food variety-seeking has a positive effect on purchase intention of VGL/PBL.*

## 2.3. Vegetarian stigma

Perceived vegetarian stigma is considered a barrier when a non-vegan/non-vegetarian chooses plant products, which can negatively affect the purchase intention of lattes using alternative milk. Minson and Monin (2012) said that "do-gooder derogation" has shown that vegetarians who are perceived to behave morally and ethically can be negatively judged by others. With focus group discussions, Markowski and Roxburgh (2019) showed that non-vegetarians

attempt to avoid this stigma through social and behavioral distancing, which suggests that the stigma of vegetarianism is a barrier inhibiting plant-based diet choices. For this reason, purchasing plant-based alternatives can sometimes be stigmatized or socially undervalued. Many studies have demonstrated that vegetarianism is an act that can be denigrated, creating "vegaphobia," which forms strained relationships with others such as family, friends, and coworkers (e.g., Chuter, 2018; Cole & Morgan, 2011; Hirschler, 2011; Larsson et al., 2003; Rosenfeld & Tomiyama, 2020; Twine, 2014). Especially in South Korea, given the social importance placed on ordering and sharing similar menu items together to create intimate relationships and emotional ties, veganism faces enormous social pressure to give in to traditional omnivorous diets, as it can be seen as a bad practice and contradictory to non-vegetarian norms (Taebum & In-Jin, 2015). This behavior tends to be stigmatized more severely by creating dissonance over group conformity (Bresnahan et al., 2016). In particular, purchasing coffee can be more influenced by other people's eyes because it is often consumed at cafes with other people (Petit & Sieffermann, 2007). Accordingly, we hypothesize the following:

*H8a/b: Vegetarian stigma has a negative effect on purchase intention of VGL/PBL.*

## 2.4. Label communication for plant-based alternative products

It is not easy to purchase food because one cannot know much about important characteristics such as taste, flavor, and texture before trying it. Yet, labels attached to products and menus help consumers make food choices by providing information about them (Heimbach, 1981). In the absence of face-to-face meetings between the end consumer and the food operator, food labeling, which represents the actual interface, is the best means of providing appropriate

information to the consumer (Caswell & Padberg, 1992; Tonkin et al., 2015). Many studies have demonstrated that the information on various labels attached to products affects perception, acceptance, preference, purchase intentions, and purchase behavior (e.g., Ares et al., 2014; Folkvord et al., 2021; McGuinness et al., 2022; Paula et al., 2021; Taillie et al., 2022).

When marketers put labels on plant-based products, they generally use the descriptors "vegetarian/vegan" or "plant-based" (Papies et al., 2020). The former can define the boundary of consumers or give people a vegan identity, which may act as a barrier to their purchase intention (Markowski & Roxburgh, 2019). And the "vegetarian/vegan" framing can be explained by loss, which means that it lacks animal-based ingredients (Rosenfeld et al., 2022). But, the latter is likely to focus on what products gain and contain rather than what they lack, so it does not have the barrier associated with veganism (Anderson, 2019). The label "plant-based" does not contain information about target consumers, so it may be more value-neutral, not a barrier to consumption. Krpan and Houtsma (2020) showed that consumers choose plant-based products more often when they are labeled with a social frame (e.g., relaxing conversations) or a pro-environmental frame (e.g., environmentally friendly), compared to when they are labeled vegetarian or vegan. According to previous studies, gain framing is more effective than loss framing in healthy and sustainable eating behavior, and it has been applied to these two labels (Carvalho et al., 2022; Gallagher & Updegraff, 2012). For this reason, it can be considered that consumers view a latte labeled "plant-based" more favorably than a latte labeled "vegan." Lattes using alternative milk can be consumed by vegans who refuse to consume cow milk (North et al., 2021); thus, we label them "vegan latte" and "plant-based latte" in this study. The effects of labeling on plant-based products have been little studied (Anderson, 2019; Rosenfeld & Tomiyama, 2020), especially in the beverage category. Therefore, we hypothesized the relationship between the purchase intention of plant-based lattes and the factors affecting that intention would differ for two labels, namely

“vegan latte (VGL)” and “plant-based (PBL).”

# 3. Research methods

## 3.1. Data collection

To investigate various factors influencing consumers’ purchase intention of a vegan/plant-based latte, a scenario-based experiment was conducted with a between-subjects online survey design. We collected responses through the Embrain, a mobile research company having 1.3 million panels in South Korea. They randomly sent links to their panels through Embrain survey platform with the quota sampling method for age and gender. Consequently, a total of 533 valid responses were collected in the study, of which 265 were responses to the vegan label group and 268 to the plant-based label group. Based on the literature reviews, sample sizes less than 100 are often considered small, sample sizes between 100 and 200 are moderate, and sample sizes exceeding 200 are considered large enough (Kline, 2005). A similar criterion reported by Ding et al. (1995) is that the minimum sample size suitable for the analysis is typically 100 to 150 participants.

Respondents’ participant consent was obtained before the experiment started. Data privacy and anonymity were assured. This study was deemed exempt from approval by the Seoul National University Institutional Review Board (IRB No. 2204/001-006). The respondents consisted of both genders with or without lactose intolerance, with a variety of educational background, age (over 18), income, frequency of coffee intake, and preference for almonds. However, vegans and vegetarians are generally known to have different purchasing behavior mechanisms when purchasing plant-based products (Martinelli & De Canio, 2021; Salehi, 2018; Yoh, 2018), and only 0.2 percent of South Koreans choose not to eat meat, specifically beef, pork, poultry, and fish (Korea Agro-Fisheries &

Food Trade Corporation, 2022). So, vegans and vegetarians were excluded from this survey targeted to non-vegetarian food and beverage consumers. Thus, our study is possibly generalizable to non-vegetarian consumers.

The demographic information of respondents in each group is presented in Table 7, which includes gender, age, monthly income, education level, (self-reported) lactose intolerance, intake frequency of coffee, and preference for almonds. In both groups, the proportion of men and women was nearly the same, and participants aged 20 to 49 accounted for about 80 percent of the total. Since it was conducted with a mobile survey, the proportion of respondents in their 50s and older, whose smartphone penetration rate is lower, was smaller than that of other age groups. Over 80 percent of the participants earned a monthly income of less than US$4734.77. Nearly 90 percent of the respondents had graduated from college. Respondents with (self-reported) lactose intolerance accounted for about 25% of the vegan latte group and 31% of the plant-based latte group. For the question asking about almond preference on a 7-point Likert scale, both groups scored 5.2 points on average. In this sense, it can be considered that there is no difference in the sample properties of the two groups. Compared to the South Korean population, the study sample is biased in favor of younger and better educated (KOSIS, 2022). Since the survey was conducted through a mobile survey app, it is presumed that it was easier to access younger people with higher mobile utilization.

Table 7

Properties of the sample (n = 533)

| | | Vegan Latte (n=265) | | Plant-based Latte (n=268) | |
|---|---|---|---|---|---|
| | | Number | Percentage | Number | Percentage |
| Gender | Male | 135 | 50.9% | 141 | 52.6% |
| | Female | 130 | 49.1% | 127 | 47.4% |
| Age | 20-29 years | 71 | 26.8% | 65 | 24.3% |
| | 30-39 years | 81 | 30.6% | 72 | 26.9% |

| | | | | | |
|---|---|---|---|---|---|
| | 40–49 years | 61 | 23.0% | 71 | 26.5% |
| | 50–59 years | 43 | 16.2% | 42 | 15.7% |
| | Over 60 years | 9 | 3.4% | 18 | 6.7% |
| Monthly income | Up to US$1578.26 | 52 | 19.6% | 55 | 20.5% |
| | Up to US$3156.52 | 127 | 47.9% | 116 | 43.3% |
| | Up to US$4734.77 | 50 | 18.9% | 59 | 22.0% |
| | Up to US$6313.03 | 13 | 4.9% | 13 | 4.9% |
| | Above US$6313.03 | 23 | 8.6% | 25 | 9.3% |
| Education | High school diploma or less | 31 | 11.7% | 31 | 11.6% |
| | Undergraduate | 14 | 5.3% | 20 | 7.5% |
| | College graduate | 187 | 70.6% | 192 | 71.6% |
| | Graduate student or more | 33 | 12.5% | 25 | 9.4% |
| lactose intolerance | Yes | 67 | 25.3% | 82 | 30.6% |
| | No | 198 | 74.7% | 186 | 69.4% |
| Intake frequency of coffee | | 9.2 per week | | 9.2 per week | |
| Preference for almond (1=strongly dislike, 7=strongly like) | | 5.2 | | 5.2 | |

Note: Exchange rate at the time of the study USD1.00 ≈ KRW1267.4.

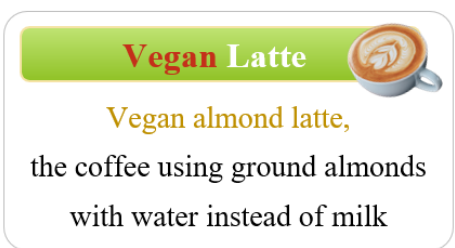
## 3.2. Experimental design and materials

After agreeing to participate, respondents could see the stimuli comprising information with vegan/plant-based labels and then

respond to the survey. The stimuli are represented in Fig. 4. Since this study aims to reveal whether there is a difference between the factors that influence purchase intention depending on labels, latte information labeled “vegan” or “plant-based” was shown to respondents. The words “vegan” and “plant-based” were marked in front of the word “latte,” and an explanation of how the latte was made was added. All information provided to both groups was the same except for the labels, as the focus was only on the effects of the labels. We described it as a latte made with almond milk to help consumers understand vegan/plant-based lattes. In the Korean market, “oat latte” is likely to be recognized as a product of a certain cafe brand (The Food & Beverage News, 2021), and soy milk has been considered a daily drink for a long time (Kim & Kwon, 2001). Therefore, almond lattes, which are uncommon but sensually less resistant compared to other plant-based milk lattes (Sethi et al., 2016), were selected as stimuli.

The research was conducted using a quantitative method, operationalized through a cross-sectional survey (Malhotra et al., 2017). To operationalize the constructs, a 7-point Likert scale was used, with its extremes being “1. strongly disagree” and “7. strongly agree.” The questionnaire included a series of statements used to measure purchase intention (PI), preference (PRF), perceived health benefits (HB), perceived sustainability benefits (SB), perceived reputational benefits (RB), food snobbery (FS), food curiosity (FC), food variety-seeking (FVS), and vegetarian stigma (VS). The statements used to evaluate the constructs of purchase intention (Chen & Lee, 2015), preference (Wang, 2013), perceived health benefits (Dorce et al., 2021; Yazdanpanah et al., 2015), perceived reputational benefits (Gershon et al., 2020), food variety-seeking (Marshall & Bell, 2004; Steenkamp et al., 1993), food curiosity (Hwang et al., 2020; UEDA, 2017), and vegetarian stigma (Rosenfeld & Tomiyama, 2020) were adapted from previous studies. The measurement items for perceived sustainability benefits and food snobbery were developed. The measure development procedure for these two variables followed Lee et al. (2021)’s method, which

is modified from Churchill Jr (1979), Smith et al. (1996), and Sweeney & Soutar (2001). After specifying the domain and dimensionality of the construct in the literature review (Food snobbery: Ashley et al. (2004); Spiller (2012); Williamson et al. (2009); Wood (1996), Perceived sustainability benefits: Schiano et al. (2020); McClements et al. (2019); Reyes-Jurado et al. (2021)), we constituted an offline expert committee with two professors and five master and doctoral students and conducted a pre-test for the face, content, and criterion validity. The Attendance of experts to judge measurements' domain is common in marketing areas (e.g., Babin & Burns, 1998; Sweeney & Soutar, 2001). Based on the feedback, items of food snobbery and perceived sustainability benefits have been added, deleted, and modified to improve content validity. The designed questionnaire, including items of all variables, was translated into Korean by five bilingual English-Korean speakers, including authors, following Tsang et al.'s (2017) guidelines. The initial version of the survey was pilot-tested on 70 coffee consumers in South Korea for exploratory/confirmatory factor analysis and a reliability test, which was administered only for the case of latte labeled "plant-based". The pilot-test link was mainly distributed to undergraduate and graduate students through Google Form. As a result, a few items were dropped and shortened based on explanatory/confirmatory factor analysis and reliability analysis of the data. Finally, 4 items were selected for the perceived sustainability benefits, and 4 items were also selected for the food snobbery. This process was performed to reduce the cognitive burden of respondents and to obtain better-quality answers. All statements for the main survey are presented in Appendix C.



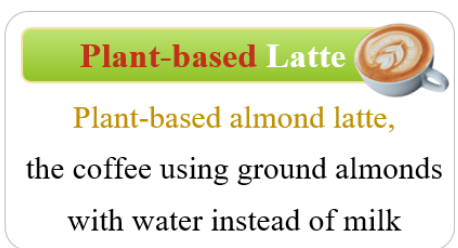



Fig. 4. Information offered to respondents as stimuli.

## 3.3. Statistical analysis

The following four-step analysis was conducted to verify the hypotheses in each group (Group 1: offered latte information with the vegan label; Group 2: offered latte information with the plant-based label). First, to evaluate the measurement models by means of partial least squares-structural equation modeling (PLS-SEM), the reliability and validity of the scales were verified with Smart PLS 3.0 (Ramayah et al., 2018) before the next analysis. For both groups, identical structures and items were used, which is essential for the multigroup comparison condition. Second, a t-test was conducted to analyze the difference of perceived benefits, preference, and purchase intention by the different label types. Third, to evaluate the structural model, path coefficients and R-squared- and p-values were separately calculated for each group. Finally, multigroup analysis (MGA) was conducted between the two groups. To study the differences between the path coefficients, the Smith-Satterthwaite t-test was conducted (Chin, 2000).

# 4. Results

## 4.1. Confirmatory factor analysis (CFA)

The assessment of the measures included the reliability and discriminant validity of the measurements. Individual item loadings and internal consistency were examined as tests of reliability. Because of high cross-loadings, items PI1, PRF2, and RB1-4 were removed from the model for adequate discriminant validity. As shown in Appendix D-1 and Appendix D-2, the cross-loading for every measurement is greater than 0.7, which means there is adequate internal reliability except for FC2; however, this item is near 0.7,

which is still acceptable. Appendix A shows Cronbach's alpha, rho A, construct reliability (CR), and average variance extracted (AVE). Cronbach's alpha and rho A for all latent constructs was above 0.7, indicating internal consistency and indicator reliability. Also, since all composite reliability values are above 0.7, measurements have both convergent validity and internal consistency (Werts et al., 1974). AVE was also examined. AVE shows the variance that a construct captures from indicators, in relation to the variance contained in measurement error. This is generally interpreted as a measurement of reliability for the construct and of evaluating discriminant validity (Bakos, 1998). These results indicate that the measurement model has suitable composite reliability and validity.

Appendix B shows the correlation coefficients between the variables and the ratio of the square root of AVE of each construct. The diagonal elements in bold are the square roots of AVE, which are the correlations of each variable with its own measurement. The off-diagonal elements are correlations between variables. Diagonal values should be greater than the entries in corresponding rows and columns for discriminate validity. Each construct is more correlated with its own measure than with other constructs, showing strong discriminant validity. Based on this result, the measurements of both models can be considered appropriate.

## 4.2. Differences in perceived benefits, preference, and purchase intention by labeling

The differences in perceived benefits, preference, and purchase intention between the vegan group and the plant-based group were analyzed with the t-test. The results are listed in Table 8. Perceived preference (mean of the VGL group = 3.589, mean of the PBL group = 3.931, t = 2.512), health benefits (mean of the VGL group = 4.229, mean of the PBL group = 4.433, t = 1.749), and reputational benefits (mean of the VGL group = 3.240, mean of the PBL group = 3.451, t = 1.671) were higher when latte information with the plant-based

label was offered than with the vegan label offered. According to the results, this implies that consumers consider the latte more favorable when names of products or menu options have plant-based labels instead of vegan labels. In other words, plant-based labeling can be considered to have a positive effect on perceived benefits and preference. However, there was no significant difference in perceived sustainability benefits and purchase intention depending on the labels.

Table 8
Differences in perceived benefits, preference, and purchase intention between the vegan label group and the plant-based label group

| Latent Construct | Vegan Latte (n=265) | Plant-based Latte (n=268) | t-value |
|---|---|---|---|
| Purchase intention | 3.862 | 3.957 | 0.679 |
| Preference | 3.589 | 3.931 | 2.512** |
| Perceived reputational benefits | 3.240 | 3.451 | 1.671* |
| Perceived health benefits | 4.229 | 4.433 | 1.749* |
| Perceived sustainability benefits | 4.203 | 4.360 | 1.358 |

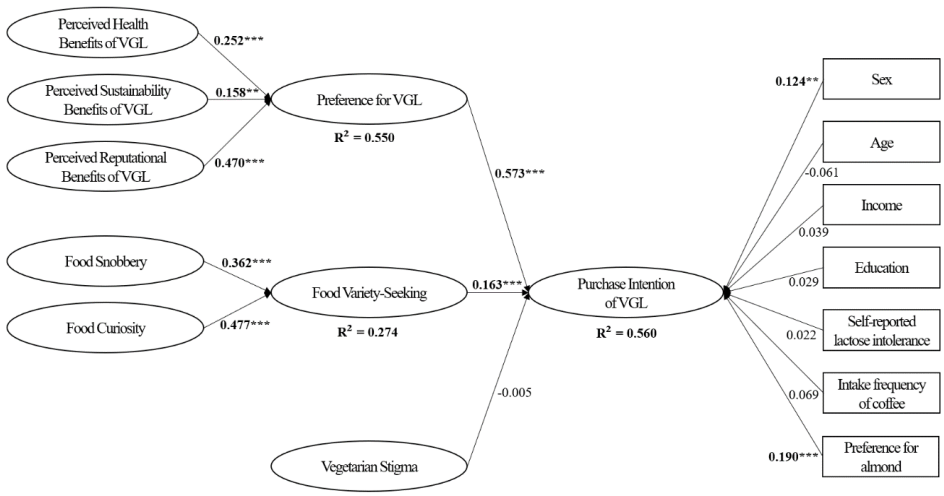
Note: ***p < 0.01; **p < 0.05; *p < 0.1.

## 4.3. Assessment of the structural model

Structural equation modeling was conducted with Smart PLS 3.0 to test the hypothesized structural models. The coefficients of determination ($R^2$) were verified to determine the explanatory power of the proposed models (Malhotra et al., 2017). In the model for the vegan latte group, independent variables explained 56.0% ($R^2$ = 0.560) of the variance of purchase intention, and in the model for the plant-based latte group, they explained 47.9% ($R^2$ = 0.479) of the variance of purchase intention.
The standardized regression coefficients and their significance levels

for the vegan latte (VGL) group are presented in Fig. 5 and those for the plant-based latte (PBL) group are presented in Fig. 6. For the vegan latte group, the theorized relationships perceived health benefits of VGL → preference for VGL, perceived sustainability benefits of VGL → preference for VGL, perceived reputational benefits of VGL → preference for VGL, preference for VGL → purchase intention of VGL, food snobbery → food variety-seeking, food curiosity → food variety-seeking, and food variety-seeking → purchase intention of VGL were found to be significantly positive. But, the relationship vegetarian → purchase intention of VGL was not significant. For the plant-based latte group, the theorized relationships perceived health benefits of PBL → preference for PBL, perceived sustainability benefits of PBL → preference for PBL, perceived reputational benefits of PBL → preference for PBL, preference for PBL → purchase intention of PBL, food snobbery → food variety-seeking, food curiosity → food variety-seeking, and food variety-seeking → purchase intention of PBL were found to be significantly positive, and the relationship vegetarian → purchase intention of PBL was not significant. In other words, all types of perceived benefits have positive effects on preference, which also has a positive effect on purchase intention, but vegetarian stigma does not have a significant effect on purchase intention in either group. Food curiosity and food snobbery positively affected variety-seeking in all groups, but food variety-seeking had a significantly positive effect on purchase intention only in the vegan latte group. Therefore, hypotheses 1, 2, 3, 4, 5, 6, and 7(a) are supported in both groups with paths significant at the $p = 0.01$ level. In both groups, variety-seeking affects preference in the order of reputation benefits (VGL; $\beta = 0.470$/PBL; $\beta = 0.337$), health benefits (VGL; $\beta = 0.252$/PBL; $\beta = 0.289$), and sustainability benefits (VGL; $\beta = 0.158$/PBL; $\beta = 0.177$). In the vegan latte group, preference ($\beta = 0.573$) considered as attitude has a greater influence on purchase intention than food variety-seeking does ($\beta = 0.163$). Among control variables, preference for almond has a significant effect on purchase intention in both groups, and gender has a significant effect

on purchase intention only in the vegan latte group




Note: ***p < 0.01; **p < 0.05; *p < 0.1.

Fig. 5. Structural model results in the VGL group. Abbreviations: VGL, Vegan latte.

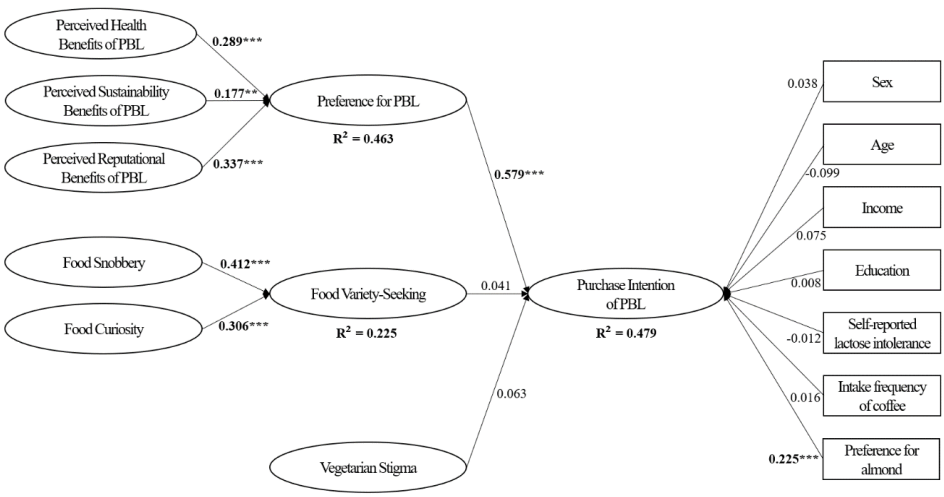



Fig. 6. Structural model results in the PBL group. Abbreviations: PBL, Plant-based latte.

## 4.4. Multigroup analysis of the vegan and plant-based labels

To compare the links between the factors and the purchase intentions

depending on two labels, the values of each path coefficient in the structural models of preference and purchase intention were compared using the Smith−Satterthwaite t−test (Chin, 2000). The Smith−Satterthwaite t−test equation used in this study is represented as follows:

$$t = \frac{Path_{VGL} - Path_{PBL}}{\left[\sqrt{\frac{(m-1)^2}{(m+n-2)} * S.E_{VGL}^2 + \frac{(n-1)2}{(m+n-2)} S.E_{PBL}^2}\right] * [\sqrt{\frac{1}{m} + \frac{1}{n}}]}$$

$Path_i$: Unstandardized path coefficient in group i, $S.E_i$: Standard error in group i, degree of freedom: m + n − 2

Table 9 indicates the results of the multigroup analysis. In the VGL group, the path coefficients from health benefits to preference, from sustainability benefits to preference, from preference to purchase intention, and from vegetarian stigma to purchase intention are significantly higher than in the PBL group. However, in the PBL group, the path coefficients from reputational benefits to preference and from food variety−seeking to purchase intention are significantly higher than in the PBL group. This shows that there are significant differences for all of the effects of the independent variables on the purchase intention of latte products with the vegan labeling and the plant−based labeling at the $p = 0.01$ level.

Table 9
Multigroup analysis results for structural models of preference and purchase intention using Smith−Satterthwaite t−test

| Path | Unstandardized Path Coefficient | | t | Signf. |
|---|---|---|---|---|
| | VGL | PBL | | |
| Perceived health benefits → Preference | 0.304 | 0.329 | −4.779*** | Supported |
| Perceived sustainability benefits → Preference | 0.187 | 0.220 | −6.396*** | Supported |

| | | | | |
|---|---|---|---|---|
| Perceived reputational benefits → Preference | 0.528 | 0.329 | 44.255*** | Supported |
| Preference → Purchase intention | 0.574 | 0.616 | −9.079*** | Supported |
| Food variety−seeking → Purchase intention | 0.189 | 0.055 | 29.759*** | Supported |
| Vegetarian stigma → Purchase intention | −0.010 | 0.071 | −13.950*** | Supported |

Note: ***p < 0.01; **p < 0.05; *p < 0.1.

# 5. Discussion

This study aims to find the factors affecting consumer intention to purchase lattes using alternative milk from plant−based sources and to compare the links between the factors and purchase intentions depending on two labels, “vegan latte” and “plant−based latte.” To achieve the above goals, the online and scenario−based experiment was conducted with a between−subjects design, followed by a survey. In both groups watching latte information with “vegan” and “plant−based”, the perceived benefits had a positively significant effect on purchase intention, but the perceived barrier (i.e., vegetarian stigma) did not. Perceived benefits and preference were higher when showing a “plant−based latte” label focusing on the presence of plant−based ingredients than when showing a “vegan latte” label focusing on the absence of animal−based ingredients. However, there was no significant difference between purchase intentions depending on the label. For the label “vegan latte,” the higher their food curiosity, food snobbery, and food variety−seeking tendency, the higher their purchase intention, even though consumers are non−vegan. It implies vegan certifications can work in marketing. The findings of this study provide marketers and practitioners with what needs to be highlighted and which consumers to target to boost sales of lattes using alternative milk. We provide a strategy for changing consumer behavior, emphasizing the potential

for labels to promote the purchase intention of lattes using alternative milk.

## 5.1. Factors associated with purchase intention of latte using alternative milk

According to the results of this study, perceived benefits have a significant effect on product preference, which affected the purchase intention of the product in both the vegan latte group and the plant-based latte group. This is supported by the theory of planned behavior (TPB) in which behavioral beliefs affect attitudes, and attitudes affect intentions (Ajzen, 1991; Fehér et al., 2020). Furthermore, this study shows results similar to those of previous studies demonstrating that perceived health benefits, perceived sustainability benefits, and perceived reputational benefits of plant-based products affect attitudes and purchase intentions toward them (Corepal & Copeman, 2014; Corrin & Papadopoulos, 2017; Fehér et al., 2020; Jang & Cho, 2022; E. J. Lea et al., 2006; E. Lea & Worsley, 2003; Ye & Mattila, 2021). This suggests that they can be applied as factors that affect the preference of coffee products using plant-based milk as well.

In detail, consumers perceive health benefits and sustainability benefits as higher among perceived benefits. In other words, consumers recognize that purchasing a latte using alternative milk not only helps them keep healthy, lose weight, and prevent disease, but also helps reduce the carbon footprint or greenhouse gas emissions and contribute to animal welfare. Not only the above two perceived benefits but also reputation benefits were found to be a factor affecting the preference for a latte using plant-based milk. This supports previous research that demonstrated a relationship between consuming plant-based alternatives and reputation benefits (Pinto et al., 2019; Schiano et al., 2020).

Consumers who purchase sustainable products are recognized as more altruistic (Shiano et al., 2020), and eco-friendly behavior is

more likely to occur when it is disclosed to others (Takahashi, 2021). Coffee is frequently consumed during social communication with others in cafes and can thus be greatly affected by reputation benefits. Meanwhile, according to existing studies on the perception of coffee where the consumption of coffee with eco-friendly and ethical attributes leads to a good reputation, the reputation benefits and preference for fair trade or organic coffee are higher than those for general coffee (Brenner et al., 2009; Carr et al., 2021; Donnet et al., 2007). The results of this study demonstrate that a latte using plant-based milk is a type of coffee that can benefit from reputation as well, extending previous literature that reputation benefits based on coffee properties can affect preferences and purchase intentions.

On the other hand, vegetarian stigma did not significantly affect the intention to purchase lattes using alternative milk, which supports findings that the social stigma does not prevent consumers from maintaining a vegan lifestyle (Brouwer et al., 2022). Beverages, especially coffees, have been considered a category reflecting individual tastes (Li et al., 2019; Masi et al., 2015; Quintão et al., 2017; Spence & Carvalho, 2020), and they are not shared with others, unlike food in Korea. Therefore, it does not cause a negative perception from people around them, and this barrier does not seem to have an impact on purchasing plant-based beverages. In other words, perceived benefits positively affect the preference and purchase intention of lattes using alternative milk in Korea, but barriers do not. This has the following important implications for marketers of plant-based beverages: showing what consumers can get from the products is more effective than covering what they can lose. This means it can boost sales of lattes using alternative milk by utilizing gain message framing on benefits such as easy to digest, low calorie, greenhouse gas reduction, and animal welfare.

Next is a discussion of the effect of food consumption propensity on purchase intention. In the results of this study, consumers' food snobbery and food curiosity have a positive significant effect on variety-seeking tendency. For the latte using alternative milk with a "vegan" label, it is an attractive option for consumers who are

curious about unfamiliar foods, snobbish from being knowledgeable about foods, and interested in diverse foods. This can be used as good data for consumer targeting by revealing the properties of consumers with higher purchase intentions for lattes using alternative milk. In addition, it would be effective to appeal with a menu separate from a traditional latte menu by adding it as a new menu or by stating that cow milk can be replaced with plant-based milk, stimulating consumers' variety-seeking behavior. Academically, it is meaningful that it expands and develops previous studies explaining the drivers for food variety-seeking behavior (Caracciolo et al., 2022; Kahn & Isen, 1993; Liu et al., 2022), since causal relationships among these have not been clearly presented in studies with structural equation modeling in the field of food purchasing. In particular, the relationship between snobbery and purchase intention has been mainly studied in fashion (Abalkhail, 2015; Chattalas & Shukla, 2015; MajlesiRad & Haji pour Shoushtari, 2020; Martinez & Kim, 2012; Wee et al., 1995). We extended this concept to food and further developed measurements to apply it for the food and beverage category. Why the tendency to pursue diversity affects purchase intention only when there is a vegan label is discussed in 5.2.

## 5.2. Different perceptions depending on labels: Comparison between "vegan" and "plant-based"

Through this study, we tried to find different perceptions depending on the two labels, "vegan" and "plant-based", to help sell lattes using alternative milk. After showing both labels to consumers, a consumer perception survey found that perceived health benefits, perceived reputation benefits, and preferences were higher in the group of consumers who saw the latte information with the plant-based label. Furthermore, as a result of analyzing the path coefficients, it was found that the health benefits and sustainability benefits were higher in the group that saw the information with the

label, “plant-based.” To sum up, most perceived benefits and preferences were higher in the group who saw “plant-based” labeled lattes. It suggests that labels representing attributes such as “plant-based” may be preferred to labels representing target consumers, such as “vegetarian/vegan”. This result also implies that the gain message can also be effective in labeling. It supports previous studies about the message framing of sustainable and healthy food consumption related to plant-based foods and beverages, since the label “plant-based” focuses on what is gained and the label “vegan” focuses on what is lacking. It supports previous studies that demonstrated a gain frame works better than a loss frame does when adopting and consuming eco-friendly and sustainable diets (Carfora et al., 2022; Carvalho et al., 2022; Conor et al., 2018). Nevertheless, there were no statistically significant differences in purchase intention between the two conditions. The market size of the domestic alternative milk-related products is growing rapidly, but it is still an early market in South Korea (IT chosun, 2021). Since the survey targets general consumers who have not confirmed their past purchase experience, there seems to be no difference in actual purchase intention.

Rosenfeld et al. (2022), however, showed the different results compared to our study. They expected higher sales when a hamburger was labeled as plant-based, but sales were higher when it was labeled as vegan. They explained that this was because people are skeptical of having unfamiliar foods. Consumers are familiar with what it means for a food to be vegan, whereas they are less familiar with what precisely it means for a food to be plant-based. In our study, we can see the results as Rosenfeld et al. (2022)’s hypothesis. This may be because uncertainty about the product was eliminated by adding an explanation. In other words, it suggests that reducing uncertainty about label content by providing information can affect the consumer perception.

In the case of using the label “vegan,” the more variety people seek, the higher the intention to purchase a latte using plant-based milk. It can be difficult that lattes with the label “plant-based” are

considered a different type of latte product, since it requires only changing the properties of latte products by replacing cow milk with plant-based milk. However, lattes with the label "vegan" can be perceived as a different product compared to normal lattes because it refers to lattes for another consumer group, vegans, that they do not belong to. Vegan certification work has been conducted to reduce the ambiguity of vegan-edible items around the world (e.g., UK: The Vegan Society; France: EVE VEGAN; Italy: Italian Vegetarian Association; South Korea: Korea Agency of Vegan Certification and Services). The findings of this study imply that vegan certifications increase not only vegans' purchase intentions by telling them that certain products are clearly edible but also non-vegans' purchase intentions by offering diverse options.

Finally, when the label "plant-based latte" was attached, reputational benefits were more readily perceived, but once they were perceived, the influence on purchase intention was higher when the label "vegan latte" was attached. In other words, when consuming a "vegan latte," people do not recognize the reputational benefits relatively well, but once they recognize these, this leads to purchase intention; thus, they need signals that imply consuming this product can look good to others.

## 5.3. Limitations and future research

Although this study has presented significant implications for marketers and menu developers by finding factors affecting the purchase intention of a latte using alternative milk and examining the difference depending on the sustainability-related labels, it has several limitations. First, since this study was conducted through an online survey and plant-based lattes are still not common in South Korea, perceived taste through past experience was not considered. Therefore, future research may be conducted in countries where plant-based lattes are common, or may add perceived taste as a factor affecting purchase intention through sensory experiments.

Second, due to the socio-cultural background mentioned in the research design, stimuli were limited to almond lattes. Future studies can examine changes in purchase intention depending on various types of stimuli. This means two types of product variations: one a latte with other plant-based milk (such as soy or oat), and another a different beverage using plant-based milk (other than a latte), such as a milk tea, a smoothie, or a frappuccino. Third, this study focused only on two labels, "plant-based" and "vegan," but excluded the label "lactose free," known to be an important attribute (McCarthy et al., 2017). We controlled the effect from this property in the regression model with lactose intolerance as a variable, but future studies can explore how the "lactose free" label influences intention to purchase a latte using alternative milk. Lastly, since this study was conducted with the online scenario-based experiment in one country, there are some limitations on external validity. To improve external validity, future studies need to prove the above factors influencing the purchase intention of vegan/plant-based lattes affect the purchase behavior in the real world through offline experiments, even though it has been proven for a long time through many studies that purchase intention has a significantly positive effect on purchase behavior (e.g., Fishbein & Ajzen, 2011; Lim et al., 2016; Son et al., 2013; Zhang & Zhang, 2007). In addition, it can be conducted in other countries for cross-cultural comparison. If the external validity increases in these ways, it will be used as more useful data for marketers and practitioners.

# 6. Conclusion

The present study aimed to find the factors affecting consumers' intention to purchase plant-based/vegan lattes and to compare the associations between the factors and the purchase intentions depending on two labels, namely "vegan" and "plant-based." Through an online survey with a between-subjects design and the two labels, we determined that perceived benefits have a positive and

significant effect on purchase intention, but perceived barriers do not. In addition, the perceived benefits and preferences were higher when a “plant-based” label focusing on the presence of plant-based ingredients was shown than when a “vegan” label focusing on the absence of animal-based ingredients was shown. However, as far as the label “vegan” is concerned, even for non-vegan consumers, the higher their food curiosity, food snobbery, and food variety-seeking tendency, the higher their purchase intention. Therefore, vegan certifications can also work in marketing. This study suggests to menu developers and marketers what needs to be highlighted and which consumers to target in order to boost latte sales using plant-based milk. It also highlights the potential for labels to promote plant-based latte purchases, thus offering a strategy for changing consumer behavior.

Appendix A.

Cronbach’s alpha, rho A, construct reliability (CR), and average variance extracted (AVE).

| Latent | Group | Cronbach | Rho A | CR | AVE |
|---|---|---|---|---|---|

| Construct | | ' s $\alpha$ | | | |
|---|---|---|---|---|---|
| PI | VGL | 0.870 | 0.871 | 0.939 | 0.885 |
| | PBL | 0.892 | 0.898 | 0.949 | 0.903 |
| RB | VGL | 0.971 | 0.971 | 0.977 | 0.895 |
| | PBL | 0.963 | 0.966 | 0.971 | 0.870 |
| SB | VGL | 0.914 | 0.927 | 0.939 | 0.793 |
| | PBL | 0.910 | 0.926 | 0.937 | 0.787 |
| HB | VGL | 0.902 | 0.904 | 0.932 | 0.773 |
| | PBL | 0.903 | 0.909 | 0.932 | 0.775 |
| PRF | VGL | 0.936 | 0.938 | 0.969 | 0.940 |
| | PBL | 0.874 | 0.889 | 0.940 | 0.888 |
| VS | VGL | 0.946 | 0.971 | 0.951 | 0.765 |
| | PBL | 0.951 | 1.006 | 0.958 | 0.765 |
| FVS | VGL | 0.924 | 0.929 | 0.941 | 0.727 |
| | PBL | 0.922 | 0.926 | 0.94 | 0.725 |
| FC | VGL | 0.808 | 0.923 | 0.874 | 0.703 |
| | PBL | 0.779 | 0.871 | 0.867 | 0.687 |
| FS | VGL | 0.915 | 0.943 | 0.94 | 0.797 |
| | PBL | 0.918 | 0.939 | 0.942 | 0.802 |

Appendix B.

Correlations of the latent variables and the square root of AVE.

| Latent Construct | Group | PI | RB | SB | HB | PRF | VS | FVS | FC | FS |
|---|---|---|---|---|---|---|---|---|---|---|
| Purchase intention (PI) | VGL | **0.941** | | | | | | | | |
| | PBL | **0.950** | | | | | | | | |
| Perceived reputational | VGL | 0.624 | **0.946** | | | | | | | |
| benefits (RB) | PBL | 0.554 | **0.933** | | | | | | | |
| Perceived sustainability | VGL | 0.437 | 0.431 | **0.891** | | | | | | |
| benefits (SB) | PBL | 0.475 | 0.526 | **0.887** | | | | | | |
| Perceived health benefits | VGL | 0.558 | 0.549 | 0.580 | **0.879** | | | | | |
| (HB) | PBL | 0.494 | 0.544 | 0.656 | **0.880** | | | | | |
| Preference (PRF) | VGL | 0.684 | 0.676 | 0.507 | 0.602 | **0.970** | | | | |
| | PBL | 0.637 | 0.587 | 0.543 | 0.588 | **0.942** | | | | |
| Vegetarian stigma (VS) | VGL | 0.071 | 0.31 | 0.08 | 0.127 | 0.176 | **0.875** | | | |
| | PBL | 0.119 | 0.221 | −0.016 | 0.036 | 0.138 | **0.875** | | | |
| Food variety−seeking | VGL | 0.317 | 0.192 | 0.274 | 0.253 | 0.189 | 0.145 | **0.853** | | |
| (FVS) | PBL | 0.22 | 0.218 | 0.169 | 0.186 | 0.186 | 0.076 | **0.851** | | |
| Food curiosity (FC) | VGL | 0.010 | −0.162 | −0.066 | −0.056 | −0.171 | 0.388 | 0.388 | **0.838** | |
| | PBL | −0.104 | −0.090 | −0.054 | −0.060 | −0.076 | −0.325 | 0.244 | **0.828** | |
| Food snobbery (FS) | VGL | 0.297 | 0.426 | 0.338 | 0.400 | 0.386 | 0.301 | 0.245 | −0.245 | **0.893** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| PBL | 0.255 | 0.343 | 0.284 | 0.264 | 0.244 | 0.26 | 0.366 | −0.149 | **0.896** |

Note: The diagonal elements in bold are the square root of AVE. The off−diagonal elements are the correlations between the variables.

Appendix C.

Items with statements used for each construct.

| Construct | Item | Statement |
|---|---|---|
| Purchase intention | $PI_1$ | After seeing the above information, I would consider purchasing a vegan/plant-based latte. |
| | $PI_2$ | After seeing the above information, the probability that I would consider purchasing a vegan/plant-based latte is high. |
| | $PI_3$ | After seeing the above information, I would recommend a vegan/plant-based latte to others. |
| Preference | $PRF_1$ | I like a vegan/plant-based latte better than a normal latte. |
| | $PRF_2$ | I consider or have a vegan/plant-based latte more than a normal latte. |
| | $PRF_3$ | I prefer a vegan/plant-based latte to a normal latte. |
| Perceived health benefits | $HB_1$ | I believe that the regular purchase and consumption of vegan/plant-based lattes helps me take care of my health. |
| | $HB_2$ | I believe that the regular purchase and consumption of vegan/plant-based lattes helps me keep healthy. |
| | $HB_3$ | I believe that the regular purchase and consumption of vegan/plant-based lattes helps me lose weight. |
| | $HB_4$ | I believe that the regular purchase and consumption of vegan/plant-based lattes helps prevent disease. |
| Perceived sustainability benefits | $SB_1$ | I believe that the regular purchase and consumption of vegan/plant-based lattes contributes to reducing my carbon footprint/greenhouse gas emissions. |

| | | |
|---|---|---|
| | $SB_2$ | I believe that the regular purchase and consumption of vegan/plant-based lattes helps reduce the use of preservatives. |
| | $SB_3$ | I believe that the regular purchase and consumption of vegan/plant-based lattes contributes to animal happiness and welfare. |
| | $SB_4$ | I believe that the regular purchase and consumption of vegan/plant-based lattes helps use simple/minimal ingredients. |
| Perceived reputational benefits | $RB_1$ | If you purchase a vegan/plant-based latte, your friends will think you are helpful. |
| | $RB_2$ | If you purchase a vegan/plant-based latte, your friends will think you are friendly. |
| | $RB_3$ | If you purchase a vegan/plant-based latte, your friends will think you are well-intentioned. |
| | $RB_4$ | If you purchase a vegan/plant-based latte, your friends will think you are trustworthy. |
| | $RB_5$ | If you purchase a vegan/plant-based latte, your friends will think you are warm-hearted. |
| | $RB_6$ | If you purchase a vegan/plant-based latte, your friends will think you are good natured. |
| | $RB_7$ | If you purchase a vegan/plant-based latte, your friends will think you are likable. |
| | $RB_8$ | If you purchase a vegan/plant-based latte, your friends will think you are sincere. |
| | $RB_9$ | If you purchase a vegan/plant-based latte, your friends will think you are generous. |
| Food variety-seeking | $FVS_1$ | When I eat out, I like to try the most unusual items, even if I am not sure I will like them. |
| | $FVS_2$ | I think it is fun to try out food items I am not familiar with. |
| | $FVS_3$ | I am eager to know what kind of foods people from other countries eat. |
| | $FVS_4$ | I like to eat exotic foods. |
| | $FVS_5$ | Items on the menu that I am unfamiliar with make me curious. |

| | | |
|---|---|---|
| | $FVS_6$ | I am curious about food products I am not familiar with. |
| Food snobbery | $FS_1$ | People who are knowledgeable of new foods can display their sophistication and distinctiveness to others. |
| | $FS_2$ | People who are knowledgeable of exotic foods can display their sophistication and distinctiveness to others. |
| | $FS_3$ | People who are knowledgeable of fashionable foods can display their sophistication and distinctiveness to others. |
| | $FS_4$ | Being knowledgeable of food allows people to display social and wealth status. |
| Food curiosity | $FC_1$ | When I prepare or eat a food that I know, I love to add new ingredients. |
| | $FC_2$ | I like to know what is in a dish. |
| | $FC_3$ | When I eat at home, I take the time to look at, feel, and touch what I am going to eat. |
| Vegetarian stigma | $VS_1$ | If I were to become a vegetarian, people would judge me negatively. |
| | $VS_2$ | If I were to become a vegetarian, people would think I am weird. |
| | $VS_3$ | If I were to become a vegetarian, my friends and/or family would make fun of me. |
| | $VS_4$ | I would feel ashamed or embarrassed to tell someone that I am a vegetarian. |
| | $VS_5$ | If I were to become a vegetarian, people would think less of me. |
| | $VS_6$ | If I were to become a vegetarian, people would treat me differently in a bad way. |
| | $VS_7$ | If I were to become a vegetarian, my friends and/or family would reject me. |

Appendix D-1.

Cross-loading in the vegan latte group.

| Item\Construct | PI | RB | SB | HB | PRF | VS | FVS | FC | FS |
|---|---|---|---|---|---|---|---|---|---|
| PI2 | 0.943 | 0.554 | 0.400 | 0.543 | 0.642 | 0.038 | 0.315 | 0.036 | 0.291 |
| PI3 | 0.939 | 0.620 | 0.423 | 0.506 | 0.645 | 0.051 | 0.281 | −0.018 | 0.268 |
| RB5 | 0.603 | 0.953 | 0.423 | 0.522 | 0.654 | 0.266 | 0.161 | −0.174 | 0.405 |
| RB6 | 0.577 | 0.934 | 0.454 | 0.517 | 0.637 | 0.237 | 0.169 | −0.176 | 0.387 |
| RB7 | 0.587 | 0.964 | 0.397 | 0.523 | 0.626 | 0.274 | 0.179 | −0.117 | 0.387 |
| RB8 | 0.578 | 0.947 | 0.382 | 0.498 | 0.639 | 0.325 | 0.193 | −0.143 | 0.388 |
| RB9 | 0.604 | 0.932 | 0.384 | 0.536 | 0.643 | 0.248 | 0.204 | −0.155 | 0.449 |
| SB1 | 0.403 | 0.343 | 0.870 | 0.484 | 0.438 | 0.044 | 0.278 | −0.054 | 0.308 |
| SB2 | 0.364 | 0.415 | 0.912 | 0.542 | 0.458 | 0.075 | 0.229 | −0.074 | 0.291 |
| SB3 | 0.345 | 0.326 | 0.877 | 0.480 | 0.360 | −0.020 | 0.262 | −0.008 | 0.307 |
| SB4 | 0.432 | 0.433 | 0.903 | 0.549 | 0.523 | 0.058 | 0.217 | −0.083 | 0.300 |
| HB1 | 0.487 | 0.442 | 0.497 | 0.869 | 0.496 | 0.047 | 0.265 | −0.018 | 0.325 |
| HB2 | 0.516 | 0.472 | 0.520 | 0.912 | 0.538 | 0.050 | 0.230 | −0.053 | 0.364 |
| HB3 | 0.461 | 0.503 | 0.506 | 0.841 | 0.515 | 0.137 | 0.198 | −0.058 | 0.362 |
| HB4 | 0.498 | 0.512 | 0.515 | 0.894 | 0.564 | 0.129 | 0.200 | −0.064 | 0.354 |
| PRF1 | 0.687 | 0.652 | 0.520 | 0.602 | 0.971 | 0.139 | 0.196 | −0.182 | 0.375 |
| PRF3 | 0.638 | 0.660 | 0.461 | 0.564 | 0.968 | 0.180 | 0.170 | −0.150 | 0.374 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| VS1 | 0.020 | 0.204 | 0.008 | 0.028 | 0.101 | 0.875 | 0.086 | −0.179 | 0.278 |
| VS2 | −0.006 | 0.189 | −0.044 | 0.042 | 0.107 | 0.850 | 0.127 | −0.151 | 0.255 |
| VS3 | −0.034 | 0.166 | −0.047 | 0.039 | 0.105 | 0.839 | 0.081 | −0.164 | 0.268 |
| VS4 | 0.062 | 0.256 | 0.075 | 0.156 | 0.130 | 0.862 | 0.132 | −0.162 | 0.299 |
| VS5 | 0.082 | 0.329 | 0.059 | 0.112 | 0.180 | 0.900 | 0.117 | −0.200 | 0.227 |
| VS6 | 0.053 | 0.243 | 0.081 | 0.099 | 0.160 | 0.920 | 0.146 | −0.167 | 0.288 |
| VS7 | 0.060 | 0.297 | 0.090 | 0.116 | 0.178 | 0.903 | 0.153 | −0.208 | 0.296 |
| FVS1 | 0.290 | 0.259 | 0.215 | 0.301 | 0.307 | 0.232 | 0.723 | 0.198 | 0.246 |
| FVS2 | 0.242 | 0.144 | 0.213 | 0.189 | 0.145 | 0.126 | 0.884 | 0.434 | 0.159 |
| FVS3 | 0.264 | 0.124 | 0.213 | 0.187 | 0.094 | 0.071 | 0.836 | 0.251 | 0.262 |
| FVS4 | 0.354 | 0.172 | 0.259 | 0.235 | 0.166 | 0.059 | 0.852 | 0.356 | 0.214 |
| FVS5 | 0.233 | 0.153 | 0.263 | 0.207 | 0.151 | 0.127 | 0.905 | 0.367 | 0.217 |
| FVS6 | 0.234 | 0.140 | 0.231 | 0.184 | 0.119 | 0.124 | 0.904 | 0.349 | 0.165 |
| FC1 | 0.052 | −0.084 | −0.040 | −0.043 | −0.126 | −0.166 | 0.401 | 0.922 | −0.194 |
| FC2 | −0.090 | −0.179 | −0.040 | −0.092 | −0.195 | −0.100 | 0.106 | 0.662 | −0.221 |
| FC3 | −0.011 | −0.201 | −0.085 | −0.043 | −0.167 | −0.218 | 0.348 | 0.907 | −0.240 |
| FS1 | 0.204 | 0.357 | 0.305 | 0.344 | 0.334 | 0.303 | 0.226 | −0.229 | 0.916 |
| FS2 | 0.307 | 0.409 | 0.305 | 0.353 | 0.351 | 0.268 | 0.259 | −0.214 | 0.928 |
| FS3 | 0.257 | 0.369 | 0.342 | 0.386 | 0.335 | 0.247 | 0.215 | −0.216 | 0.911 |
| FS4 | 0.307 | 0.402 | 0.246 | 0.358 | 0.378 | 0.298 | 0.153 | −0.222 | 0.810 |

Appendix D−2.

Cross−loading in the plant−based latte group.

| Item\Construct | PI | RB | SB | HB | PRF | VS | FVS | FC | FS |
|---|---|---|---|---|---|---|---|---|---|
| PI2 | 0.945 | 0.477 | 0.413 | 0.460 | 0.568 | 0.079 | 0.207 | −0.095 | 0.249 |
| PI3 | 0.955 | 0.572 | 0.487 | 0.479 | 0.640 | 0.128 | 0.211 | −0.102 | 0.236 |
| RB5 | 0.508 | 0.920 | 0.505 | 0.495 | 0.512 | 0.170 | 0.190 | −0.112 | 0.316 |
| RB6 | 0.486 | 0.930 | 0.455 | 0.472 | 0.495 | 0.196 | 0.185 | −0.082 | 0.322 |
| RB7 | 0.524 | 0.944 | 0.488 | 0.525 | 0.570 | 0.241 | 0.225 | −0.081 | 0.326 |
| RB8 | 0.485 | 0.942 | 0.488 | 0.494 | 0.548 | 0.235 | 0.201 | −0.061 | 0.304 |
| RB9 | 0.572 | 0.926 | 0.512 | 0.542 | 0.600 | 0.204 | 0.212 | −0.084 | 0.331 |
| SB1 | 0.447 | 0.431 | 0.902 | 0.566 | 0.492 | −0.016 | 0.181 | −0.028 | 0.233 |
| SB2 | 0.376 | 0.501 | 0.887 | 0.556 | 0.478 | −0.005 | 0.079 | −0.097 | 0.202 |
| SB3 | 0.356 | 0.362 | 0.854 | 0.586 | 0.371 | −0.149 | 0.204 | 0.002 | 0.294 |
| SB4 | 0.485 | 0.544 | 0.905 | 0.622 | 0.557 | 0.079 | 0.149 | −0.058 | 0.288 |
| HB1 | 0.435 | 0.458 | 0.526 | 0.852 | 0.490 | −0.020 | 0.177 | −0.120 | 0.237 |
| HB2 | 0.407 | 0.436 | 0.558 | 0.894 | 0.470 | −0.051 | 0.139 | −0.054 | 0.202 |
| HB3 | 0.418 | 0.494 | 0.592 | 0.875 | 0.525 | 0.105 | 0.165 | −0.009 | 0.257 |
| HB4 | 0.474 | 0.520 | 0.626 | 0.901 | 0.574 | 0.066 | 0.171 | −0.037 | 0.231 |
| PRF1 | 0.551 | 0.496 | 0.465 | 0.522 | 0.932 | 0.084 | 0.163 | −0.063 | 0.194 |
| PRF3 | 0.643 | 0.602 | 0.552 | 0.582 | 0.952 | 0.178 | 0.185 | −0.078 | 0.260 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| VS1 | 0.151 | 0.205 | −0.013 | 0.061 | 0.166 | 0.897 | 0.076 | −0.291 | 0.248 |
| VS2 | 0.127 | 0.188 | −0.040 | 0.023 | 0.100 | 0.883 | 0.027 | −0.244 | 0.203 |
| VS3 | 0.096 | 0.180 | −0.035 | 0.041 | 0.134 | 0.860 | 0.061 | −0.332 | 0.203 |
| VS4 | 0.045 | 0.170 | −0.018 | 0.025 | 0.106 | 0.903 | 0.048 | −0.307 | 0.214 |
| VS5 | 0.078 | 0.239 | 0.020 | −0.001 | 0.155 | 0.875 | 0.056 | −0.262 | 0.201 |
| VS6 | 0.069 | 0.227 | 0.010 | 0.013 | 0.084 | 0.889 | 0.095 | −0.288 | 0.275 |
| VS7 | 0.081 | 0.144 | −0.004 | 0.029 | 0.067 | 0.830 | 0.116 | −0.301 | 0.259 |
| FVS1 | 0.197 | 0.229 | 0.172 | 0.217 | 0.211 | 0.262 | 0.716 | 0.177 | 0.283 |
| FVS2 | 0.170 | 0.195 | 0.101 | 0.155 | 0.146 | 0.114 | 0.864 | 0.267 | 0.303 |
| FVS3 | 0.175 | 0.124 | 0.091 | 0.098 | 0.111 | −0.050 | 0.825 | 0.170 | 0.316 |
| FVS4 | 0.187 | 0.134 | 0.152 | 0.113 | 0.120 | −0.025 | 0.869 | 0.214 | 0.323 |
| FVS5 | 0.183 | 0.201 | 0.163 | 0.182 | 0.192 | 0.024 | 0.904 | 0.185 | 0.302 |
| FVS6 | 0.211 | 0.231 | 0.184 | 0.186 | 0.172 | 0.062 | 0.913 | 0.224 | 0.338 |
| FC1 | −0.090 | −0.114 | −0.064 | −0.094 | −0.062 | −0.154 | 0.184 | 0.779 | −0.068 |
| FC2 | −0.148 | −0.096 | −0.071 | −0.085 | −0.072 | −0.304 | 0.120 | 0.792 | −0.168 |
| FC3 | −0.058 | −0.039 | −0.021 | −0.005 | −0.061 | −0.351 | 0.261 | 0.909 | −0.147 |
| FS1 | 0.254 | 0.351 | 0.288 | 0.240 | 0.254 | 0.242 | 0.356 | −0.136 | 0.929 |
| FS2 | 0.260 | 0.345 | 0.267 | 0.257 | 0.208 | 0.207 | 0.374 | −0.107 | 0.928 |
| FS3 | 0.165 | 0.224 | 0.248 | 0.243 | 0.168 | 0.214 | 0.315 | −0.143 | 0.892 |
| FS4 | 0.231 | 0.304 | 0.204 | 0.197 | 0.254 | 0.275 | 0.244 | −0.162 | 0.830 |

# Bibliography

## Essay 1

Aday, M. S., & Yener, U. (2015). Assessing consumers' adoption of active and intelligent packaging. British Food Journal, 117(1), 157–177. https://doi.org/10.1108/BFJ-07-2013-0191

Ahn, Y.-Y., Ahnert, S. E., Bagrow, J. P., & Barabási, A.-L. (2011). Flavor network and the principles of food pairing. Scientific Reports, 1(1), 1–7.

Aydar, E. F., Tutuncu, S., & Ozcelik, B. (2020). Plant-based milk substitutes: Bioactive compounds, conventional and novel processes, bioavailability studies, and health effects. Journal of Functional Foods, 70, 103975.

Babin, B. J., & Harris, W. G. (2012). Consumer behavior: CB. South-Western, Cengage Learning.

Bae, K (2021), "[Market trend] "Plant milk" threatens the original milk market in the U.S. and China", The Food and Beverage News, 5 August, available at https://www.thinkfood.co.kr/news/articleView.html?idxno=91906/ (accessed 18 January 2023)

Baldassarre, F., Campo, R., & Falcone, A. (2016). Food for kids: How children influence their parents purchasing decisions. Journal of Food Products Marketing, 22(5), 596–609.

Bastian, S. E. P., Collins, C., & Johnson, T. E. (2010). Understanding consumer preferences for Shiraz wine and Cheddar cheese pairings.

Food Quality and Preference, 21(7), 668–678.

Basu, A. (2022). Plant-Based Milk Consumption in India: Motivators, Deterrents and Marketing Strategies in a Competitive Market. Journal of International Food & Agribusiness Marketing, 1–23.

Baumrucker, C (2008), "Why does organic milk last so much longer than regular milk?", Scientific American, 6 June, available at https://www.scientificamerican.com/article/experts-organic-milk-lasts-longer/ (accessed 18 January 2023)

Beacom, E., Bogue, J., & Repar, L. (2021). Market-oriented Development of Plant-based Food and Beverage Products: A Usage Segmentation Approach. Journal of Food Products Marketing, 27(4), 204–222. https://doi.org/10.1080/10454446.2021.1955799

Belk, R. W. (1975). Situational variables and consumer behavior. Journal of Consumer Research, 2(3), 157–164.

Berni, P., Begalli, D., & Capitello, R. (2005). An Occasion-Based Segmentation Approach to the Wine Market in Denmark. Journal of International Food & Agribusiness Marketing, 17(1), 117–145. https://doi.org/10.1300/J047v17n01_07

Bhanu, M., & Kumar, J. P. P. (2019). The Impact of Measure and Time on Quality Wine-Food Pairing. Asia-Pac. J. Innov. Hosp. Tour, 8, 19–35.

Blissett, J., & Fogel, A. (2013). Intrinsic and extrinsic influences on children's acceptance of new foods. Physiology & Behavior, 121, 89–95. https://doi.org/https://doi.org/10.1016/j.physbeh.2013.02.013

Boaitey, A., & Minegishi, K. (2020). Determinants of Household Choice of

Dairy and Plant-based Milk Alternatives: Evidence from a Field Survey. Journal of Food Products Marketing, 26(9), 639–653. https://doi.org/10.1080/10454446.2020.1857318

Bozkir, A. S., & Sezer, E. A. (2011). Predicting food demand in food courts by decision tree approaches. Procedia Computer Science, 3, 759–763.

Breiman, L., Friedman, J., Olshen, R., & Stone, C. (1984). Classification and regression trees–crc press. Boca Raton, Florida.

Cahill, D. J. (1997). Target marketing and segmentation: valid and useful tools for marketing. Management Decision.

Calvo-Porral, C., & Levy-Mangin, J.-P. (2019). Situational factors in alcoholic beverage consumption: Examining the influence of the place of consumption. British Food Journal.

Cameron, A. C., & Trivedi, P. K. (2010). Microeconometrics using stata (Vol. 2). Stata press College Station, TX.

Chenarides, L., Grebitus, C., Lusk, J. L., & Printezis, I. (2021). Food consumption behavior during the COVID-19 pandemic. Agribusiness, 37(1), 44–81.

Chiorando, M (2018), "Sales Of Vegan Food Skyrocket To $3.3 Billion In One Year", Plant-based News, 31 July, available at https://plantbasednews.org/news/sales-of-vegan-food-skyrocket-3-3-billion/ (accessed 18 January 2023)

Clune, S., Crossin, E., & Verghese, K. (2017). Systematic review of greenhouse gas emissions for different fresh food categories. Journal of Cleaner Production, 140, 766–783.

Cruz, N., Capellas, M., Hernández, M., Trujillo, A. J., Guamis, B., & Ferragut, V. (2007). Ultra high pressure homogenization of soymilk: Microbiological, physicochemical and microstructural characteristics. Food Research International, 40(6), 725–732.

Das, A., Raychaudhuri, U., & Chakraborty, R. (2012). Cereal based functional food of Indian subcontinent: a review. Journal of Food Science and Technology, 49(6), 665–672.

Deng, H., & Hu, R. (2019). A crisis of consumers' trust in scientists and its influence on consumer attitude toward genetically modified foods. British Food Journal.

Dominici, A., Boncinelli, F., Gerini, F., & Marone, E. (2021). Determinants of online food purchasing: The impact of socio−demographic and situational factors. Journal of Retailing and Consumer Services, 60, 102473. https://doi.org/https://doi.org/10.1016/j.jretconser.2021.102473

Eschevins, A., Giboreau, A., Allard, T., & Dacremont, C. (2018). The role of aromatic similarity in food and beverage pairing. Food Quality and Preference, 65, 18–27. https://doi.org/https://doi.org/10.1016/j.foodqual.2017.12.005

Eschevins, A., Giboreau, A., Julien, P., & Dacremont, C. (2019). From expert knowledge and sensory science to a general model of food and beverage pairing with wine and beer. International Journal of Gastronomy and Food Science, 17, 100144.

Feunekes, G. I. J., de Graaf, C., Meyboom, S., & van Staveren, W. A.

(1998). Food choice and fat intake of adolescents and adults: associations of intakes within social networks. Preventive Medicine, 27(5), 645–656.

Font-i-Furnols, M., & Guerrero, L. (2014). Consumer preference, behavior and perception about meat and meat products: An overview. Meat Science, 98(3), 361–371.

Galmarini, M. V. (2020). The role of sensory science in the evaluation of food pairing. Current Opinion in Food Science, 33, 149–155.

Gehrt, K. C. (2000). Situational segmentation opportunities in the snack food market. Journal of Food Products Marketing, 5(4), 1–17.

Giacalone, D., Frøst, M. B., Bredie, W. L. P., Pineau, B., Hunter, D. C., Paisley, A. G., Beresford, M. K., & Jaeger, S. R. (2015). Situational appropriateness of beer is influenced by product familiarity. Food Quality and Preference, 39, 16–27.

Good Food institute (2022), "2021 U.S Retail Market Insights: Plant-based foods", available at https://gfi.org/marketresearch/ (accessed 18 January 2023)

Gorgulho, B. M., Pot, G. K., Sarti, F. M., & Marchioni, D. M. (2017). Main meal quality in Brazil and United Kingdom: Similarities and differences. Appetite, 111, 151–157. https://doi.org/https://doi.org/10.1016/j.appet.2016.12.038

Güney, O. I., & Sangün, L. (2021). How COVID-19 affects individuals' food consumption behaviour: a consumer survey on attitudes and habits in Turkey. British Food Journal.

Haas, R., Schnepps, A., Pichler, A., & Meixner, O. (2019). Cow Milk versus Plant-Based Milk Substitutes: A Comparison of Product Image and Motivational Structure of Consumption. In Sustainability (Vol. 11, Issue 18). https://doi.org/10.3390/su11185046

Hallak, R., Lee, C., & Onur, I. (2019). Examining healthy beverages in the hospitality industry: Evidence from Australia and New Zealand. British Food Journal.

Hassen, T. Ben, El Bilali, H., Allahyari, M. S., & Morrar, R. (2021). Food attitudes and consumer behavior towards food in conflict-affected zones during the COVID-19 pandemic: case of the Palestinian territories. British Food Journal.

Hwang, S (2021), "Focus on 'alternative milk' in the aftermath of rising milk prices", The Food and Beverage News, 13 September, available at https://www.thinkfood.co.kr/news/articleView.html?idxno=92272/ (accessed 18 January 2023)

Jackson, C. L., & Hu, F. B. (2014). Long-term associations of nut consumption with body weight and obesity. The American Journal of Clinical Nutrition, 100(suppl_1), 408S-411S.

JOI (2020), "The Most Shelf Stable, Long Lasting, and Cost Effective Plant Milk For Your Pantry", 3 March, available at https://addjoi.com/blogs/news/the-most-shelf-stable-long-lasting-and-cost-effective-plant-milk-for-your-pantry/ (accessed 18 January 2023)

Jovanović, M. M., Kašćelan, L., Joksimović, M., & Kašćelan, V. (2017).

Decision tree analysis of wine consumers' preferences: evidence from an emerging market. British Food Journal.

Jung, Y (2022), "Changed oat drink. Why are you looking for it instead milk?", Kyunghyang News, 25 December, available at https://www.khan.co.kr/economy/economy-general/article/202212251553001/ (accessed 18 January 2023)

Karwacka, M., Ciurzyńska, A., Lenart, A., & Janowicz, M. (2020). Sustainable development in the agri-food sector in terms of the carbon footprint: A Review. Sustainability, 12(16), 6463.

Kim, J.-M., Park, S.-J., Lee, C.-S., Ren, C., Kim, S.-S., & Shin, M. (2011). Functional properties of different Korean sweet potato varieties. Food Science and Biotechnology, 20(6), 1501–1507.

Koutsoumanis, K., Pavlis, A., Nychas, G.-J. E., & Xanthiakos, K. (2010). Probabilistic model for Listeria monocytogenes growth during distribution, retail storage, and domestic storage of pasteurized milk. Applied and Environmental Microbiology, 76(7), 2181–2191.

Kritchevsky, S. B., & Kritchevsky, D. (2000). Egg consumption and coronary heart disease: an epidemiologic overview. Journal of the American College of Nutrition, 19(sup5), 549S-555S.

Lahne, J. (2019). 15 - Food combinations and food and beverage combinations in meals (H. L. B. T.-C. Meiselman (ed.); pp. 307–321). Woodhead Publishing. https://doi.org/https://doi.org/10.1016/B978-0-12-814495-4.00015-5

Lee, H.-J. (2016). Individual and Situational Determinants of U.S.

Consumers' Buying Behavior of Organic Foods. Journal of International Food & Agribusiness Marketing, 28(2), 117–131. https://doi.org/10.1080/08974438.2015.1035471

Lillegaard, I. T. L., & Andersen, L. F. (2005). Validation of a pre-coded food diary with energy expenditure, comparison of under-reporters v. acceptable reporters. British Journal of Nutrition, 94(6), 998–1003.

Liu, J. L., Han, B., & Cohen, D. A. (2015). Associations between eating occasions and places of consumption among adults. Appetite, 87, 199–204.

Liu, K. (1997). Soybeans chemistry, technology, and utilization Chapman & Hall. New York.[Google Scholar].

Loose, S. M., & Jaeger, S. R. (2012). Factors that influence beverage choices at meal times. An application of the food choice kaleidoscope framework. Appetite, 59(3), 826–836.

Lunardo, R., Jaud, D., & Jaspers, E. (2022). Engagement in vice food and beverage consumption: The role of perceived lack of control. Psychology & Marketing.

Makinei, L. V, & Hazarika, M. K. (2022). Flavour network-based analysis of food pairing: Application to the recipes of the sub-cuisines from Northeast India. Current Research in Food Science, 5, 1038–1046.

Marshall, D., & Bell, R. (2003). Meal construction: exploring the relationship between eating occasion and location. Food Quality and Preference, 14(1), 53–64.

McNaughton, S. A., Pendergast, F. J., Worsley, A., & Leech, R. M. (2020).

Eating occasion situational factors and sugar-sweetened beverage consumption in young adults. International Journal of Behavioral Nutrition and Physical Activity, 17(1), 1–12.

Mercier, S., Villeneuve, S., Mondor, M., & Uysal, I. (2017). Time–temperature management along the food cold chain: A review of recent developments. Comprehensive Reviews in Food Science and Food Safety, 16(4), 647–667.

Mwanga, R. O. M., Andrade, M. I., Carey, E. E., Low, J. W., Yencho, G. C., & Grüneberg, W. J. (2017). Sweetpotato (Ipomoea batatas L.). In Genetic improvement of tropical crops (pp. 181–218). Springer.

Pandey, S., Ritz, C., & Perez-Cueto, F. J. A. (2021). An application of the theory of planned behaviour to predict intention to consume plant-based yogurt alternatives. Foods, 10(1), 148.

Park, Y., & Moon, J. (2022). Drinking instead of eating as breakfast in South Korea: In which context do people place food with a beverage? International Journal of Gastronomy and Food Science, 27, 100477. https://doi.org/https://doi.org/10.1016/j.ijgfs.2022.100477

Parmar, G., & Rathod, R. M. (2020). Impact of covid-19 situation on food consumption. Journal of Interdisciplinary Cycle Research, 12, 1393–1406.

Paulsen, M. M., Myhre, J. B., & Andersen, L. F. (2016). Beverage Consumption Patterns among Norwegian Adults. In Nutrients (Vol. 8, Issue 9). https://doi.org/10.3390/nu8090561

Pendergast, F. J., Ridgers, N. D., Worsley, A., & McNaughton, S. A.

(2017). Evaluation of a smartphone food diary application using objectively measured energy expenditure. International Journal of Behavioral Nutrition and Physical Activity, 14(1), 1–10.

Pointke, M., Ohlau, M., Risius, A., & Pawelzik, E. (2022). Plant−Based Only: Investigating Consumers’ Sensory Perception, Motivation, and Knowledge of Different Plant−Based Alternative Products on the Market. In Foods (Vol. 11, Issue 15). https://doi.org/10.3390/foods11152339

Prabhakaran, M. P., Perera, C. O., & Valiyaveettil, S. (2005). Quantification of isoflavones in soymilk and tofu from South East Asia. International Journal of Food Properties, 8(1), 113–123.

Rime, J. A. (2020). Dairy Milk and Plant−Based Alternative Beverage Purchasing Factors: Consumer Insights. Brigham Young University.

Rozin, P., & Hormes, J. M. (2011). Psychology and sensory marketing, with a focus on food. In Sensory marketing (pp. 333–352). Routledge.

Rune, C. J. B., Münchow, M., & Perez−Cueto, F. J. A. (2021). Systematic Review of Methods Used for Food Pairing with Coffee, Tea, Wine, and Beer. In Beverages (Vol. 7, Issue 2). https://doi.org/10.3390/beverages7020040

Rune, C. J. B., Münchow, M., Perez−Cueto, F. J. A., & Giacalone, D. (2022). Pairing coffee with basic tastes and real foods changes perceived sensory characteristics and consumer liking. International Journal of Gastronomy and Food Science, 30, 100591.

Sabaté, J. (2003). Nut consumption and body weight. The American

Journal of Clinical Nutrition, 78(3), 647S-650S.

Scander, H., Monteagudo, C., Nilsen, B., Tellström, R., & Yngve, A. (2018). Food and beverage dinner combinations, patterns among Swedish adults. International Journal of Gastronomy and Food Science, 14, 20–26.

Schiano, A. N., Harwood, W. S., Gerard, P. D., & Drake, M. A. (2020). Consumer perception of the sustainability of dairy products and plant-based dairy alternatives. Journal of Dairy Science, 103(12), 11228–11243. https://doi.org/https://doi.org/10.3168/jds.2020-18406

Schiano, A. N., Nishku, S., Racette, C. M., & Drake, M. A. (2022). Parents' implicit perceptions of dairy milk and plant-based milk alternatives. Journal of Dairy Science, 105(6), 4946–4960.

Seo, H., & Hwang, J. (2022). Analysis of Decisive Elements in the Purchase of Alternative Foods Using Bivariate Probit Model. Sustainability, 14(7), 3822.

Sethi, S., Tyagi, S. K., & Anurag, R. K. (2016). Plant-based milk alternatives an emerging segment of functional beverages: a review. Journal of Food Science and Technology, 53(9), 3408–3423.

Seoul Economy (2009), "Why does soy milk have a long shelf life unlike milk?", 17 February, available at https://www.sedaily.com/NewsView/VZ98DDJ1V/ (accessed 18 January 2023)

Shukla, P. (2009). Impact of contextual factors, brand loyalty and brand

switching on purchase decisions. Journal of Consumer Marketing.

Singh, A., & Verma, P. (2017). Factors influencing Indian consumers' actual buying behaviour towards organic food products. Journal of Cleaner Production, 167, 473–483.

Skoczek-Rubińska, A., & Bajerska, J. (2021). The consumption of energy dense snacks and some contextual factors of snacking may contribute to higher energy intake and body weight in adults. Nutrition Research, 96, 20–36.

Song, Y.-Y., & Ying, L. U. (2015). Decision tree methods: applications for classification and prediction. Shanghai Archives of Psychiatry, 27(2), 130.

Sparke, K., & Menrad, K. (2009). Cross-European and Functional Food-Related Consumer Segmentation for New Product Development. Journal of Food Products Marketing, 15(3), 213–230. https://doi.org/10.1080/10454440902908142

Spence, C. (2020). Food and beverage flavour pairing: A critical review of the literature. Food Research International, 133, 109124.

Stroebele, N., & De Castro, J. M. (2004). Effect of ambience on food intake and food choice. Nutrition, 20(9), 821–838. https://doi.org/https://doi.org/10.1016/j.nut.2004.05.012

Su, C.-H., Tsai, C.-H., Chen, M.-H., & Lv, W. Q. (2019). US sustainable food market generation Z consumer segments. Sustainability, 11(13), 3607.

Sultan, P., Wong, H. Y., & Sigala, M. (2018). Segmenting the Australian

organic food consumer market. Asia Pacific Journal of Marketing and Logistics.

Terrier, L., & Jaquinet, A.-L. (2016). Food–wine pairing suggestions as a risk reduction strategy: reducing risk and increasing wine by the glass sales in the context of a Swiss restaurant. Psychological Reports, 119(1), 174–180.

Thompson, F. E., Larkin, F. A., & Brown, M. B. (1986). Weekend–weekday differences in reported dietary intake: The nationwide food consumption survey, 1977–78. Nutrition Research, 6(6), 647–662. https://doi.org/https://doi.org/10.1016/S0271-5317(86)80006-9

Tuso, P. J., Ismail, M. H., Ha, B. P., & Bartolotto, C. (2013). Nutritional update for physicians: plant-based diets. The Permanente Journal, 17(2), 61.

Vander Wal, J. S., Gupta, A., Khosla, P., & Dhurandhar, N. V. (2008). Egg breakfast enhances weight loss. International Journal of Obesity, 32(10), 1545–1551.

Verain, M. C. D., Bartels, J., Dagevos, H., Sijtsema, S. J., Onwezen, M. C., & Antonides, G. (2012). Segments of sustainable food consumers: a literature review. International Journal of Consumer Studies, 36(2), 123–132.

Verain, M. C. D., Dagevos, H., & Antonides, G. (2015). Sustainable food consumption. Product choice or curtailment? Appetite, 91, 375–384. https://doi.org/https://doi.org/10.1016/j.appet.2015.04.055

Wilkinson, K., Muhlhausler, B., Motley, C., Crump, A., Bray, H., & Ankeny,

R. (2018). Australian consumers' awareness and acceptance of insects as food. Insects, 9(2), 44.

Wolf, C. A., Malone, T., & McFadden, B. R. (2020). Beverage milk consumption patterns in the United States: Who is substituting from dairy to plant-based beverages? Journal of Dairy Science, 103(12), 11209–11217. https://doi.org/https://doi.org/10.3168/jds.2020-18741

Yilmaz-Ersan, L., Ozcan, T., & Akpinar-Bayizit, A. (2020). Assessment of socio-demographic factors, health status and the knowledge on probiotic dairy products. Food Science and Human Wellness, 9(3), 272–279. https://doi.org/https://doi.org/10.1016/j.fshw.2020.05.004

Yoon, D (2022), "Plant alternative milk is rising. Market Size Expected to Be over 800 Billion in 5 Years", News1, 5 January, available at https://www.news1.kr/articles/?4544249/ (accessed 18 January 2023)

## Essay 2

Abalkhail, T. S. (2015). *An assessment of values concerning luxury brand purchase intention: a cross-culture comparison*.

Adamczyk, D., Jaworska, D., Affeltowicz, D., & Maison, D. (2022). Plant-Based Dairy Alternatives: Consumers’ Perceptions, Motivations, and Barriers—Results from a Qualitative Study in Poland, Germany, and France. In *Nutrients* (Vol. 14, Issue 10).

Adams, J. (2012). Australia’s American coffee culture. *Australasian Journal of Popular Culture*, *2*(1), 23-36.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179-211.

Anderson, J. (2019). *What To Call Plant-Based Meat Alternatives: A Labeling Study*.

Ares, G., Mawad, F., Giménez, A., & Maiche, A. (2014). Influence of rational and intuitive thinking styles on food choice: Preliminary evidence from an eye-tracking study with yogurt labels. *Food Quality and Preference*, *31*, 28-37.

Arnaudova, M., Brunner, T. A., & Götze, F. (2022). Examination of students’ willingness to change behaviour regarding meat consumption. *Meat Science*, *184*, 108695.

Ashley, B., Hollows, J., Jones, S., & Taylor, B. (2004). *Food and cultural studies*. Routledge.

Babin, L. A., & Burns, A. C. (1998). A modified scale for the measurement of communication-evoked mental imagery. Psychology & Marketing, 15(3), 261-278.

Bakhsh, A., Lee, S.-J., Lee, E.-Y., Hwang, Y.-H., & Joo, S.-T. (2021). Evaluation of Rheological and Sensory Characteristics of Plant-Based Meat Analog with Comparison to Beef and Pork. *Food Science of Animal Resources*, *41*(6), 983.

Bakos, Y. (1998). The emerging role of electronic marketplaces on the Internet. *Communications of the ACM*, *41*(8), 35-42.

Bauman, Z. (2005). *Liquid life*. Polity.

Bhumiratana, N., Adhikari, K., & Chambers IV, E. (2014). The development of an emotion lexicon for the coffee drinking experience. *Food Research International*, *61*, 83-92.

Boaitey, A., & Minegishi, K. (2020). Determinants of Household Choice of Dairy and Plant-based Milk Alternatives: Evidence from a Field Survey. Journal of Food Products Marketing, 26(9), 639-653.

Boeck, T., Sahin, A. W., Zannini, E., & Arendt, E. K. (2021). Nutritional properties and health aspects of pulses and their use in plant-based yogurt alternatives. *Comprehensive Reviews in Food Science and Food Safety*, *20*(4), 3858-3880.

Brenner, M., Deneau, M., Von Schulz, B., Webb, L., & Wong, A. (n.d.). *What industries would benefit from using ethical business practices?*

Bresnahan, M., Zhuang, J., & Zhu, X. (2016). Why is the vegan line in the dining hall always the shortest? Understanding vegan stigma. *Stigma and Health*, *1*(1), 3.

Brouwer, A. R., D' Souza, C., Singaraju, S., & Arango-Soler, L. A. (2022). Value attitude behaviour and social stigma in the adoption of veganism: An integrated model. *Food Quality and Preference*, *97*, 104479.

Caracciolo, F., Furno, M., D' Amico, M., Califano, G., & Di Vita, G. (2022). Variety seeking behavior in the wine domain: A consumers segmentation using big data. *Food Quality and Preference*, *97*, 104481.

Carfora, V., Morandi, M., & Catellani, P. (2022). The Influence of Message Framing on Consumers’ Selection of Local Food. In *Foods* (Vol. 11, Issue 9).

Carr, S. C., Meyer, I., Saxena, M., Seubert, C., Hopfgartner, L., Arora, B., Jyoti, D., Rugimbana, R., Kempton, H., & Marai, L. (2021). "Our fair trade coffee tastes better": It might, but under what conditions? *Journal of Consumer Affairs*.

Carvalho, A. S. M., Godinho, C. I. A., & Graça, J. (2022). Gain framing increases support for measures promoting plant-based eating in university settings. *Food Quality and Preference*, *97*, 104500.

Caswell, J. A., & Padberg, D. I. (1992). Toward a more comprehensive theory of food labels. American Journal of Agricultural Economics, 74(2), 460-468.

Chalupa-Krebzdak, S., Long, C. J., & Bohrer, B. M. (2018). Nutrient density and nutritional value of milk and plant-based milk alternatives. *International Dairy Journal*, *87*, 84-92.

Charlebois, S., Somogyi, S., Music, J., & Cunningham, C. (2019). Biotechnology in food: Canadian attitudes towards genetic engineering in both plant-and animal-based foods. *British Food Journal*.

Chattalas, M., & Shukla, P. (2015). Impact of value perceptions on luxury purchase intentions: a developed market comparison. *Luxury Research Journal*, *1*(1), 40-57.

Chen, M.-F., & Lee, C.-L. (2015). The impacts of green claims on coffee consumers' purchase intention. *British Food Journal*.

Chin, W. W. (2000). *Frequently asked questions-partial least squares & PLS-graph*.

Churchill Jr, G. A. (1979). A paradigm for developing better measures of marketing constructs. Journal of Marketing Research, 16(1), 64-73.

Chuter, R. (2018). *Finding companionship on the road less travelled: A netnography of the Whole Food Plant-Based Aussies Facebook group*.

Çınar, Ç., Wesseldijk, L. W., Karinen, A. K., Jern, P., & Tybur, J. M. (2022). Sex differences in the genetic and environmental underpinnings of meat and plant preferences. *Food Quality and Preference*, *98*, 104421.

Cliceri, D., Spinelli, S., Dinnella, C., Prescott, J., & Monteleone, E. (2018). The influence of psychological traits, beliefs and taste responsiveness on implicit attitudes toward plant-and animal-based dishes among vegetarians, flexitarians and omnivores. *Food Quality and Preference*, *68*, 276-291.

Clune, S., Crossin, E., & Verghese, K. (2017). Systematic review of greenhouse gas emissions for different fresh food categories. *Journal of Cleaner Production*, *140*, 766-783.

Cole, M., & Morgan, K. (2011). Vegaphobia: Derogatory discourses of veganism and the reproduction of speciesism in UK national newspapers 1. *The British Journal of Sociology*, *62*(1), 134-153.

Conor, S., Kief, A., Kremer, F., Iyer, S., & Sieklucki, M. (2018). *Plant Based Diets : Effects of Framing on Willingness to Adopt Plant-Based*

*Diets*.

Corepal, R. K., & Copeman, J. (2014). The Perceived Barriers and Benefits of Consuming A Plant-Based Diet.

Corrin, T., & Papadopoulos, A. (2017). Understanding the attitudes and perceptions of vegetarian and plant-based diets to shape future health promotion programs. Appetite, 109, 40-47.

Cruz, N., Capellas, M., Hernández, M., Trujillo, A. J., Guamis, B., & Ferragut, V. (2007). Ultra high pressure homogenization of soymilk: Microbiological, physicochemical and microstructural characteristics. *Food Research International*, *40*(6), 725-732.

Das, A., Raychaudhuri, U., & Chakraborty, R. (2012). Cereal based functional food of Indian subcontinent: a review. *Journal of Food Science and Technology*, *49*(6), 665-672.

de Almeida, L. F., & Zylbersztajn, D. (2017). Key success factors in the brazilian coffee agrichain: Present and future challenges. *International Journal on Food System Dynamics*, *8*(1), 45-53.

Dember, W. N., & Earl, R. W. (1957). Analysis of exploratory, manipulatory, and curiosity behaviors. *Psychological Review*, *64*(2), 91.

Demïr, H., Simsek, M., & Yıldırım, G. (2021). Effect of oat milk pasteurization type on the characteristics of yogurt. *LWT*, *135*, 110271.

Ding, L., Velicer, W. F., & Harlow, L. L. (1995). Effects of estimation methods, number of indicators per factor, and improper solutions on

structural equation modeling fit indices. *Structural Equation Modeling: A Multidisciplinary Journal*, *2*(2), 119-143.

Donnet, M. L., Weatherspoon, D. D., & Hoehn, J. P. (2007). What adds value in specialty coffee? Managerial implications from hedonic price analysis of Central and South American e-auctions. *International Food and Agribusiness Management Review*, *10*(1030-2016-82517), 1-18.

Dorce, L. C., da Silva, M. C., Mauad, J. R. C., de Faria Domingues, C. H., & Borges, J. A. R. (2021). Extending the theory of planned behavior to understand consumer purchase behavior for organic vegetables in Brazil: The role of perceived health benefits, perceived sustainability benefits and perceived price. *Food Quality and Preference*, *91*, 104191.

Duchene, T. N., & Jackson, L. M. (2019). Effects of motivation framing and content domain on intentions to eat plant-and animal-based foods. *Society & Animals*, *27*(5-6), 526-543.

Ellis, D., & Mattison Thompson, F. (2018). The effect of wine knowledge type on variety seeking behavior in wine purchasing. *Journal of Wine Research*, *29*(2), 71-86.

EVE VEGAN. (2022). Retrieved from https://www.certification-vegan.org. Accessed June 20, 2022.

Farah, A. (2009). Coffee as a speciality and functional beverage. In *Functional and speciality beverage technology* (pp. 370-395). Elsevier.

Fehér, A., Gazdecki, M., Véha, M., Szakály, M., & Szakály, Z. (2020). A Comprehensive Review of the Benefits of and the Barriers to the Switch to a Plant-Based Diet. *Sustainability*, *12*(10), 4136.

Fishbein, M., & Ajzen, I. (2011). *Predicting and changing behavior: The reasoned action approach*. Psychology press.

Folkvord, F., Bergmans, N., & Pabian, S. (2021). The effect of the nutri-score label on consumer' s attitudes, taste perception and purchase intention: An experimental pilot study. *Food Quality and Preference*, *94*, 104303.

Gallagher, K. M., & Updegraff, J. A. (2012). Health message framing effects on attitudes, intentions, and behavior: a meta-analytic review. *Annals of Behavioral Medicine*, *43*(1), 101-116.

Gershon, R., Cryder, C., & John, L. K. (2020). Why prosocial referral incentives work: the interplay of reputational benefits and action costs. *Journal of Marketing Research*, *57*(1), 156-172.

Good Food Institute. (2021). 2020 U.S. retail market data for the plant-based industry. Retrieved from https://gfi.org/marketresearch. Accessed June 1, 2022.

Graça, J., Oliveira, A., & Calheiros, M. M. (2015). Meat, beyond the plate. Data-driven hypotheses for understanding consumer willingness to adopt a more plant-based diet. *Appetite*, *90*, 80-90.

Grasso, N., Alonso-Miravalles, L., & O' Mahony, J. A. (2020). Composition, physicochemical and sensorial properties of commercial plant-based yogurts. *Foods*, *9*(3), 252.

Grasso, N., Roos, Y. H., Crowley, S. V, Arendt, E. K., & O' Mahony, J. A. (2021). Composition and physicochemical properties of commercial plant-based block-style products as alternatives to cheese. *Future Foods*, *4*, 100048.

Greis, M., Sainio, T., Katina, K., Kinchla, A. J., Nolden, A., Partanen, R., & Seppä, L. (2020). Dynamic texture perception in plant-based yogurt alternatives: Identifying temporal drivers of liking by TDS. *Food Quality and Preference*, *86*, 104019.

Grunert, K. G. (2002). Current issues in the understanding of consumer food choice. Trends in Food Science & Technology, 13(8), 275-285.

GUPTA, S., & BISLA, G. (2019). Nutritional and sensory characteristics of oat milk based yoghurt. *J. Appl. Home Sci*, *6*(6-8), 261-265.

Haas, R., Schnepps, A., Pichler, A., & Meixner, O. (2019). Cow Milk versus Plant-Based Milk Substitutes: A Comparison of Product Image and Motivational Structure of Consumption. In *Sustainability* (Vol. 11, Issue 18).

He, J., Evans, N. M., Liu, H., & Shao, S. (2020). A review of research on plant-based meat alternatives: Driving forces, history, manufacturing, and consumer attitudes. *Comprehensive Reviews in Food Science and Food Safety*, *19*(5), 2639-2656.

Heimbach, J. T. (1981). Defining the problem: The scope of consumer concern with food labeling. ACR North American Advances.

Hirschler, C. A. (2011). "What pushed me over the edge was a deer hunter": Being vegan in North America. *Society & Animals*, *19*(2),

156-174.

Hoyer, W. D., & Ridgway, N. M. (1984). Variety seeking as an explanation for exploratory purchase behavior: A theoretical model. *ACR North American Advances*.

Hwang, J., You, J., Moon, J., & Jeong, J. (2020). Factors affecting consumers' alternative meats buying intentions: Plant-based meat alternative and cultured meat. *Sustainability*, *12*(14), 5662.

Hwang, S. Y. (2021, October). Starbucks introduces 'Oat Milk' option for a month...Two hundred thousand people chose to replace milk. The Food & Beverage News. Retrieved from https://www.thinkfood.co.kr/news/articleView.html?idxno=92577. Accessed May 28, 2022.

Italian Vegetarian Association. (2022). Retrieved from http://www.vlabel.org. Accessed June 20, 2022.

IT Chosun. (2021). The alternative to milk that keeps on rising is "plant-based alternative milk.". Retrieved from https://it.chosun.com/site/data/html_dir/2021/10/05/2021100502057.html. Accessed October 5, 2022

Jang, H.-W., & Cho, M. (2022). Relationship between Personal Values and Intentions to Purchase Plant-Based Meat Alternatives: Application of the Dual Concern Theory. International Journal of Environmental Research and Public Health, 19(14), 8673.

Jeske, S., Zannini, E., & Arendt, E. K. (2017). Evaluation of physicochemical and glycaemic properties of commercial plant-based

milk substitutes. *Plant Foods for Human Nutrition*, *72*(1), 26-33.

Kahn, B. E., & Isen, A. M. (1993). The Influence of Positive Affect on Variety Seeking among Safe, Enjoyable Products. *Journal of Consumer Research*, *20*(2), 257-270.

Karwacka, M., Ciurzyńska, A., Lenart, A., & Janowicz, M. (2020). Sustainable development in the agri-food sector in terms of the carbon footprint: A Review. *Sustainability*, *12*(16), 6463.

Kim, J.-S., & Kwon, C.-S. (2001). Estimated dietary isoflavone intake of Korean population based on National Nutrition Survey. *Nutrition Research*, *21*(7), 947-953.

Kimura, A., Mukawa, N., Yamamoto, M., Masuda, T., Yuasa, M., Goto, S., Oka, T., & Wada, Y. (2012). The influence of reputational concerns on purchase intention of fair-trade foods among young Japanese adults. *Food Quality and Preference*, *26*(2), 204-210.

Kline, R. B. (2015). *Principles and practice of structural equation modeling*. Guilford publications.

KOSIS. (2022). Statistical Database. Retrieved from https://kosis.kr/index/index.do. Accessed May 4, 2022.

Korea Agency of Vegan Certification and Services. (2022). Retrieved from https://vegan-korea.com. Accessed June 20, 2022.

Korea Agro-Fisheries & Food Trade Corporation. (2022). 2021 Processed food Subdivision Market Status Report: Vegan food. Retrieved from https://www.atfis.or.kr/home/board/FB0027.do?act=read&bpoId=415

6. Accessed May 15, 2022.

Krpan, D., & Houtsma, N. (2020). ToMarkowski, K. L., & Roxburgh, S. (2019). “If I became a vegan, my family and friends would hate me:” Anticipating vegan stigma as a barrier to plant-based diets. Appetite, 135, 1-9. veg or not to veg? The impact of framing on vegetarian food choice. *Journal of Environmental Psychology*, *67*, 101391.

Kundu, P., DhANKhAr, J., & ShArMA, As. (2018). Development of non dairy milk alternative using soymilk and almond milk. *Current Research in Nutrition and Food Science Journal*, *6*(1), 203-210.

Kyriakopoulou, K., Dekkers, B., & van der Goot, A. J. (2019). Plant-based meat analogues. In *Sustainable meat production and processing* (pp. 103-126). Elsevier.

Labbe, D., Ferrage, A., Rytz, A., Pace, J., & Martin, N. (2015). Pleasantness, emotions and perceptions induced by coffee beverage experience depend on the consumption motivation (hedonic or utilitarian). *Food Quality and Preference*, *44*, 56-61.

Larsson, C. L., Rönnlund, U., Johansson, G., & Dahlgren, L. (2003). Veganism as status passage: The process of becoming a vegan among youths in Sweden. *Appetite*, *41*(1), 61-67.

Lazzarini, G. A., Visschers, V. H. M., & Siegrist, M. (2017). Our own country is best: Factors influencing consumers’ sustainability perceptions of plant-based foods. *Food Quality and Preference*, *60*, 165-177.

Lee, D., Moon, J., & Jeong, J. (2021). Consumer sophistication as an enhancer of innovation in the food industry: measurement development and validation. *British Food Journal*, *ahead-of-p*(ahead-of-print).

Lea, E. J., Crawford, D., & Worsley, A. (2006). Public views of the benefits and barriers to the consumption of a plant-based diet. *European Journal of Clinical Nutrition*, *60*(7), 828-837.

Lea, E., & Worsley, A. (2003). The factors associated with the belief that vegetarian diets provide health benefits. *Asia Pacific Journal of Clinical Nutrition*, *12*(3), 296-303.

Legohérel, P., Daucé, B., & Hsu, C. H. C. (2012). Divergence in Variety Seeking: An Exploratory Study Among International Travelers in Asia. *Journal of Global Marketing*, *25*(4), 213-225.

Li, J., Streletskaya, N. A., & Gómez, M. I. (2019). Does taste sensitivity matter? The effect of coffee sensory tasting information and taste sensitivity on consumer preferences. *Food Quality and Preference*, *71*, 447-451.

Lim, Y. J., Osman, A., Salahuddin, S. N., Romle, A. R., & Abdullah, S. (2016). Factors influencing online shopping behavior: the mediating role of purchase intention. *Procedia Economics and Finance*, *35*, 401-410.

Lin, E.-Y. (2012). Starbucks as the third place: Glimpses into Taiwan's consumer culture and lifestyles. *Journal of International Consumer Marketing*, *24*(1-2), 119-128.

Liu, R., Banovic, M., & Grunert, K. G. (2022). Beliefs about food quality attributes, food-related goals and satisfaction with food-related life among the elderly in China: A means-end approach. *Food Quality and Preference*, *95*, 104367.

Maciejewski, G., Mokrysz, S., & Wróblewski, Ł. (2019). Segmentation of coffee consumers using sustainable values: Cluster analysis on the Polish coffee market. *Sustainability*, *11*(3), 613.

MajlesiRad, Z., & Haji pour Shoushtari, A. H. (2020). Analysis of the impact of social network sites and eWOM marketing, considering the reinforcing dimensions of the concept of luxury, on tendency toward luxury brand. *Future Business Journal*, *6*(1), 1-19.

Malhotra, N., Nunan, D., & Birks, D. (2017). *Marketing research: An applied approach*. Pearson.

Markowski, K. L., & Roxburgh, S. (2019). "If I became a vegan, my family and friends would hate me:" Anticipating vegan stigma as a barrier to plant-based diets. *Appetite*, *135*, 1-9.

Marshall, D., & Bell, R. (2004). Relating the food involvement scale to demographic variables, food choice and other constructs. *Food Quality and Preference*, *15*(7-8), 871-879.

Martinelli, E., & De Canio, F. (2021). Non-vegan consumers buying vegan food: the moderating role of conformity. *British Food Journal*.

Martinez, B., & Kim, S. (2012). Predicting purchase intention for private sale sites. *Journal of Fashion Marketing and Management: An International Journal*.

Masi, C., Dinnella, C., Monteleone, E., & Prescott, J. (2015). The impact of individual variations in taste sensitivity on coffee perceptions and preferences. *Physiology & Behavior*, *138*, 219-226.

May, J. (1996). "A little taste of something more exotic": The imaginative geographies of everyday life. *Geography*, 57-64.

McCarthy, K. S., Parker, M., Ameerally, A., Drake, S. L., & Drake, M. A. (2017). Drivers of choice for fluid milk versus plant-based alternatives: What are consumer perceptions of fluid milk? *Journal of Dairy Science*, *100*(8), 6125-6138.

McClements, D. J., Newman, E., & McClements, I. F. (2019). Plant-based milks: A review of the science underpinning their design, fabrication, and performance. *Comprehensive Reviews in Food Science and Food Safety*, *18*(6), 2047-2067.

McGuinness, L., McCabe, M., Kiernan, C., McCrickerd, K., Forde, C. G., Dolores O' Riordan, E., & Feeney, E. L. (2022). Impact of front-of-pack labels with nutrition and Grass-Fed claims on consumer perceptions and expected sensory and nutritional characteristics of Cheddar cheese - A comparative study of Irish and US consumers. *Food Quality and Preference*, *101*, 104649.

Michel, F., Hartmann, C., & Siegrist, M. (2021). Consumers' associations, perceptions and acceptance of meat and plant-based meat alternatives. *Food Quality and Preference*, *87*, 104063.

Minson, J. A., & Monin, B. (2012). Do-gooder derogation: Disparaging morally motivated minorities to defuse anticipated reproach. *Social*

*Psychological and Personality Science*, *3*(2), 200-207.

Mirkovic, A. (2005). *From courtly curiosity to revolutionary refreshment: Turkish coffee and English politics in the Seventeenth Century*.

Nestle. (2019, August). Nestlé launches plant-based coffee lattes. Retrieved from https://www.nestle.com/media/news/nestle-launches-plant-based-coffee-lattes. Accessed June 4, 2022.

Pandey, S., Ritz, C., & Perez-Cueto, F. J. A. (2021). An application of the theory of planned behaviour to predict intention to consume plant-based yogurt alternatives. *Foods*, *10*(1), 148.

Papies, E. K., Johannes, N., Daneva, T., Semyte, G., & Kauhanen, L.-L. (2020). Using consumption and reward simulations to increase the appeal of plant-based foods. *Appetite*, *155*, 104812.

Paula, S. C. S. E. de, Zuim, L., Paula, M. C. de, Mota, M. F., Lima Filho, T., & Della Lucia, S. M. (2021). The influence of musical song and package labeling on the acceptance and purchase intention of craft and industrial beers: A case study. *Food Quality and Preference*, *89*, 104139.

Petit, C., & Sieffermann, J. M. (2007). Testing consumer preferences for iced-coffee: Does the drinking environment have any influence? *Food Quality and Preference*, *18*(1), 161-172.

Pinto, D. C., Herter, M. M., Rossi, P., Nique, W. M., & Borges, A. (2019). Recycling cooperation and buying status: Effects of pure and competitive altruism on sustainable behaviors. *European Journal of Marketing*.

Quintão, R. T., Brito, E. P. Z., & Belk, R. W. (2017). The taste transformation ritual in the specialty coffee market. *Revista de Administração de Empresas*, *57*, 483-494.

Radnitz, C., Beezhold, B., & DiMatteo, J. (2015). Investigation of lifestyle choices of individuals following a vegan diet for health and ethical reasons. *Appetite*, *90*, 31-36.

Ramayah, T., Cheah, J., Chuah, F., Ting, H., & Memon, M. A. (2018). Partial least squares structural equation modeling (PLS-SEM) using smartPLS 3.0. *An Updated Guide and Practical Guide to Statistical Analysis*.

Ratner, R. K., & Kahn, B. E. (2002). The impact of private versus public consumption on variety-seeking behavior. *Journal of Consumer Research*, *29*(2), 246-257.

Reyes-Jurado, F., Soto-Reyes, N., Dávila-Rodríguez, M., Lorenzo-Leal, A. C., Jiménez-Munguía, M. T., Mani-López, E., & López-Malo, A. (2021). Plant-based milk alternatives: Types, processes, benefits, and characteristics. *Food Reviews International*, 1-32.

Rosenfeld, D. L., Bartolotto, C., & Tomiyama, A. J. (2022). Promoting plant-based food choices: Findings from a field experiment with over 150,000 consumer decisions. *Journal of Environmental Psychology*, 101825.

Rosenfeld, D. L., & Tomiyama, A. J. (2020). Taste and health concerns trump anticipated stigma as barriers to vegetarianism. *Appetite*, *144*, 104469.

Rubio, N. R., Xiang, N., & Kaplan, D. L. (2020). Plant-based and cell-based approaches to meat production. *Nature Communications*, *11*(1), 1-11.

Salehi, G. (2018). Exploring ethical purchase decision-making toward vegan food products. *Doctoral Degree Thesis, Comillas Pontifical University*, 67-84.

Schiano, A. N., Harwood, W. S., Gerard, P. D., & Drake, M. A. (2020). Consumer perception of the sustainability of dairy products and plant-based dairy alternatives. *Journal of Dairy Science*, *103*(12), 11228-11243.

Sethi, S., Tyagi, S. K., & Anurag, R. K. (2016). Plant-based milk alternatives an emerging segment of functional beverages: a review. *Journal of Food Science and Technology*, *53*(9), 3408-3423.

Sharp, B. (2018). How brands grow. NewsCo Group.

Smith, H. J., Milberg, S. J., & Burke, S. J. (1996). Information privacy: Measuring individuals' concerns about organizational practices. *MIS Quarterly*, 167-196.

Son, J., Jin, B., & George, B. (2013). Consumers' purchase intention toward foreign brand goods. *Management Decision*.

Spence, C., & Carvalho, F. M. (2020). The coffee drinking experience: Product extrinsic (atmospheric) influences on taste and choice. *Food Quality and Preference*, *80*, 103802.

Spiller, K. (2012). It tastes better because … consumer understandings of UK farmers' market food. *Appetite*, *59*(1), 100-107.

Starbucks. (2020, June). Plant-based menu innovation at Starbucks. Retrieved from https://stories.starbucks.com/stories/2020/plant-based-menu-innovation-at-starbucks. Accessed June 8, 2022.

Steenkamp, J., van Trijp, J. C. M., & Candel, M. (1993). *Consumentenreacties op de IKB propositie.*

Sweeney, J. C., & Soutar, G. N. (2001). Consumer perceived value: The development of a multiple item scale. *Journal of Retailing*, *77*(2), 203-220.

Szmukler, G. (2019). "Capacity", "best interests", "will and preferences" and the UN Convention on the Rights of Persons with Disabilities. *World Psychiatry*, *18*(1), 34-41.

Taebum, Y. O. O., & In-Jin, Y. (2015). Becoming a vegetarian in Korea: The sociocultural implications of vegetarian diets in Korean society. *Korea Journal*, *55*(4), 111-135.

Taillie, L. S., Higgins, I. C. A., Lazard, A. J., Miles, D. R., Blitstein, J. L., & Hall, M. G. (2022). Do sugar warning labels influence parents' selection of a labeled snack for their children? A randomized trial in a virtual convenience store. *Appetite*, *175*, 106059.

Tangyu, M., Muller, J., Bolten, C. J., & Wittmann, C. (2019). Fermentation of plant-based milk alternatives for improved flavour and nutritional value. *Applied Microbiology and Biotechnology*, *103*(23), 9263-9275.

Takahashi, R. (2021). How to stimulate environmentally friendly consumption: Evidence from a nationwide social experiment in Japan to promote eco-friendly coffee. Ecological Economics, 186, 107082.

The Vegan Society. (2022). Retrieved from https://www.vegansociety.com. Accessed June 20, 2022.

Tonkin, E., Wilson, A. M., Coveney, J., Webb, T., & Meyer, S. B. (2015). Trust in and through labelling–a systematic review and critique. British Food Journal.

Trijp, H. C. M. Van, Hoyer, W. D., & Inman, J. J. (1996). Why Switch? Product Category–Level Explanations for True Variety–Seeking Behavior. *Journal of Marketing Research*, *33*(3), 281–292.

Tsang, S., Royse, C. F., & Terkawi, A. S. (2017). Guidelines for developing, translating, and validating a questionnaire in perioperative and pain medicine. *Saudi Journal of Anaesthesia*, *11*(Suppl 1), S80.

Tuso, P. J., Ismail, M. H., Ha, B. P., & Bartolotto, C. (2013). Nutritional update for physicians: plant–based diets. *The Permanente Journal*, *17*(2), 61.

Twine, R. (2014). Vegan killjoys at the table—Contesting happiness and negotiating relationships with food practices. *Societies*, *4*(4), 623–639.

Tziva, M., Negro, S. O., Kalfagianni, A., & Hekkert, M. P. (2020). Understanding the protein transition: The rise of plant–based meat substitutes. *Environmental Innovation and Societal Transitions*, *35*, 217–231.

UEDA, H. (2017). Impact Evaluation of a School–based Food Education Intervention on Cognitive and Attitudinal Aspects of Children’s Dietary Habits A Case Study of a Sensory Education Program

"Leçon de Goût." *Journal of Food System Research*, *24*(1), 2-17.

Vainio, A., Niva, M., Jallinoja, P., & Latvala, T. (2016). From beef to beans: Eating motives and the replacement of animal proteins with plant proteins among Finnish consumers. *Appetite*, *106*, 92-100.

van de Grint, L. T. M., Evans, A. M., & Stavrova, O. (2021). Good eats, bad intentions? Reputational costs of organic consumption. *Journal of Environmental Psychology*, *75*, 101622.

Van Loo, E. J., Hoefkens, C., & Verbeke, W. (2017). Healthy, sustainable and plant-based eating: Perceived (mis) match and involvement-based consumer segments as targets for future policy. *Food Policy*, *69*, 46-57.

Vinnari, M., & Tapio, P. (2012). Sustainability of diets: From concepts to governance. *Ecological Economics*, *74*, 46-54.

Wang, E. S. T. (2013). The influence of visual packaging design on perceived food product quality, value, and brand preference. *International Journal of Retail & Distribution Management*.

Wee, C., Ta, S., & Cheok, K. (1995). Non-price determinants of intention to purchase counterfeit goods: an exploratory study. *International Marketing Review*.

Werts, C. E., Linn, R. L., & Jöreskog, K. G. (1974). Intraclass reliability estimates: Testing structural assumptions. *Educational and Psychological Measurement*, *34*(1), 25-33.

Williamson, D., Tregidga, H., Harris, C., & Keen, C. (2009). The working engines of distinction: Discourse for main course in restaurant

reviews. *Journal of Hospitality and Tourism Management*, *16*(1), 55-61.

Wood, R. C. (1996). Talking to themselves: food commentators, food snobbery and market reality. *British Food Journal*.

Xuhui, W., Muhammad, A., & Ayyub, S. (2019). Determinants of consumption intention of Chinese cuisines for foreigners: the mediating role of variety seeking behavior. *International Journal of Culture, Tourism and Hospitality Research*, *12*(2), 213-222.

Yazdanpanah, M., Forouzani, M., & Hojjati, M. (2015). Willingness of Iranian young adults to eat organic foods: Application of the Health Belief Model. *Food Quality and Preference*, *41*, 75-83.

Ye, T., & Mattila, A. S. (2021). The effect of ad appeals and message framing on consumer responses to plant-based menu items. International Journal of Hospitality Management, 95, 102917.

Yoh, E. (2018). Determinants of purchase intention for vegan fashion products-Application of the modified planned behavior model. *The Research Journal of the Costume Culture*, *26*(2), 125-139.

Zhang, T., & Zhang, D. (2007). Agent-based simulation of consumer purchase decision-making and the decoy effect. *Journal of Business Research*, *60*(8), 912-922.

# 국 문 초 록

최근 환경 및 지속가능성, 개인건강, 동물복지 이슈 등에 대한 관심이 높아지면서 식물성 대체음료의 수요는 증가하고 있다. 본 연구에서는 식물성 대체음료의 소비에 영향을 미치는 주요 요인을 분석한다. 에세이 1은 기존의 소 우유와 식물성 우유에 따라 소비 상황, 소비자 특성, 식품 페어링 패턴이 어떻게 달라지는 것을 탐색하기를 목적으로 한다. 이를 위해 본 연구(Main study)와 후속 테스트(Follow-up tests)을 위해 푸드다이어리 데이터를 활용하였다. 본 연구는 프로빗 모델을 통해 우유/식물 기반 우유의 소비자 특성과 음주 상황을 분석한다. 후속 테스트는 의사결정나무 분석을 통해 기존 우유/식물성 우유와 함께 주로 어떤 종류의 음식을 섭취하는지 조사한다. 그 결과 식물성 우유를 더 많이 마시는 소비자들은 우유를 마시는 소비자들에 비해 나이가 많고, 여성이 많고, 가족 구성원이 적으며, 어린 아이들보다 성인 자녀를 낳고, 소득이 낮고, 수도권에 거주할 가능성이 더 높은 것으로 나타났다. 또한, 우유의 음용 상황에 비해 식물성 우유의 음용 상황은 이동 중에 발생할 가능성이 높다. 식물성 우유를 마실 때 달걀, 바나나, 고구마, 견과류를 함께 먹는 반면, 우유를 마실 때는 시리얼, 바나나, 다양한 종류의 빵을 함께 먹는 경향이 있다. 이러한 발견은 마케팅 담당자와 영양 관련 실무자들이 식물성 우유와 관련된 마케팅 전략 및 식생활 가이드라인을 개발할 수 있는 발판을 제공한다. 본 연구는 우유와 식물성 우유의 식품 페어링 패턴을 비교한 최초의 실증 연구로, 식품 페어링 연구의 범위를 방법으로 확장하였다. 에세이2는 식물성 원료의 대체 우유를 이용한 라떼 구매의도에 영향을 미치는 요인을 찾고, '비건 라떼'와 '식물성 라떼'라는 두 가지 라벨에 따라 요인과 구매의도 간의 연관성을 비교하는 것을 목적을 목적으로 한다. 문헌 검토를 바탕으로 지각된 건강/지속가능성/평판적 이익, 음식 속물 성향, 음식 호기심, 음식 다양성 추구, 채식주의자 낙인 등 식물 기반 라떼의 구매 의도에 영향을 미치는 선행 요인을 제안한다. 온라인과 시나리오 기반의 실험을 피실험자 간 설계로 수행한 후 설문조사를 실시하였고, 실험에는 두 가지 '비건(Vegan)'과 '식물성(Plant-

based)'이라는 각기 다른 라벨이 사용되었다. 두 그룹 모두에서 인식된 이익은 구매 의도에 긍정적으로 유의한 영향을 미치지만 인식된 장벽(즉, 채식주의자 낙인)은 그렇지 않다는 것을 보여준다. 동물성 재료가 없는 것에 초점을 맞춘 '비건 라떼' 라벨을 보여줄 때보다 식물성 재료의 존재에 초점을 맞춘 '식물성 라떼' 라벨을 보여줄 때 인지된 이점과 선호도가 더 높다. 다만 라벨에 따라 구매의도에 큰 차이는 없다. '비건 라떼'라는 라벨의 경우 소비자가 비건이 아니더라도 음식에 대한 호기심, 음식 속 물 근성, 음식 다양성 추구 성향이 높을수록 구매의도가 높았다. 따라서 비건 인증은 구매의도를 증가시키는 마케팅 방안으로서 효과가 있을 수 있다. 본 연구는 대체 우유를 활용한 라떼 판매를 활성화하기 위해 마케팅 담당자와 메뉴 개발자들에게 어떤 점을 부각시켜야 하는지, 어떤 소비자를 공략해야 하는지 제안한다. 또한 특정 라벨이 대체 우유를 사용하는 라떼의 구매 의도를 촉진할 수 있는 가능성을 강조하여 소비자 행동을 변화시킬 수 있는 전략을 제시한다.