

UNIVERSITY OF LJUBLJANA
SCHOOL OF ECONOMICS AND BUSINESS

MASTER'S THESIS

**CONSUMER WILLINGNESS TO PAY FOR PLANT-BASED DAIRY
ALTERNATIVES IN SLOVENIA**

AUTHORSHIP STATEMENT

The undersigned Bogdan Perić, a student at the University of Ljubljana, School of Economics and Business, (hereafter: UL SEB), author of this written final work of studies with the title Consumer willingness to pay for plant-based dairy alternatives in Slovenia, prepared in collaboration with mentor assoc. prof. Tamara Pavasović Trošt, PhD

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ABSTRACT

Plant-based dairy alternatives (PBDAs) are becoming increasingly popular due to their health benefits, environmental sustainability, unique taste, and enhanced nutritional value. This thesis aims to identify consumers' willingness to pay (WTP) for PBDAs and its associations with socio-demographic factors, consumer attitudes, and product attributes. This thesis uses the payment card approach to calculate consumers' WTP for PBDAs. Findings show that age is negatively associated with consumers' WTP, while income and education levels are positively associated with consumers' WTP for PBDAs. Health consciousness, environmental concerns, animal welfare concerns, and food curiosity are positively associated with consumers' WTP, while food neophobia is negatively associated with consumers' WTP. Taste, origin, and environmental certification are positively associated with WTP, while price importance is negatively associated with it. The results of this thesis provide insight that benefits a wide spectrum of stakeholders, including producers, retailers, marketers, and policymakers.

KEY WORDS: willingness to pay, plant-based dairy alternatives, price, consumer behavior

SUSTAINABLE DEVELOPMENT GOALS



POVZETEK

Rastlinske alternative mlečnim izdelkom (PBDAs) postajajo vse bolj priljubljene zaradi svojih zdravstvenih koristi, okoljske trajnosti, edinstvenega okusa in višje hranilne vrednosti. Namen te magistrske naloge je ugotoviti pripravljenost plačati (WTP) za PBDAs in njeno povezavo s sociodemografskimi značilnostmi, stališči potrošnikov in lastnostmi izdelkov. Raziskava uporablja pristop plačilne lestvice (payment card approach) za izračun pripravljenosti potrošnikov za plačilo za PBDAs. Rezultati kažejo, da starejši potrošniki izražajo nižjo pripravljenost za plačilo, medtem ko potrošniki z višjim dohodkom in stopnjo izobrazbe izkazujejo večjo pripravljenost. Potrošniki z višjo zdravstveno ozaveščenostjo, večjo okoljsko skrbjo, skrbjo za dobrobit živali ter večjo prehransko radovednostjo izražajo višjo pripravljenost za plačilo, medtem ko tisti s prehransko neofobijo izražajo nižjo. Okus, poreklo in okoljski certifikat povečujejo pripravljenost za plačilo, medtem ko pomembnost cene nanjo vpliva negativno. Ugotovitve raziskave ponujajo dragocene vpoglede za širok krog deležnikov, vključno s proizvajalci, trgovci, tržniki in oblikovalci politik.

KLJUČNE BESEDE: pripravljenost za plačilo, rastlinske alternative mlečnim izdelkom, cena, vedenje potrošnikov

CILJI TRAJNOSTNEGA RAZVOJA



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LIST OF ABBREVIATIONS

1KA – (sl. EnKlikAnketa); OneClickSurvey (Slovene online survey tool)

AVE – (sl. povprečna pojasnjena variance); Average Variance Extracted

bn – billion (sl. milijarda)

CAGR – (sl. povprečna letna stopnja rasti); Compound Annual Growth Rate

CR – (sl. sestavljena zanesljivost); Composite Reliability

EU – (sl. Evropska unija); European Union

GHGE – (sl. emisije toplogrednih plinov); Greenhouse Gas Emissions

m – million (sl. milijon)

NGO – (sl. nevladna organizacija); Non-Governmental Organization

PBBA – (sl. rastlinske alternative mlasu); Plant-Based Butter Alternatives

PBCA – (sl. rastlinske alternative siru); Plant-Based Cheese Alternatives

PBCRA – (sl. rastlinske alternative smetani); Plant-Based Cream Alternatives

PBDA – (sl. rastlinske alternative mlečnim izdelkom); Plant-Based Dairy Alternatives

PBIA – (sl. rastlinske alternative sladoledu); Plant-Based Ice Cream Alternatives

PBMA – (sl. rastlinske alternative mleku); Plant-Based Milk Alternatives

PBYA – (sl. rastlinske alternative jogurtu); Plant-Based Yogurt Alternatives

SDG – (sl. cilji trajnostnega razvoja); Sustainable Development Goal(s)

sl. – Slovene

TPB – (sl. teorija načrtovanega vedenja); Theory of Planned Behavior

UN – (sl. Združeni narodi); United Nations

WTP – (sl. pripravljenost na plačilo); Willingness to Pay

WTPM – (sl. pripravljenost na plačilo več); Willingness to Pay More

1 INTRODUCTION

The growing focus on sustainability has significantly influenced consumer behavior, particularly in the food industry. European consumers are increasingly opting for plant-based dairy alternatives (hereinafter: PBDAs), which fall into five broad groups: cereal-based (rice and oat), legume-based (pea and soy), vegetable-based (potatoes), seed-based (flax and hemp), and nut-based (almond, coconut, and cashew). These alternatives include milk, yoghurt, cheese, butter, cream, ice cream, and other types of desserts (Adamczyk et al., 2022).

The concept of PBDAs is often characterized as a modern phenomenon, tightly connected with a healthy lifestyle and sustainability. Their roots, however, date back to ancient times, with one of the first recorded uses of PBDAs in China during the early years of the Han Dynasty. The first commercialized PBDA was soymilk, founded by the Chinese biologist Li Yu-Ying in Paris in 1910. The 1960s were the most important milestone due to the introduction of new packaging for soy milk and the removal of the enzyme that gave off the unpleasant beany taste. Today, numerous companies are producing plant-based milk alternatives, constantly innovating by adding different flavors and making them more palatable for a wider customer base (Linné & McCrow-Young, 2017; Herring, 2024).

According to Global Monitor (2025), consumer preferences in the Slovenian dairy sector are shifting toward PBDAs, with the growing popularity of veganism and the increasing incidence of lactose intolerance. There has also been a significant increase in marketing activities, the intensity of competition, and price sensitivity in the Slovenian market. The Slovenian market currently offers a wide range of PBDAs, including milk, yogurt, cheese, cream, butter, ice cream, and desserts. Milk alternatives are the most prominent, including soy, almond, oat, rice, coconut, spelt, and pistachio. Yogurt alternatives are gaining importance, while cheese, cream, and dessert alternatives have potential for penetration.

The rising interest in plant-based foods is driven by growing awareness of both individual well-being and environmental sustainability. Diets that are particularly heavy in animal products cause significant greenhouse gas emissions (hereinafter: GHGEs), freshwater use, and energy use. In order to achieve the UN Paris Agreement's objective of no more than 2 °C increase over pre-industrial levels (United Nations, 2015), dietary shifts are recommended, especially in high-income nations where reduced meat and dairy consumption is crucial (Viroli et al., 2023). According to Kozicka et al. (2023), replacing 50% of meat and milk products with plant-based alternatives by 2050 may result in a 31% decrease in GHGEs from agriculture and land usage while also halting the deforestation and destruction of natural land. According to Carlsson Kanyama et al. (2021), compared to dairy products, PBDAs have a smaller negative impact on the environment when it comes to GHGEs, land, water, and energy use, as well as emissions of acidifying, eutrophication, and ozone-depleting substances.

The regulatory framework for PBDAs in the European Union (hereinafter: EU) is very strict. Namely, the current EU regulation regarding PBDAs prohibits the use of the term “milk” in marketing or product claims. This regulation is often criticized for its strict labels, asymmetric rules for different sectors, and lack of regulations for vegetarian and vegan food. However, exceptions exist for nut-based spreads and coconut milk and cream, as they possess specific characteristics (Leialohilani & De Boer, 2020). Interestingly, the EU school milk scheme, which supports dairy distribution in schools, is part of this regulation. Overall, the exclusion of PBDAs from school programs and the limitations on their naming in the EU are discriminatory and hinder progress towards sustainable goals.

Understanding consumers’ willingness to pay (hereinafter: WTP) goes beyond price sensitivity, encompassing attitudes, drivers, and barriers that influence choices. The Theory of Planned Behavior (hereinafter: TPB) posits that behavior is guided by intention, but shaped by attitudes, subjective norms, and perceived control. Since attitudes strongly predict intentions, consumer attitudes towards PBDAs play a major role in purchasing decisions and willingness to pay (Ajzen, 2015). Drivers for purchasing PBDAs include health consciousness (Rombach et al., 2023; Su et al., 2024; Martínez-Padilla et al., 2023; Mäkinen et al., 2015), environmental concerns and animal welfare (Haas et al., 2019; Rombach et al., 2023; Su et al., 2024), curiosity and diet diversification (Adamczyk et al., 2022; Ammann et al., 2023), as well as convenience, availability, and social influence (Hansen et al., 2023; Kuosmanen et al., 2025). On the other hand, barriers include sensory properties (Adamczyk et al., 2022; Hansen et al., 2023; Östlund et al., 2024), high price (De Castro Carvalho et al., 2025; Hansen et al., 2023; Adamczyk et al., 2022), and dairy attachment linked to culture and memories (Haas et al., 2019; Philippi Rosane et al., 2025).

Yet research on WTP for PBDA remains limited. The existing studies mostly focus on consumer WTP for plant-based milk alternatives (Madududu et al., 2024; Rombach et al., 2023; Su et al., 2024; Wang et al., 2025). They show that WTP is shaped by socio-demographic factors, health consciousness, environmental awareness, animal welfare, taste, and curiosity (Su et al., 2024; Rombach et al., 2023; Wang et al., 2025). However, price and familiarity remain critical barriers, significantly reducing WTP (Szczepanski et al., 2025; Laassal & Kallas, 2019). Moreover, the literature has indicated that consumer perception and WTP vary significantly between geographical regions and the demographic characteristics of the studied population (Rombach et al., 2023; Adamczyk et al., 2022; Mekanna et al., 2024; Hansen et al., 2023). There is an overconcentration of research on solely plant-based milk alternatives, ignoring the rest of the PBDA industry. Also, there is a lack of research on Slovenian consumers’ perceptions and WTP for PBDAs. Therefore, this thesis will fill the numerous gaps in the literature, offering an expanded understanding of the topic.

The purpose of this thesis is thus to develop a comprehensive understanding of Slovenian consumers’ WTP for PBDAs. It offers insight that benefits a wide spectrum of stakeholders, including producers, retailers, marketers, and policymakers. Last but not least, the study also

contributes to the development of knowledge that supports long-term sustainability objectives within Slovenia's food system.

The goals of the thesis are:

- To determine how key drivers of customers' adoption and consumption of PBDAs are associated with their WTP.
- To determine how key barriers to customers' adoption and consumption of PBDAs are associated with their WTP.
- To determine how product attributes are associated with the consumers' WTP for PBDAs.
- To estimate Slovenian consumers' WTP for PBDAs.
- To provide recommendations to food industry stakeholders, marketers, and policymakers.
- To compare the key factors influencing purchasing decisions and WTP of consumers in the Slovenian market with the results of available research from foreign markets.

The research questions of the thesis are:

RQ1: How are demographic and socioeconomic factors (age, education, and income level) associated with willingness to pay for plant-based dairy alternatives in Slovenia?

RQ2: What psychographic factors (motivations and barriers) are associated with Slovenian consumers' willingness to pay for plant-based dairy alternatives?

RQ3: Which product attributes are associated with Slovenian consumers' willingness to pay for plant-based dairy alternatives?

The main method for primary data collection in this thesis is an online survey. The survey was created using the OneClick Survey (hereinafter: 1KA) online tool for its convenience, ease of use, and flexibility. The questionnaire consisted of 6 sections and 20 questions, focusing on consumption, behavioral patterns, drivers, barriers, importance of product attributes, WTP, and socio-demographic data. In total, 338 participants took part in the survey, comprising 305 PBDA users and 33 non-users.

The structure of the thesis is divided into two main parts: the theoretical review and the empirical part. The first part consists of three chapters. The first chapter provides a definition of the PBDAs, a historical overview of PBDAs' development, as well as the trends in the global and Slovenian markets. The second chapter in this part provides a broad outline of regulatory and environmental frameworks, discussing regulations regarding PBDAs and differences in environmental aspects of dairy compared to PBDAs. The third chapter provides an overview of consumer attitudes towards PBDAs, systematically analyzing the drivers, barriers, and WTP for PBDAs. The second part is divided into three chapters: research methodology, results, and discussion. The fifth chapter, research methodology,

explains the definition and operationalization of WTP, discusses the model to be used for measuring WTP, research purpose and goals, research questions and hypotheses, defines methods used for gathering and analyzing the data, the methods of hypothesis testing, and lastly, demographic characteristics of the sample. The sixth chapter, results and analysis, provides the results of the descriptive statistics, hypothesis testing, and a summary of the main findings. The seventh chapter, discussion, provides the discussion of the main findings, practical implications, recommendations, limitations, and suggestions for further research.

2 THE PLANT-BASED DAIRY MARKET

The growing focus on sustainability has significantly influenced consumer behavior, especially in the food industry. Dietary habits in Europe are changing, with an increased number of consumers opting for PBDAs (Adamczyk et al., 2022). Even though PBDAs seem to be a new concept, their historic roots date back to ancient times. However, this industry experienced a boom only in the last couple of decades. With the increasing environmental and health awareness, consumers are also increasingly showing preferences towards PBDAs. This chapter will define the scope of PBDAs, trace their historical development, and examine current global and Slovenian market trends.

2.1 Definition of plant-based dairy alternatives

By definition, PBDAs are goods essentially based on plants that strive to provide similar features to animal-based dairy products while differing in sensory properties (Hansen et al., 2023). PBDAs fall into five broad groups: cereal-based (rice and oat), legume-based (pea and soy), vegetable-based (potatoes), seed-based (flax and hemp), and nut-based (almond, coconut, and cashew). These alternatives include milk, yoghurt, cheese, butter, cream, ice cream, and other types of desserts (Adamczyk et al., 2022).

Plant-based milk alternatives (hereinafter: PBMA) are the most developed and consumed type of PBDAs. PBMA are usually produced through milling, extraction, homogenization, and fortification with vitamins and minerals. Plant-based yogurt alternatives (hereinafter: PBYA) are made mostly from soy, almond, and coconut milk. PBYA are typically obtained through the process of fermenting milk with lactic acid using starter microorganisms. Plant-based cheese alternatives (hereinafter: PBCA) are most commonly made from soy but can also be made using other legumes and nuts. PBCA are a category that struggles with consumer acceptance since it is hard to achieve the desired mouthfeel. Plant-based cream alternatives (hereinafter: PBCRA) are oil-in-water emulsions made from vegetable fats to mimic dairy creams. Plant-based butter alternatives (hereinafter: PBBA) have become popular as a healthier substitute for dairy butter. Out of all PBBA available on the market, peanut butter is claimed to be the most popular worldwide. Plant-based ice cream alternatives (hereinafter: PBIAs) are gaining popularity due to nutritional benefits, including low calories, protein content, and amino acid balance. Additionally, other plant-

based desserts have emerged recently as well. These products are usually made by combining PBMAAs with fresh fruit and fruit juices. The product range includes panna cotta, pudding, cheesecake, kulfi, and custard (Plamada et al., 2023).

Unlike traditional dairy, the nutritional properties of PBDAs vary greatly, depending on the type of raw material, fortification, and processing (Mäkinen et al., 2015). Despite this, Craig et al. (2023) argue that PBDAs exhibit similar or better nutritional quality than dairy products. Their study found that replacing dairy products causes minimal nutritional changes while significantly reducing environmental impact. Moreover, PBDAs contain a nutritionally sufficient amount of protein, iodine, essential minerals, as well as vitamins B2 and B12.

In the last decade, PBDAs have reached high market penetration. What started as food for people with lactose intolerance and milk allergy is now becoming a lifestyle instrument, consumed not only because of dietary restrictions but also individual beliefs. Nowadays, PBDAs are used in a variety of settings, such as coffee, cooking, baking, as a drink, for cereals, and for oatmeal (Haas et al., 2019). The PBDA industry is highly dynamic, constantly developing new products, fermentation techniques, flavors, and textures. The diversified variety of PBDAs has actually motivated consumers who seek a new spectrum of flavors and want to diversify their diets (Adamczyk et al., 2022).

2.2 Historical development of plant-based dairy alternatives

The concept of PBDAs is often characterized as a modern phenomenon, tightly connected with a healthy lifestyle and sustainability. Yet its roots date back to ancient times. One of the first recorded uses of PBDAs was discovered in the early years of the Han Dynasty in China. Namely, in the period between 202BC and AD 9, people were grinding and mixing soybeans with water to get soy milk in order to produce tofu. Even though tofu is nowadays categorized as a plant-based meat alternative, back then, it was perceived as a dairy alternative. In the Middle East, people started using almond milk in their culinary practices. A cookbook from 1226 found in present-day Iraq is the first documented use of PBDAs (Linné & McCrow-Young, 2017).

One of the earliest records of PBDAs in Europe was almond milk. In the fourteenth century, the Christian church enforced strict restrictions related to fasting, especially during Lent. Since the consumption of animal-based food was forbidden, the monastic kitchen started importing almond milk and paste from the Middle East. Due to its rich taste, almond milk quickly became a luxury product, often used by the upper classes in the medieval period. Aside from almond milk, walnut and hazelnut milk were also used as dairy alternatives at that time (Herring, 2024).

Although PBDAs are not a new idea themselves, their everyday use is a much newer concept. Regular use began in China in the late eighteenth century when soy milk became a traditional

drink that is usually served warmed and sweetened for breakfast. In the late nineteenth century, these traditional practices were transformed into commodities due to industrialization. According to Charvatova (2023), the first commercialized PBDA was soy milk, founded and patented by the Chinese biologist Li Yu-Ying in Paris in 1910.

The 1960s were a major turning point for PBMA. Namely, two important milestones took place in that period. First, the Singaporean company Benavit started using aesthetic packaging for soy milk. This packaging, which is known as Tetra Pak, was not only visually appealing but also helped the drink to last for up to a couple of months in storage. The second milestone was the technological innovation of removing the enzyme that gave off the unpleasant beany taste. Soon after, numerous companies that started producing PBMA started adding different flavours, making it more palatable for Western societies (Linné & McCrow-Young, 2017).

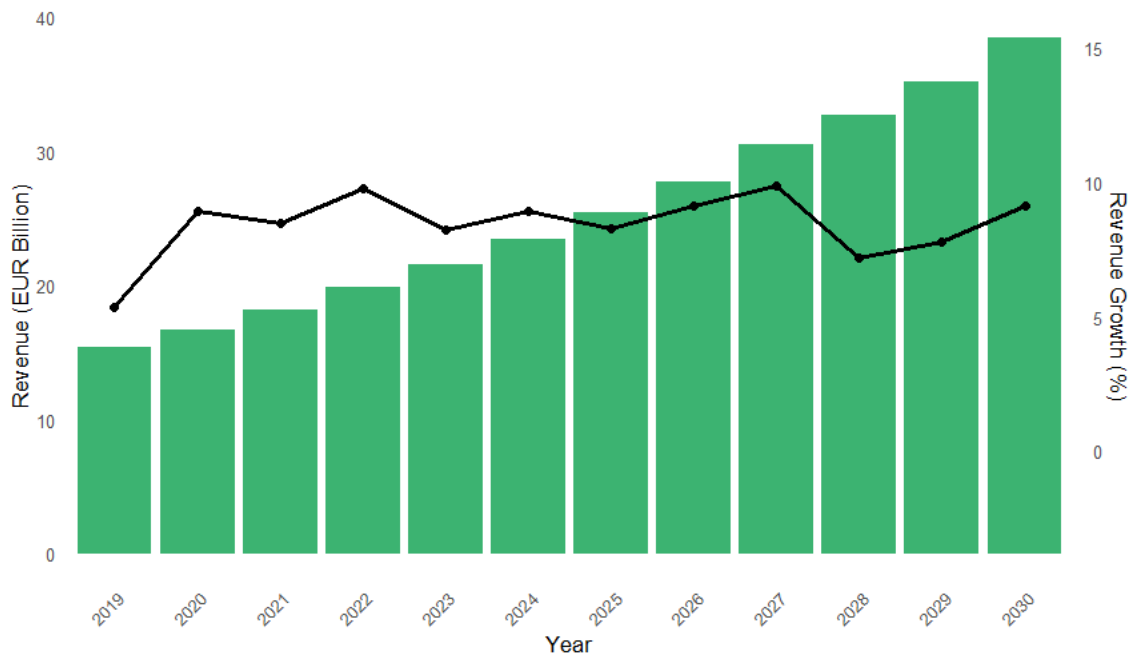
In the late twentieth century, PBMA began to be widely commercialized, with numerous companies entering the market. The process of commercialization was accompanied by yet another technological milestone. Namely, producers started using ultra-high temperature treatment together with homogenisation in order to improve suspension (Mäkinen et al., 2015). It is important to note that all other PBDAs have gained popularity only after PBMA. Thus, plant-based cheese, yoghurt, butter, ice cream, and other dairy alternatives are relatively new inventions that at first gained momentum in the twentieth century due to dietary restrictions. The majority of multinational companies in this sector started producing PBMA at the very beginning and then diversified into other dairy segments. Today, PBDAs include numerous plant options for different consumer preferences, far beyond soy and almond, including oat, rice, walnut, hazelnut, pea, pistachio, cashew, hemp, banana, quinoa, spelt, sesame, peanut, macadamia, and potato.

2.3 Trends in the global plant-based dairy market

Despite traditional dairy products still having a significant market share, PBDAs have gained popularity in recent years. The Asia-Pacific region is the largest market for PBMA, with a revenue more than double that of North America. On the other hand, Europe and North America are notably larger markets for other PBDAs. Yet the overall consumption of PBMA vastly exceeds the consumption of other PBDAs across the world, with PBMA consumption being over 20 times higher than the combined PBYAs and PBCAs (Wunsch, 2024).

Figure 1 represents the revenue and revenue growth of the PBDA industry worldwide. The revenue reached €21.81 bn in 2024, with a growth of almost 9% compared to the previous year. The expected total revenue in the PBDA industry globally is €23.61 bn for 2025, while the market is expected to continue its growth with periodic ups and downs between 2025 and 2030, reaching €35.73 bn by 2030.

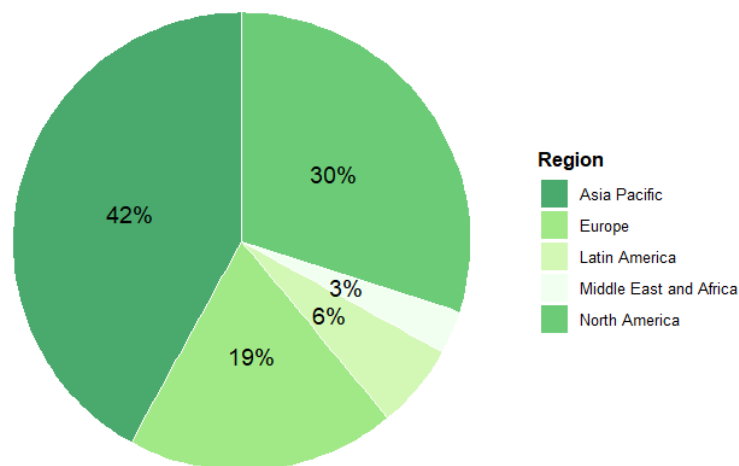
Figure 1: Global plant-based dairy market revenue and growth 2019 to 2030



Source: adapted from Wunsch (2024).

Figure 2 represents the distribution of market shares by regions. The Asia Pacific region has the highest market share, with 42% in 2024, valued at €11.27 bn, and expected to reach €32.66 bn by 2034. North America follows with 30%, driven by the popularity of flavored milk and the growing demand for PBDAs in schools. Europe is experiencing rapid growth due to increased demand for healthy foods and beverages, with a notable rise in PBDAs consumption (Pandey & Shivarkar, 2025).

Figure 2: Global plant-based dairy alternatives market share by region in 2024



Source: adapted from Pandey & Shivarkar (2025).

According to Belderok et al. (2025), the rise of PBDAs is driven by shifting customer preferences for health, sustainability, and ethics, as well as premium product appeal. Strategic investments from major corporations such as Danone and Nestlé are also signaling the importance and potential of the PBDA industry. Namely, according to Pulidindi and Ahuja (2025), these companies are shifting focus and considerable funds toward enhancing the product quality and nutritional value of their oat and pea products. As large food manufacturers enter the PBDA industry, they improve product quality, expand production capacity, and consequently make PBDAs more competitive with traditional dairy in terms of quality and pricing. This has encouraged retailers and hospitality businesses to include more PBDAs in their assortments, further mainstreaming the consumption of PBDAs. Based on all these trends, there is no doubt that PBDAs will continue positive growth trajectory and play a crucial role in the global transition toward sustainable food systems.

2.4 Trends in Slovenia's plant-based dairy alternatives market

Consumer preferences in the Slovenian dairy sector are increasingly shifting toward PBDAs, with the growing popularity of veganism and the increasing incidence of lactose intolerance. While PBMAAs have been the most prominent, PBYAs and PBCAs have recently also gained notable popularity. There has also been a significant increase in marketing activities, the intensity of competition, and price sensitivity in the Slovenian market. The emergence of e-commerce has additionally boosted sales of PBDAs since the overall availability on the market is improving. As customers grow more health-conscious and environmentally aware, competition in the PBDA industry is projected to heat up, spurring innovation and product development (Global Monitor, 2025).

According to Statista (n.d.-a), the expected total revenue in the PBMA market in Slovenia is €7.42 m for 2025, while the market is expected to grow annually by 16.39% (CAGR 2025-2030), reaching €15.9 m by 2030. When it comes to PBYAs in Slovenia, the expected total revenue is €1.58 m for 2025, while the market is expected to grow at a CAGR of 3.58% between 2025 and 2030 (Statista, n.d.-b). PBCAs in Slovenia have the expected revenue of €0.7 m for 2025, with expected annual growth of 10.99% CAGR between 2025-2030 (Statista, n.d.-c).

Table 1 provides an overview of the PBDAs currently available on the Slovenian market. The price data was collected among the four largest Slovenian retailers during September 2025. PBMAAs represent the widest and most established category, where consumers have multiple plant options, including soy, almond, oat, rice, coconut, spelt, and pistachio. These are available from numerous companies, including both multinational companies and private labels. The typical price range is between €1.49 and €4.11 per liter. Certain retailers sell a private-label soy milk for €0.89, but since this represents just one product, it is treated as an outlier. PBYAs are dominated by soy products, with some oat and coconut-based options available. The typical price range is hard to estimate because some products are packaged in

grams and others in milliliters, but it usually ranges between €0.99 and €3.99. PBCAs are a relatively small category in the Slovenian market, and they have great potential for penetration. Currently, PBCAs come in several formats (slices, blocks, and spreads), and are usually priced between €2.59 and €4.99. PBCRAs consist of a relatively wide range of plant-based options, including soy, oat, rice, and coconut. There are two types of PBCRAs on the market (for whipping and cooking), with a price range between €1.19 and €3.39. PBBAs cover a wide price spectrum, from low-cost private labels to premium brands, and have the widest distribution. Their prices vary between €0.62 and €5.49. PBIAs seem to be the most innovative, with numerous options available, despite limited distribution. Their price range is between €1.39 and €3.39. Plant-based dessert alternatives represent the smallest category, dominated by rice and soy. Since these mostly come in a multipack, the price range is higher, between €2.69 and €9.29.

Table 1: Availability of plant-based dairy alternatives in Slovenia

Category	Plant bases available	Typical price range (€)	The average price (€)	Key brands
Milk alternatives	Soy, Almond, Oat, Rice, Coconut, Spelt, Pistachio	1.49 – 4.11 €/L	€2.59	Alpro, Valsoia, Isola Bio, Scotti, The Bridge, Boom Box, Private Labels
Yoghurt alternatives	Soy (dominant), Oat, Coconut	0.99 – 3.99 €/150–400 g	€2.40	Alpro, Valsoia, Sojade, My Love My Life, Private Labels
Cheese alternatives	Soy/coconut oil blends	2.59 – 4.99 €/150–250 g	€3.25	Violife, GreenVie, Bedda, Private Labels
Cream alternatives	Soy, Oat, Rice, Coconut, Mixed oils	1.19 – 3.39 €/200–500 ml	€2.05	Valsoia, Isola Bio, The Bridge, Hulala, Alinor, Private Labels
Butter alternatives	Mixed plant oils (soy, sunflower, rapeseed)	0.62 – 5.49 €/200–500 g	€1.98	Rama, Becel, Zvijezda, Vitaquell, Margo, Private Labels
Ice cream alternatives	Soy, Rice	1.39 – 3.99 €/200–400 g	€2.22	Alpro, Valsoia, Sojade, The Bridge, My Love My Life, Private Labels
Dessert alternatives	Soy, Almond, Oat, Rice, Cashew, Pistachio	2.69 – 9.29 €/multipack or tub	€4.93	Valsoia, Carte d'Or, Gelatissimo, Private Labels

Source: own work.

3 ENVIRONMENTAL AND REGULATORY FRAMEWORK

Research suggests that dietary shifts, including a reduction in the consumption of animal-based foods, can contribute to climate-change mitigation (Carlsson Kanyama et al., 2021). In this context, PBDAs have significant potential for achieving sustainable goals and preserving the environment. In the PBDA industry, the environmental dimension and the regulatory dimension are deeply intertwined. This chapter will compare the environmental aspects of dairy and PBDAs and examine the current European regulatory framework for PBDAs.

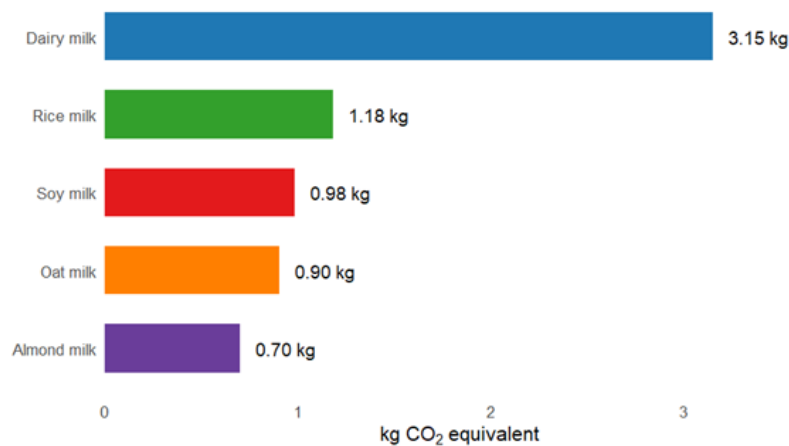
3.1 The environmental aspects of dairy and plant-based dairy alternatives

In the past few decades, there has been an ongoing debate about the environmental aspects of food production. Both dairy and PBDAs are based on fossil energy requirements, meaning they both have an environmental impact to some extent. However, there is no doubt that animal-based dairy has a higher impact on the environment due to higher consumption rates. This can be attributed to the inherently higher resource intensity and emissions required for dairy production systems. According to Kozicka et al. (2023), replacing 50% of meat and milk products with plant-based alternatives by 2050 may result in a 31% decrease in GHGs from agriculture and land usage while also halting the deforestation and destruction of natural land. Diets that are heavy in animal products cause significant GHGs, freshwater use, and energy use. These environmental issues highlight the need for more sustainable food systems. Therefore, coordinated global action is required to decrease GHGs to the UN Paris Agreement's objective of no more than 2 °C over pre-industrial levels (United Nations, 2015).

3.1.1 Greenhouse gas emissions

One of the most notable differences between dairy and PBDAs is their GHGs. Figure 3 shows GHGs in kilograms of CO₂-equivalent per liter of milk. Thus, dairy milk produces over three times more GHGs than most PBMA, with emissions of 3.15 kg CO₂ equivalent per liter compared to 0.7–1.18 kg CO₂ equivalent per liter for rice, soy, oat, and almond milks. Carlsson Kanyama et al. (2021) compared GHGs associated with other dairy categories, including cheese, milk-based spreads, cream, and yoghurt. PBDAs consistently demonstrate significantly lower environmental impacts. Similarly, Ramsing et al. (2023) argue that GHGs associated with PBMA are 62–78% lower than those associated with cow's milk. These findings imply that substituting dairy products with PBDAs can substantially reduce total emissions within the food sector, contributing to the achievement of global climate targets.

Figure 3: Greenhouse gas emissions of dairy and selected plant-based milk alternatives

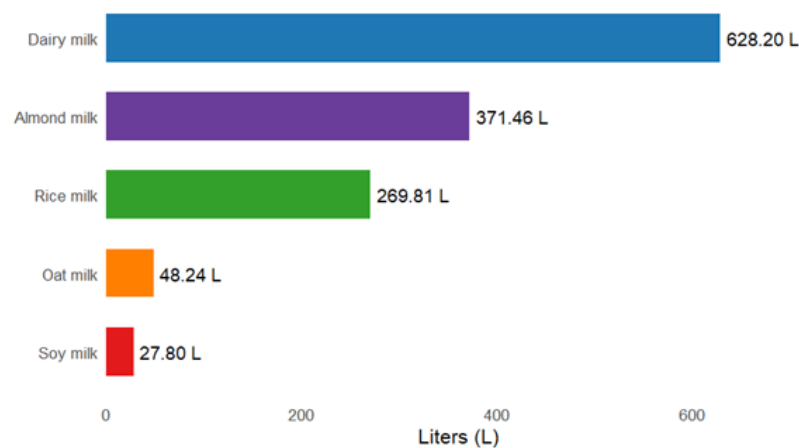


Source: adapted from Poore & Nemecek (2018).

3.1.2 Water usage

Water usage is the most controversial area when it comes to PBDAs. According to Carlsson Kanyama et al. (2021), the production of almond dairy alternatives can lead to much higher water use compared to dairy. Almost 80% of almonds in the world are produced in California, which causes serious water stress (Haas et al., 2019). This large-scale irrigation required for cultivation raises concerns about the long-term sustainability of almond-based products. On the other hand, Poore and Nemecek (2018) argue that dairy milk causes the highest water usage. Figure 4 indicates that milk is by far the most water-intensive, requiring approximately 628 liters of water per liter of milk produced. According to Ramsing et al. (2023), PBCRAs use 17-74% less water than dairy ones, while PBCAs have almost the same water usage as dairy ones.

Figure 4: Freshwater use for dairy milk and selected plant-based milk alternatives

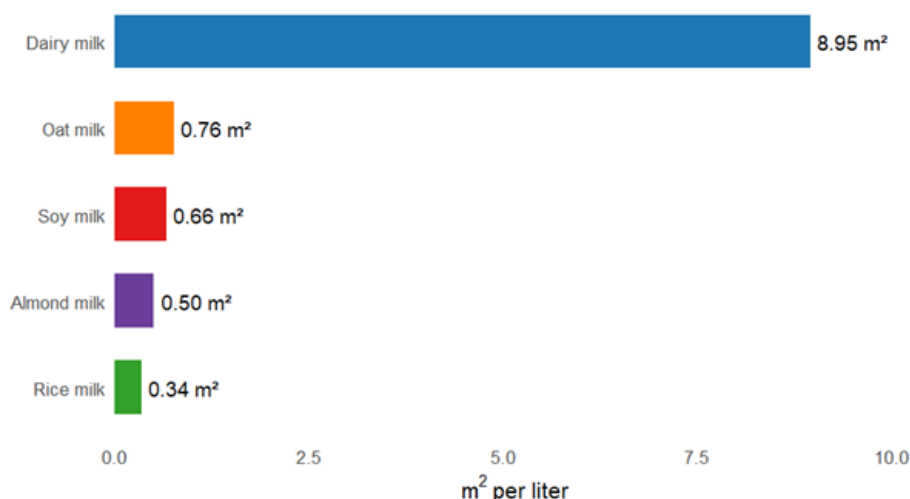


Source: adapted from Poore & Nemecek (2018).

3.1.3 Land use and biodiversity

Figure 5 suggests that the production of one liter of milk requires 8.95 m² of land, while PBMAAs use almost ten times less land. Since fertile land is a scarce resource, optimizing its use is crucial for reaching sustainable goals (Mäkinen et al., 2015). Extensive land usage also leads to deforestation and irreversible biodiversity loss since the decrease in available fertile land significantly stresses ecosystems. Interestingly, Carlsson Kanyama et al. (2021) argue that even though animal husbandry is often negatively associated with biodiversity, in some cases, it can also be necessary for preserving biodiversity in some areas if used correctly. Furthermore, Ramsing et al. (2023) found that PBCRAs use 58% of the land needed to produce dairy cream, while PBYAs use 42% of the land needed to produce dairy yoghurt. That being said, PBDAs have lower land usage and contribute less to biodiversity loss.

Figure 5: Land use for dairy milk and selected plant-based milk alternatives



Source: adapted from Poore & Nemecek (2018).

There is no doubt that dairy production generates substantially higher GHGEs, higher water and land consumption, as well as biodiversity loss. Although certain crops face some challenges, shifting to PBDAs is overall much more environmentally sustainable for the food system.

3.2 EU regulatory framework for plant-based dairy alternatives

PBDAs are regulated under Regulation (EU) No 1308/2013 of the European Parliament and of the Council of 17 December 2013 establishing a common organisation of the markets in agricultural products, OJ EU L 347/671. According to Regulation 1308/2013, milk is defined as “the normal mammary secretion obtained from one or more milkings without either addition thereto or extraction therefrom” (Annex VII, Part III, point 1; OJ EU L 347/814),

which clearly prohibits all dairy alternatives from using the term milk. Similarly, there is a whole list of milk products that are being protected by this regulation. For example, butter must contain no less than 80% milk-fat, while cream has to contain at least 10% milkfat, both directly and exclusively obtained from cows' milk. Additionally, no label, marketing, or product claim is allowed to claim, imply, or even suggest that the product is a dairy product if it is not (Regulation 1308/2013).

One of the most famous cases of this law's reinforcement is found in the judgment of the Court of Justice of the European Union C-422/16 (TofuTown), which occurred in 2017. Namely, this company was accused of unlawfully naming its products veggie cheese, plant cheese, spread, tofu butter, and other similar names. The judgment of the European Court of Justice criticizes the company for misleading customers by referring to traditional food terms, undermining the lawfulness of the word 'milk' (CJEU, Case C-422/16).

In 2020, these restrictive measures went even further, with the European Parliament voting for Amendment 171. This prohibited PBDAs from having familiar packaging to dairy products, visual depictions of PBDAs that suggest traditional dairy features, science-based claims comparing PBDAs to dairy (even if it is related to environmental impacts), descriptive terms like “creamy” or “buttery”, and even the “does not contain milk” label. The legislation caused a backlash, with numerous multinational PBDA companies, environmental and non-governmental organizations' resistance. Eventually, the European Commission dropped Amendment 171, after almost half a million consumers signed a petition against it (Southey, 2021).

Furthermore, the current EU legislation negatively impacts innovation in the area of PBDAs due to its several shortcomings (Leialohilani & De Boer, 2020):

- 1) Even though legislation is strict about labels, those are often subject to leniency of interpretation. For example, Alpro products in the Netherlands are placed in the milk section at the stores, and it is also allowed to use the term dairy-free alternative to milk.
- 2) The EU Regulation imposes different rules for different sectors. The idea itself is understandable, since different sectors operate in completely different ways. However, due to this regulation, consumers are more protected of PBDAs than plant-based meat products, meaning that the legislation is asymmetric.
- 3) Up until now, the EU has not regulated either vegetarian or vegan food. This is very problematic since it creates uncertainty, posing an obstacle to further product development.

According to Commission Decision 2010/791/EU of 20 December 2010 listing the products referred to in the second subparagraph of point III(1) of Annex XII to Council Regulation (EC) No 1234/2007, OJ EU L 336/51, nut-based spreads, such as peanut butter, as well as coconut milk and cream, are exceptions to this regulation. The reason behind this is that these products possess specific characteristic qualities, and due to their traditional use. Even

though EU legislation was established to protect consumers from being misled and confused, consumers still associate PBDAs with protected traditional dairy products. This sparks a debate about the over-protection of consumers and the necessity of such protective laws (Leialohilani & De Boer, 2020). Interestingly, some producers started using creative linguistic adaptations in order to overcome the legislation (mylk, not milk, and similar). Moreover, the EU school milk scheme is a part of Regulation 1308/2013, which financially supports the distribution of dairy products in schools across the EU member states. Excluding comparably nutritious PBDAs is not only discriminatory but also impedes progress toward sustainable goals.

4 CONSUMER ATTITUDES TOWARDS PLANT-BASED DAIRY ALTERNATIVES

Understanding consumers' WTP goes far beyond price sensitivity, encompassing consumer attitudes, drivers, and barriers that influence purchasing decisions and consumption choices. TPB posits that individual behavior is actually the intention to perform the behavior, which is influenced by attitudes, subjective norms, and perceived behavioral control. This theory also argues that socio-demographic factors, intelligence, life values, emotions, and personality traits are important background factors indirectly influencing behavior. TPB has proven to be an excellent predictor of food-related intentions, arguing that a person's attitude or preference is the strongest predictor of intentions (Ajzen, 2015). That being said, there is no doubt that consumer attitudes towards PBDAs play a significant role in shaping consumer purchasing decisions and WTP. This chapter will provide a systematic overview of drivers and barriers to consuming PBDAs, followed by the synthesis of previous studies examining WTP for PBDAs.

4.1 Drivers to consume plant-based dairy alternatives

According to Su et al. (2024), in order to truly understand the development and acceptance of PBDAs, it is necessary to understand consumer motivations for choosing them. While motivations themselves do not guarantee purchase, they represent an important factor determining consumer behavior and can strongly influence WTP. There is a plethora of drivers to consume PBDAs found in different contexts, yet the most prominent ones are health consciousness, environmental concerns, animal welfare, taste, and availability. Table 2 presents a synthesis of empirical studies that have examined consumer attitudes and motivations for choosing PBDAs, summarizing the authors, year of publishing, observed countries, methodological approaches used, sample size, most common motivators, and main findings of the study.

Table 2: Review of studies on consumer drivers for plant-based dairy alternatives

Authors and year	Countries observed	Method	Sample	Main motivators	Main findings
Martínez-Padilla et al. (2023)	Denmark	Survey	N = 341	Taste, naturalness, health	Taste and naturalness perceptions strongly predict PBMA acceptance.
Adamczyk et al. (2022)	Poland, Germany, France	Focus Group Interviews	N = 154	Curiosity, diet diversification, and health reasons	Cross-country differences in consumer behavior towards PBMA.
Haas et al. (2019)	Austria	Survey (S) and interviews (I)	N(S) = 1001 N(I) = 30	Sustainability aspects, animal welfare	PBMA consumption is driven more by ethical and environmental concerns than dairy consumption.
Hansen et al. (2023)	Denmark, Germany, Spain, France, Italy, Poland	Survey	N = 3086	Availability, variety, taste	Cross-cultural differences in PBDA and dairy consumption.
Kuosmanen et al. (2025)	Finland	Semi-structured individual interviews	N = 28	Convenience, availability, social influence	Dairy norms and social context shape PBDA adoption in dairy-rich food cultures.
Ammann et al. (2023)	Switzerland	Survey	N = 594	Health, variety in diet, and lactose intolerance	Health and lactose intolerance are primary drivers.
Schimmel et al. (2025)	Denmark	Survey	N = 550	Naturalness, availability, flavour, texture	Sensory and availability factors influence PBCAs adoption.
De Castro Carvalho et al. (2025)	Brazil	Survey	N = 153	Health, sustainability, animal ethics	Ethical and environmental motives drive the purchase of PBDAs.

Source: own work.

4.1.1 Health consciousness

The great majority of studies state that health-related concerns are the most important determinant for choosing PBDAs. The main drivers for consumers choosing PBDAs are dietary restrictions, including milk allergies, lactose intolerance, hypercholesterolemia, and perceived healthiness (Rombach et al., 2023; Su et al., 2024; Martínez-Padilla et al., 2023; Mäkinen et al., 2015). According to Adamczyk et al. (2022), some people's motivation to consume PBDAs is due to digestive system difficulties and malaise after consumption of dairy products. Similarly, Ramsing et al. (2023) argue that digestivity is the most important health-related factor, since almost two-thirds of people in the world are lactose intolerant.

Haas et al. (2019) emphasize the importance of two other health-related factors, weight control and lifestyle, arguing that the flexitarian, vegetarian, and vegan lifestyles are tightly connected to consumption of PBDAs. Interestingly, they also argue that there is an increasing trend of consumers reporting lactose intolerance based not on a medical diagnosis, but solely on their own beliefs. This indicates that health-related drivers are not just medically based, but also a personal perception of consumers, driving their behavior. Moreover, Martínez-Padilla et al. (2023) suggest that attitudes related to health and naturalness of PBDAs are very strong predictors of consumption.

4.1.2 Environmental concerns

Environmental concerns, moral beliefs, and animal welfare are also important motivations influencing the decision to choose PBDAs. Studies show that perceiving PBDAs as environmentally friendly motivates consumers to purchase these products (Haas et al., 2019; Rombach et al., 2023; Su et al., 2024). The main environmental concerns include climate change, disruption of nutrient cycles, GHGEs, and environmental sustainability. Ammann et al. (2023) argue that environmental protection and sustainability are the most important reasons for the consumption of PBDAs. Conversely, research by Martínez-Padilla et al. (2023) found that environmental concerns are not a strong predictor of consuming PBDAs.

Yet another widely discussed motivation is animal welfare. Haas et al. (2019) found that consumers who consume PBDAs have strong beliefs about abuse of livestock during slaughtering and rearing. Additionally, Rombach et al. (2023) discovered that consumers are highly concerned about animal husbandry conditions and factory farming, as well as animals being treated ethically and with adequate sanitation. Su et al. (2024) found that concerns about animal welfare significantly increase PBDA purchases. However, Östlund et al. (2024) argue that despite animal welfare being an important purchasing factor, vegan, vegetarian, and flexitarian consumers tend to be more influenced by it. Recently, animal welfare has become such an important purchasing factor that certificates have been created to ensure animal welfare in the production process.

4.1.3 Food curiosity and diet diversification

Several studies mention food curiosity as a motivator for PBDAs consumption. Rombach et al. (2023, p.2) defined food curiosity as “an enticing feeling that drives consumers to explore food, often characterized by awareness of food-related knowledge gaps and the urge to close those gaps through information seeking.” According to Adamczyk et al. (2022), curiosity is an important motivator for reaching for PBDAs. Their research also found that most people are not expecting the same taste as dairy products but rather seek a new spectrum of flavors, aiming to diversify their diet. Interestingly, their findings also indicate that some parents nowadays use PBDAs to teach children to be more open to new tastes, suggesting a significant shift in food habits. Similarly, research by Ammann et al. (2023) found that variety seeking is an important factor among Swiss consumers. Since the palatability of PBDAs is constantly improving, consumers are starting to like the distinctive taste of PBDAs. Furthermore, Chen et al. (2025) found that willingness to try new foods is a significant positive driver of consumption.

4.1.4 Convenience, availability, and social influence

Purchasing convenience, availability, and variety of PBDAs are also important motivators. According to Hansen et al. (2023), these factors have a significant positive impact on the probability of consuming PBDAs. Similarly, Kuosmanen et al. (2025) argue that convenience matters, especially in the process of product adoption, emphasizing the need for a large and diverse selection of PBDAs. Haas et al. (2019) and Martínez-Padilla et al. (2023) also suggest that convenience and familiarity with PBDAs are key factors to acceptance and that they influence consumption significantly. Furthermore, Schimmel et al. (2025) argue that availability in markets, shops, and restaurants significantly influences the consumption of PBDAs.

Adamczyk et al. (2022) mention social influence, claiming that one's significant person often influences purchase. Similarly, Kuosmanen et al. (2025) found that family, friends, and partners tend to socially support both voluntary and necessity dietary shifts. Hansen et al. (2023) found that individuals whose social environment has a positive attitude towards PBDAs are 6% more likely to use PBDAs multiple times a week. These motivators should not be overlooked, especially in countries where traditional dairy is still dominant and culturally significant, like Slovenia.

4.2 Barriers to consuming plant-based dairy alternatives

Despite the skyrocketing growth of PBDAs, certain barriers still prevent consumers from adopting these products in their usual diets. Numerous studies have thoroughly explored barriers to adopting and consuming PBDAs. The most frequently mentioned barriers include high prices and sensory properties (taste, texture, flavour, and mouthfeel). Table 3 presents a synthesis of empirical studies that have examined the barriers to consuming PBDAs,

summarizing the authors, year of publishing, observed countries, methodological approaches used, sample size, most common barriers, and main findings of the study.

Table 3: Review of studies on barriers to consuming plant-based dairy alternatives

Authors and year	Countries observed	Method	Sample	Main barriers	Main findings
Philippi Rosane et al. (2025)	Denmark	A Mixed-Method (survey	N = 16	Dairy attachment, taste, price, and food culture	Dairy attachment, taste, and culture are the main barriers to substituting dairy with PBDAs.
Kuosmanen et al. (2025)	Finland	Semi-structured individual interviews	N = 28	Taste, pleasure, price	Sensory expectations and price hinder PBDA consumption.
Schimmel et al. (2025)	Denmark	Survey	N = 550	Product availability, flavour, texture	Sensory and availability issues limit PBCA adoption.
Östlund et al. (2024)	Sweden	Survey	N = 702	Taste, texture, appearance, and price	Sensory and price barriers affect PBYA acceptance.
Jaeger et al. (2023)	New Zealand	Sensory evaluation experiment	N = 113	Sensory attributes, appearance, and color	Sensory attributes strongly shape PBYA perceptions.

Source: own work.

4.2.1 Sensory properties

Sensory properties are one of the most cited barriers to consuming PBDAs. A study by Adamczyk et al. (2022) found that consumers perceive PBDAs as untasty, watery, processed, less concentrated, and bland-tasting. Additionally, some consumers approach PBDAs as a 'dairy substitute', which makes them be perceived as inferior, imitating something they are not. Similarly, Hansen et al. (2023) claim that two key consumption barriers in terms of PBDAs are taste and texture. Philippi Rosane et al. (2025) found that consumers think that most PBDAs are not as good as dairy products, except for PBYAs. However, Östlund et al. (2024) found that the majority of Swedish consumers are not consuming PBYAs due to unpleasant taste. Similarly, Kuosmanen et al. (2025) found that taste and pleasure, as hedonic reasons, are the biggest barriers to the adoption of PBDAs. Jaeger et al. (2023) argue that sensory attributes, lumpy appearance, and non-white colour negatively impact the consumption of PBYAs.

4.2.2 Price

Numerous studies claim that the main barrier to consuming PBDAs is that they are perceived as too expensive (Hansen et al., 2023; Adamczyk et al., 2022; Martínez-Padilla et al., 2023; Laassal & Kallas, 2019). High prices, together with a perceived lack of sensory properties, lead to purchase hesitation due to a lack of perceived value among some consumers. Philippi Rosane et al. (2025) argue that price is a fixed number, but its interpretation depends on multiple factors, such as socio-economic status, environmental consciousness, and lifestyle. Thus, some consumers might perceive PBDAs as expensive or a luxury good, while some see them as cheap or a necessity. Still, price can be a very significant barrier, especially in lower-income or developing countries.

4.2.3 Dairy attachment and memories

Haas et al. (2019) argue that cow milk is tightly connected with indulgence and childhood memories, which often leads to lifelong consumption. School milk programs aim at establishing tradition and habits, which might be the reason for the strong product image of cow milk outperforming plant milk. Philippi Rosane et al. (2025) highlight the importance of dairy attachment in Danish culture, claiming that participants from the study had been socialized through family life into dairy consumption. The cultural attachment to dairy in Denmark started after World War II with the introduction of school milk programs. Moreover, Adamczyk et al. (2022) found that the role of dairy is closely related to culinary traditions, which can act as a social barrier to PBDAs adoption. Furthermore, Szczepanski et al. (2025) argue that the consumption of dairy is habitual, and since consumers use it from their childhoods on, it creates a psychological barrier for PBDAs consumption.

4.3 Willingness to pay for plant-based dairy alternatives

Understanding consumers' WTP is essential for understanding consumer behavior, especially in the context of health-focused and environmentally friendly products (Su et al., 2024). However, a systematic review of currently available academic literature reveals a serious lack of studies on WTP for PBDAs. The majority of studies focus on analyzing PBMA exclusively. There is very limited information on factors influencing WTP for other PBDAs, such as cheese, yoghurt, butter, and ice cream. This research gap highlights the need for broader investigation into diverse PBDA categories to better capture consumer preferences and market potential. Table 4 represents a synthesis of empirical studies that have examined WTP for PBDAs, summarizing the authors, year of publishing, observed countries, methodological approaches used, sample size, most common determinants, and main findings of the study.

Table 4: Review of studies on willingness to pay for plant-based dairy alternatives

Authors and year	Countries observed	Method	Sample	Main determinants	Main findings
Su et al. (2024)	China	Online survey	N = 819	Socio-demographic factors, health consciousness, environmental awareness, and food neophobia.	Health concerns, environmental awareness, and high food neophobia increase WTP for PBMA.s.
Rombach et al. (2023)	United States	Online survey	N = 486	Food curiosity, animal welfare, food safety, green and clean image, and taste	Curiosity, animal welfare, and green image positively influence WTP for PBMA.s.
Wang et al. (2025)	China	Online survey	N = 1052	Nutritional value, food safety, product quality, social influence, price, and taste	Nutritional and safety factors increase WTP for PBMA.s.
Szczepanski et al. (2025)	Germany	Online survey	N = 667	Price and familiarity.	Price and familiarity strongly shape WTP for PBMA.s.
Laassal and Kallas (2019)	Spain	Homescan data	N = 343	Price, original flavour, producer-brand	Price, flavour, and brand significantly affect WTP for PBMA.s.
Östlund et al. (2024)	Sweden	Survey	N = 702	Taste, texture, appearance, and price	Sensory and price factors strongly influence WTP for PBMA.s.

Source: own work.

Su et al. (2024) examined the effect of consumer preferences and attitudes towards PBMA.s on WTP. They found a strong positive correlation between health consciousness, environmental awareness, and WTP for PBMA.s. Interestingly, their findings indicate that consumers with high food neophobia are willing to pay more for the convenience and taste of PBMA.s than consumers with low or medium food neophobia. They argue that the logic behind this is that convenience reduces the risk associated with trying new food, while taste is the most important factor in food choices. Moreover, the study suggests that socio-demographic factors play a significant role in WTP. Younger consumers, females, higher-income consumers, higher education consumers, and urban residents are more willing to pay for PBMA.s. Similarly, consumers with lactose intolerance, vegans, vegetarians, and those with dietary restrictions are also more willing to pay for PBMA.s.

A study by Rombach et al. (2023) researched key factors influencing WTP and WTPM for PBMA in the United States. Their findings suggest that food curiosity, food price inflation, flavour, taste, and texture impact both WTP and WTPM for PBMA. Animal welfare and green and clean image impact only WTPM, while food safety impacts only WTP. They also argue that negative past experience, such as quality issues, negatively impacts consumer WTP for PBMA.

Wang et al. (2025) found that nutritional value, food safety, product quality, and taste are the most significant factors influencing consumers' WTP for PBMA. Furthermore, the knowledge about PBMA, social influence (recommendations by family and friends), as well as advertising exposure, impact both purchase frequency and WTP for PBMA. They identified price as the critical factor for purchase since almost half of their respondents stated that PBMA are too expensive. However, the majority of respondents stated that they would be willing to pay more for enhanced product quality or nutritional value.

Szczepanski et al. (2025) analyzed the consumption of milk and milk alternatives among young people in Germany. Their findings indicate that German consumers are willing to pay €1.53 for 1 l of PBMA. According to their study, price and familiarity are the most important factors discouraging consumers from buying PBMA instead of traditional dairy milk.

Furthermore, a study by Laassal and Kallas (2019) emphasizes the importance of price as the major driving factor when it comes to WTP, followed by the original flavor attribute. Their findings indicate that consumers are willing to pay an extra €0.89 per unit for the original flavor, €0.18 per unit for the producer-brand, €0.16 per unit for added vitamins and calcium, and €0.27 per unit for a drink without additional ingredients.

A scoping review by Madududu et al. (2024) synthesized WTP studies on dairy and PBMA. Their findings state that the increasing consumer demand for sustainable food is actually driven by health concerns, environmental consciousness, and animal welfare. These attributes are associated with substantial WTP premiums, especially among European consumers. Their study also found a connection between WTP and product attribute categories, such as organic, origin, safety, and sensory. Interestingly, they argue that organic is the attribute category with the highest average WTP.

A pan-EU consumer survey was conducted as part of the Smart Protein Project. The survey included participants from 10 European countries, including France, Germany, the Netherlands, Austria, Italy, Denmark, the United Kingdom, Belgium, Poland, and Romania. Almost 30% of participants stated that they intend to increase consumption of PBDA. Interestingly, 20% of consumers are willing to pay a higher price for PBDA than for conventional cheese if it has a similar taste and texture to dairy cheese (ProVeg International et al., 2021).

5 RESEARCH METHODOLOGY

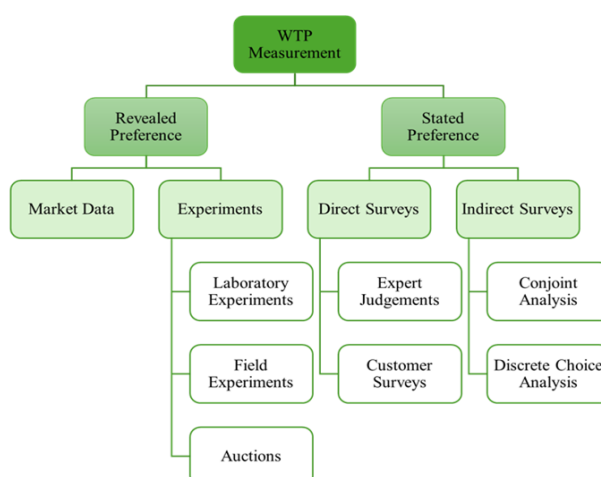
The theoretical review on the topic of WTP for PBDAs showed that there is extensive research on consumer attitudes towards PBDAs and WTP for PBMAAs (Madududu et al., 2024; Rombach et al., 2023; Su et al., 2024; Wang et al., 2025; Szczepanski et al., 2025). Moreover, the literature has indicated that consumer perception and WTP vary significantly between geographical regions and the demographic characteristics of the studied population (Hansen et al., 2023; Rombach et al., 2023; Adamczyk et al., 2022). Only a few studies examined consumer behavior related to PBDAs as a whole, usually focusing mainly on perceptions and motivations (Hansen et al., 2023; Adamczyk et al., 2022; Ammann et al., 2023). This indicates that there is a need for more research on Slovenian consumers, their purchase intentions, and WTP for PBDAs. In this chapter, I present the definition of WTP and its operationalization to measure WTP for PBDAs, the research purpose and goals, the research questions and hypotheses, the method of empirical data collection, the method of data analysis, the sampling method, and the demographic characteristics of the sample.

5.1 Definition and operationalization of willingness to pay

According to Wertenbroch and Skiera (2002, p.228), WTP or reservation price is defined as “the maximum price a buyer is willing to pay for a given quantity of a good”. They also argue that WTP is a ratio-scaled measure of subjective value that is assigned to that quantity of a good. Schmidt and Bijmolt (2019) argue that WTP represents the products' inherent value in monetary terms, defining it as an indifference point, meaning that at that price, consumers are indifferent to buying or not buying. Similarly, Madududu et al. (2024) describe WTP as the maximum amount an individual is willing to spend in order to obtain a certain product, expressing the utility they assign to it given their budgetary constraints. Furthermore, Voelckner (2006) argues that WTP is an individual-level construct that is always situation-specific.

There are numerous methods for measuring WTP. The common dilemma is which method should be used for measuring WTP. Voelckner (2006) argues that there is no straightforward answer to this problem because true WTP is an unobservable construct that can only be estimated, not measured. That being said, every method for measuring WTP is just an attempt to close the true customer valuation. Figure 6 represents the most common classification framework of methods to measure WTP. According to Wertenbroch and Skiera (2002), researchers can estimate WTP either from survey data (stated preferences) or real market transactions (revealed preferences). Stated preferences can be measured with either direct or indirect surveys. Direct surveys ask respondents to state the amount they would be prepared to pay for a certain product, while indirect surveys often use ranking processes to approximate and derive WTP. On the other hand, revealed preferences come from real market data, experiments, and auctions.

Figure 6: Classification of methods to measure willingness to pay



Source: adapted from Breidert et al. (2015).

There are certain advantages and disadvantages of using both approaches. The main advantage of the stated preference approach is that it is cost-effective and time-efficient. Indirect surveys are the most commonly used because they exhibit high levels of internal and external validity, while direct surveys are often criticized for the lack of accuracy and truthfulness since consumers tend to overstate or understate their real WTP. Interestingly, a more recent study by Schmidt and Bijmolt (2019) found that indirect methods actually overestimate WTP significantly more than direct methods. In general, the hypothetical nature of the stated preference approach makes it prone to biases and inaccuracies. The revealed preference approach, on the other hand, reflects actual purchasing decisions of consumers, but does not provide the reasons behind the purchase. Without the reasons, it is very hard to understand how pricing has influenced the purchasing decision, which is the biggest flow of that approach. Figure 7 provides a summary of the advantages and disadvantages of WTP measurement methods.

Figure 7: Comparative assessment of willingness to pay measurement methods

	Cost effective	Time efficient	Flexibility for new price/product combinations	Validity of estimations	Real purchase behavior	Observed choice behavior	Individual-level estimations
Market data	Neutral	Neutral	Strong disadvantage	Advantage	Strong advantage	Strong advantage	Neutral
Experiments	Disadvantage	Strong disadvantage	Strong advantage	Neutral	Neutral	Advantage	Neutral
Direct Surveys	Strong advantage	Strong advantage	Neutral	Disadvantage	Disadvantage	Disadvantage	Strong advantage
Conjoint Analysis	Advantage	Advantage	Strong advantage	Advantage	Disadvantage	Strong disadvantage	Advantage
Discrete Choice Analysis	Advantage	Advantage	Strong advantage	Advantage	Disadvantage	Strong advantage	Advantage

Source: adapted from Breidert et al. (2015).

I have decided to use the stated preference approach for the following reasons:

- There is a lack of market data available for PBDAs in the Slovenian market. In order to produce high-quality results using revealed preference, one has to have a rich and vast data set. The stated preference approach is, in this case, a much more time-efficient and cost-effective way of estimating WTP.
- According to Breidert et al. (2015), stated preference is more suitable for new products or products that are not widely adopted, such as PBDAs in Slovenia.
- The stated preference approach uses a survey, which is suitable for gathering in-depth insight into the reasoning behind the purchase.
- The stated preference approach is widely used in the literature, with numerous studies utilizing it to estimate WTP (Szczepanski et al., 2025; Wang et al., 2025; Su et al., 2024; Rombach et al., 2023).
- Last but not least, the stated preference method is more flexible. It is extremely useful for testing different combinations of products and prices (Breidert et al., 2015).

Since the stated preferences method has many different approaches, it is important to note that this thesis is using the payment card approach. This approach uses closed-end questions to obtain the maximum amount consumers are willing to pay. The true consumers' WTP is then presumed to be greater than the given value, but lower than the next higher value. The advantages of this approach are its simplicity, practicality, and reduction of starting point bias. However, it also has some limitations, such as range bias, centering bias, and endpoint bias (Tian et al., 2011). These biases can be reduced by pretesting and carefully setting the price ranges in a survey.

5.2 Research purpose and goals

The purpose of this thesis is to develop a comprehensive understanding of Slovenian consumers' WTP for PBDAs. It offers insight that benefits a wide spectrum of stakeholders, including producers, retailers, marketers, and policymakers. Last but not least, the study also contributes to the development of knowledge that supports long-term sustainability objectives within Slovenia's food system.

The goals of the thesis are:

- To determine how key drivers of customers' adoption and consumption of PBDAs are associated with their WTP.
- To determine how key barriers to customers' adoption and consumption of PBDAs are associated with their WTP.
- To determine how product attributes are associated with the consumers' WTP for PBDAs.
- To estimate Slovenian consumers' WTP for PBDAs.

- To provide recommendations to food industry stakeholders, marketers, and policymakers.
- To compare the key factors influencing purchasing decisions and WTP of consumers in the Slovenian market with the results of available research from foreign markets.

5.3 Research questions and hypotheses

Based on the research purpose and goals, this thesis answers three research questions and ten hypotheses. The research questions and hypotheses of the thesis are as follows:

RQ1: How are demographic and socioeconomic factors (age, education, and income level) associated with willingness to pay for plant-based dairy alternatives in Slovenia?

H1a: Age is negatively associated with consumers' willingness to pay. (Older people are usually willing to pay less than younger people.)

According to Su et al. (2024), age is a very important factor when it comes to attitudes toward PBDAs. Younger consumers, females, higher-income consumers, higher-education consumers, and urban residents are more willing to pay for PBMAAs. Their study found that each additional year of age is associated with a decrease in WTP of 0.0012. The study by Ammann et al. (2023) found that consumers of PBDAs tended to be young, well-educated, and flexitarians. Szczepanski et al. (2025) argue that younger consumers are more open to trying new food since their eating habits are less fixed compared to older people. Similarly, Östlund et al. (2024) found that females and younger consumers are more likely to choose PBDAs. Furthermore, according to Schimmel et al. (2025), younger generations (Gen Z and Millennials) tend to be more willing to adopt and purchase PBDAs. Therefore, it is reasonable to assume that younger consumers in Slovenia are willing to pay more for PBDAs.

H1b: Income level is positively associated with consumers' willingness to pay. (People with higher income are usually willing to pay more.)

De Castro Carvalho et al. (2025) argue that income plays a crucial role in shaping purchasing decisions related to PBDAs. Their study suggests that higher-income consumers focus on quality, nutritional value, and ethical concerns, while lower-income consumers focus on cost-effectiveness in their purchasing decisions. Moreover, according to Su et al. (2024), monthly income positively impacts WTP. Based on these findings, I hypothesize that Slovenian consumers with higher incomes are willing to pay more for PBDAs.

H1c: Education level is positively associated with consumers' willingness to pay. (People with higher education are usually willing to pay more.)

Su et al. (2024) found a strong association between education level and WTP for PBMAAs. Similarly, the study by De Castro Carvalho et al. (2025) revealed that higher-education

consumers are more willing to adopt PBDAs due to their better understanding of the functions, nutritional value, and safety. Thus, I assume that Slovenian consumers with higher education levels are willing to pay more for PBDAs.

RQ2: What psychographic factors (motivations and barriers) are associated with Slovenian consumers' willingness to pay for plant-based dairy alternatives?

H2a: Health consciousness is positively associated with consumers' willingness to pay. (People who care more about health are usually willing to pay more.)

As mentioned before, health-related concerns are the most important determinant for choosing PBDAs. The main drivers for consumers choosing PBDAs are dietary restrictions, including milk allergies, lactose intolerance, hypercholesterolemia, and perceived healthiness (Rombach et al., 2023; Su et al., 2024; Martínez-Padilla et al., 2023; Mäkinen et al., 2015; Adamczyk et al., 2022). According to Su et al. (2024), individuals with health restrictions are willing to pay €0.018 more for PBMA. Their study also shows a positive association between health consciousness and WTP. In accordance with that, it is expected that consumers who care more about health are willing to pay more for PBDAs.

H2b: Environmental concerns are positively associated with consumers' willingness to pay. (People who care more about the environment are usually willing to pay more.)

Environmental concerns are a frequently cited driver for purchasing PBDAs. Studies show that PBDAs are perceived as environmentally friendly by consumers (Haas et al., 2019; Rombach et al., 2023; Su et al., 2024). De Castro Carvalho et al. (2025) argue that environmental impact and animal welfare are the main reasons for purchasing PBDAs. Similarly, Östlund et al. (2024) found that environmental concerns and animal welfare were crucial determinants for purchasing PBDAs. Su et al. (2024) found that environmental consciousness is positively associated with WTP, meaning that the consumers who are more concerned about the environment are, on average, willing to pay more.

H2c: Animal welfare concerns are positively associated with consumers' willingness to pay. (People who care more about animal welfare are usually willing to pay more.)

Many researchers argue that animal welfare is a key motivator for avoiding dairy and choosing PBDAs (Haas et al., 2019; Ammann et al., 2023; Östlund et al., 2024; Philippi Rosane et al., 2025). Haas et al. (2019) found that PBDA consumers hold strong beliefs about livestock abuse during rearing and slaughter. Rombach et al. (2023) also reported that animal welfare positively influences WTP for PBMA. Therefore, animal welfare concerns are expected to be positively associated with consumers' WTP for PBDAs.

H2d: Food curiosity is positively associated with consumers' willingness to pay. (People who like to try new foods are usually willing to pay more.)

Rombach et al. (2023, p.2) defined food curiosity as “an enticing feeling that drives consumers to explore food, often characterized by awareness of food-related knowledge gaps and the urge to close those gaps through information seeking.” Their research found that food curiosity significantly influences consumers' WTP and WTPM for PBMA. According to Adamczyk et al. (2022), curiosity is the main motivator for reaching PBDAs, and consumers are mostly purchasing PBDAs to diversify their diets. Moreover, Chen et al. (2025) found that food neophilia (willingness to try new foods) is a significant positive driver of WTP. Thus, I hypothesize that food curiosity is positively associated with consumers' WTP.

H2e: Food neophobia is negatively associated with consumers' willingness to pay. (People who dislike trying new foods are willing to pay less.)

Su et al. (2024) defined food neophobia as the reluctance to try new or unfamiliar foods. Kuosmanen et al. (2025) emphasize that unfamiliarity with PBDAs imposes a barrier to consumption. Szczepanski et al. (2025) found that unfamiliarity is one of the most important factors discouraging consumers from buying PBMA. Moreover, Chen et al. (2025) found that food neophobia has a significant negative effect on consumers' WTP. Hence, neophobic tendencies are likely to reduce consumers' WTP significantly.

H2f: Limited availability of plant-based dairy alternatives is negatively associated with consumers' willingness to pay. (Limited availability of plant-based dairy alternatives in stores may reduce consumers' WTP.)

According to Hansen et al. (2023), availability and variety have a significant positive impact on consuming PBDAs. Kuosmanen et al. (2025) argue that convenience matters, especially in the process of product adoption, emphasizing the need for a large and diverse selection of PBDAs. Similarly, Schimmel et al. (2025) argue that availability in markets, shops, and restaurants significantly influences the consumption of PBDAs. De Castro Carvalho et al. (2025) highlight the importance of practical restrictions (such as time, budget, and availability), arguing that they influence WTP significantly. It is reasonable to assume that the limited availability of PBDAs is negatively associated with consumers' WTP.

RQ3: Which product attributes are associated with Slovenian consumers' willingness to pay for plant-based dairy alternatives?

H3: The importance consumers attach to product attributes of plant-based dairy alternatives is positively associated with their willingness to pay, except for price, where higher importance is negatively associated with willingness to pay. (When people care more about attributes like taste, texture, origin, environmental certifications, brand, nutritional value, and packaging design, they are more willing to pay. But when price is very important to them, they are less willing to pay.)

Madududu et al. (2024) identified several attribute classes affecting consumers' WTP, including environment, animal welfare, health, origin, organic, safety, and sensory factors. Su et al. (2024) found a positive correlation between product attributes (appearance, convenience, taste, nutritional value, and environmental benefit) and WTP. Wang et al. (2025) highlighted nutritional value, safety, quality, and taste as key WTP determinants for PBMAAs. Rombach et al. (2023) reported that flavour, taste, and texture influence both WTP and WTPM. However, numerous studies claim that the main barrier to consuming PBDAs is that they are perceived as too expensive (Adamczyk et al., 2022; Martínez-Padilla et al., 2023; Wang et al., 2025; Szczepanski et al., 2025). Therefore, I expect to find a positive association between the given product attributes and consumers' WTP. The only product attribute that is expected to have a negative association with WTP is price.

Table 5 presents an overview of research questions, hypotheses, factors, expected WTP relationships, and measurement methods.

Table 5: Overview of hypotheses and operationalization

Research question	Hypothesis	Variable	Expected relationship with WTP	Measurement
RQ1	H1a	Age	Negative	Self-reported age in years (open)
	H1b	Income level	Positive	Monthly net income (categorical)
	H1c	Education level	Positive	Highest completed education (categorical)
RQ2	H2a	Health consciousness	Positive	Construct formed of 4 Likert-scale questions
	H2b	Environmental concern	Positive	Construct formed of 5 Likert-scale questions
	H2c	Animal welfare	Positive	Construct formed of 4 Likert-scale questions
	H2d	Food curiosity	Positive	Construct formed of 4 Likert-scale questions
	H2e	Food neophobia	Negative	Construct formed of 4 Likert-scale questions
	H2f	Availability	Negative	Construct formed of 4 Likert-scale questions
RQ3	H3	Product attributes	Positive, except for the price	Likert scale

Source: own work.

5.4 Sampling method and frame

I obtained my respondents using non-probability sampling. More precisely, I have utilized convenience and snowball sampling, starting with friends, colleagues, and acquaintances. They were encouraged to forward the questionnaire onwards through a direct link, creating a chain of participants that are connected through social networks. The reason for choosing an online survey is its time efficiency, practicality, and flexibility (Lefever et al., 2006).

Snowball sampling has both advantages and disadvantages. The main advantages of snowball sampling are its notable practicality, cost-effectiveness, time efficiency, and ability to access hard-to-reach populations. Moreover, it also increases response rates substantially by encouraging participation through referrals from trusted contacts, which mitigates non-response bias and improves data quality. On the other hand, there are several limitations that can influence the validity and generalizability of research findings. These include the lack of control over sample composition, the inability to precisely calculate response rates due to referrals, and limited representativeness (Ting et al., 2025).

The sampling frame included both consumers and non-consumers of PBDAs. Classification into consumer and non-consumer groups was based on two initial questions about PBDA use and frequency of consumption.

5.5 Method of empirical data collection

The survey was created using the 1KA online tool. The survey was done in the Slovenian language since the target population was Slovenian consumers of PBDAs. The reasons for using the 1KA online tool are its convenience, ease of use, good interface, and familiarity of the Slovenian population with the tool. Moreover, responses gathered using 1KA can be easily transferred to programs for statistical analysis, which significantly accelerates the process of data analysis.

The questionnaire consisted of 6 sections and 20 questions. The questionnaire started with an introduction where participants were informed about the purpose of data collection and assured anonymity. The first section of the questionnaire focused on consumption and behavioral patterns. The initial questions established whether respondents consume PBDA and how frequently they do so. For those who do not consume such products or state they never used them, a follow-up question was included to capture reasons for non-consumption (such as high price, lack of interest, or dissatisfaction with taste). Their reasons for non-consumption can be found in Appendix 4. After stating reasons for non-consumption, these respondents were redirected to the end of the survey. Other respondents, who consume PBDA, were asked to indicate which categories (plant-based milk, yogurt, cheese, cream, butter, or ice cream) they usually consume. The latter questions aimed at measuring the share of PBDAs in overall dairy purchases. For that purpose, respondents were asked to estimate the % of their purchases that come from PBDA, with the remaining share assumed to

represent traditional dairy. In this section, respondents were also asked to state if they are the primary shopper in their household, which is important for assessing the decision-making power. Additionally, they were asked to specify their diet (omnivore, flexitarian, vegetarian, vegan, or other).

The second section focused on consumers' drivers towards PBDAs. This section consisted of 2 questions. The first one was a multiple-choice question requiring them to state reasons that motivate them to purchase PBDAs. This was followed by Likert-scale statements related to drivers for purchasing PBDAs (1 – strongly disagree, 2 – disagree, 3 – neutral, 4 – agree, 5 – strongly agree).

The third section was about consumers' barriers to PBDAs, and it was designed in the same way as the drivers section. A multiple-choice question requiring respondents to state reasons that prevent them from purchasing PBDAs, followed by Likert-scale statements related to barriers for purchasing PBDAs (1 – strongly disagree, 2 – disagree, 3 – neutral, 4 – agree, 5 – strongly agree).

The fourth section examined the importance of specific product attributes on a Likert scale from 1 to 5 (1 – not at all important, 2 – not important, 3 – neutral, 4 – important, 5 – very important).

The fifth section was dedicated to measuring WTP for PBDA. At the beginning, respondents were asked how much they were willing to pay for one liter of different types of PBMA (soy, oat, almond, rice, and coconut). Price range was from €1 to €5 on a discrete scale. All the price ranges were based on the current market dynamics and observed prices at the 4 biggest retailers on the Slovenian market. By the same logic, the following question extended the analysis to other PBDAs categories, with prices ranging from €1 to €6. In both cases, respondents had the option of choosing 0, indicating they would not buy the product. Moreover, respondents were asked if they would be willing to buy PBDAs more often if they were the same price as dairy products.

The sixth section of the questionnaire collected socio-demographic data. Respondents were asked about their gender, age, the highest achieved education level, and monthly income. Lastly, an open question at the end asked respondents about their opinions and comments. The whole questionnaire can be found in Appendix 2.

The primary data collection through this survey took place from September 30th to October 8th. The responses were gathered relatively quickly due to the high interest and relevance of the topic among respondents. It is important to note that the questionnaire was pre-tested by 12 respondents who confirmed the clarity of the questions and the adequacy of the selected price ranges for estimating WTP.

5.6 Method of data analysis

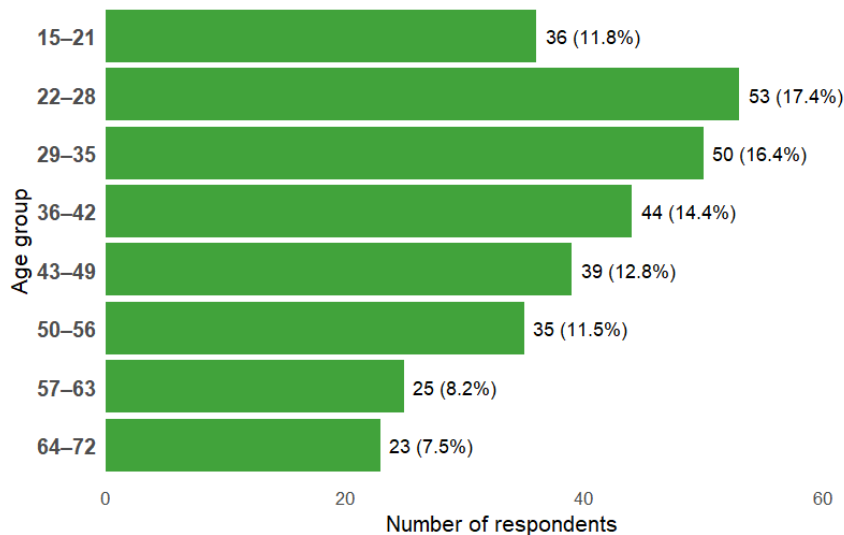
The data that was gathered using this survey was exported using the 1KA online tool. It was then imported into the R Studio statistics program R version 4.3.1 (2023-06-16). Firstly, the data was cleaned of all invalid responses. All respondents who did not finish the survey until the end were removed from the final dataset to maintain the integrity of the analysis. Moreover, it is important to note that all “don’t know” responses were treated as missing. The next step was analyzing the data, which was also performed in R Studio. The statements that made up the constructs were tested for reliability using Cronbach’s alpha. All visualizations are conducted using the ggplot2 and tidyverse packages. All statistical tests are conducted using $\alpha = 0.05$. For the purpose of hypothesis testing, multiple regressions were performed, which will be explained in detail later in Chapter 6.

5.7 Demographic characteristics of the sample

The sample of a total of 305 respondents who are users of PBDAs included 150 males (49%), 153 females (50%), and 2 non-binary/third gender respondents (1%).

Figure 8 represents the distribution of respondents’ ages. The majority of respondents were aged 22–28 (17.4%), followed closely by those aged 29–35 (16.4%) and 36–42 (14.4%). Participation declines steadily in the older age groups. However, the sample still consists of respondents of different age groups, allowing for meaningful comparisons. The average age of all respondents is 39.2 years.

Figure 8: Distribution of respondents by age group

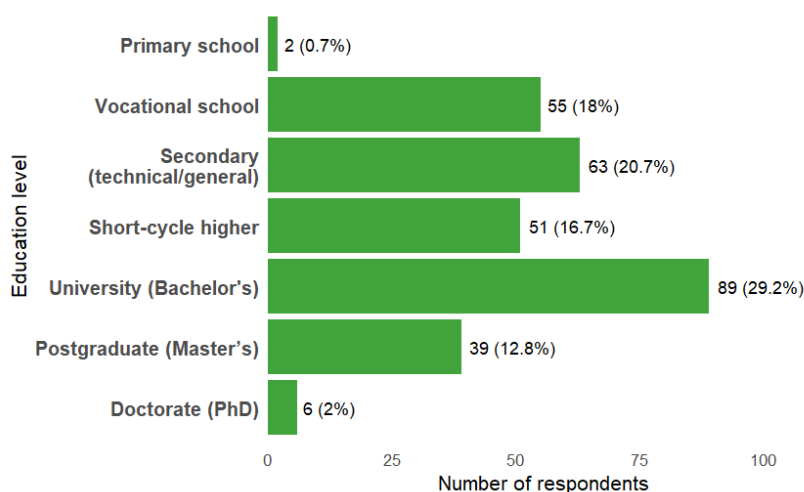


Source: own work.

Figure 9 represents the distribution of respondents’ highest achieved levels of education. Almost a third of respondents have a bachelor’s degree (29.2%), followed by secondary

school (20.7%), vocational school (18%), short-cycle higher education (16.7%), and postgraduate (12.8%). Primary school (0.7%) and doctorate (2%) were the smallest categories in the sample. Overall, this distribution indicates a diverse range of educational levels among participants, with a noticeable concentration at the tertiary level. This suggests that respondents are relatively well-educated.

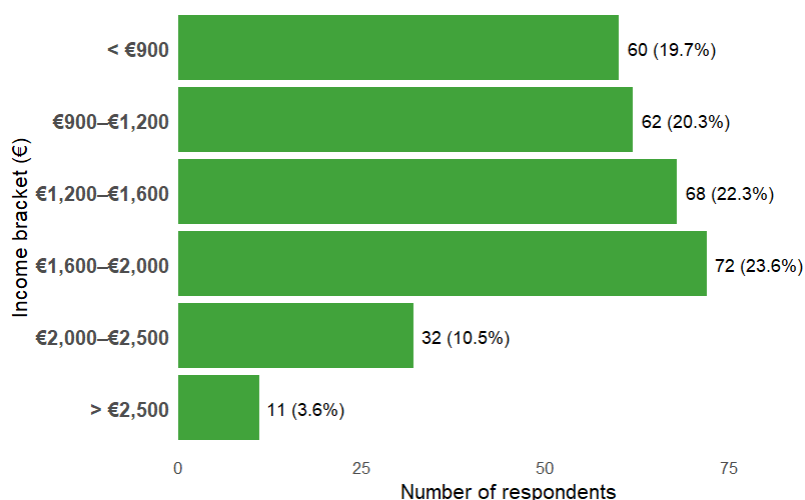
Figure 9: Distribution of respondents by level of education



Source: own work.

Figure 10 represents the distribution of respondents' net monthly income. Most respondents fall within the mid-income range, particularly €1,600–€2,000 (23.6%) and €1,200–€1,600 (22.3%), while only a small share earn above €2,000 (3.6%) or below €900 (19.7%). Income distribution is relatively balanced, except for the highest income categories.

Figure 10: Distribution of respondents by monthly net income



Source: own work.

6 ANALYSIS AND RESULTS

This chapter aims to present the results of the empirical research done based on the online survey. In the first part of the chapter, the descriptive statistics will be presented with appropriate graphs and tables. The second part of the chapter will focus on testing the hypotheses.

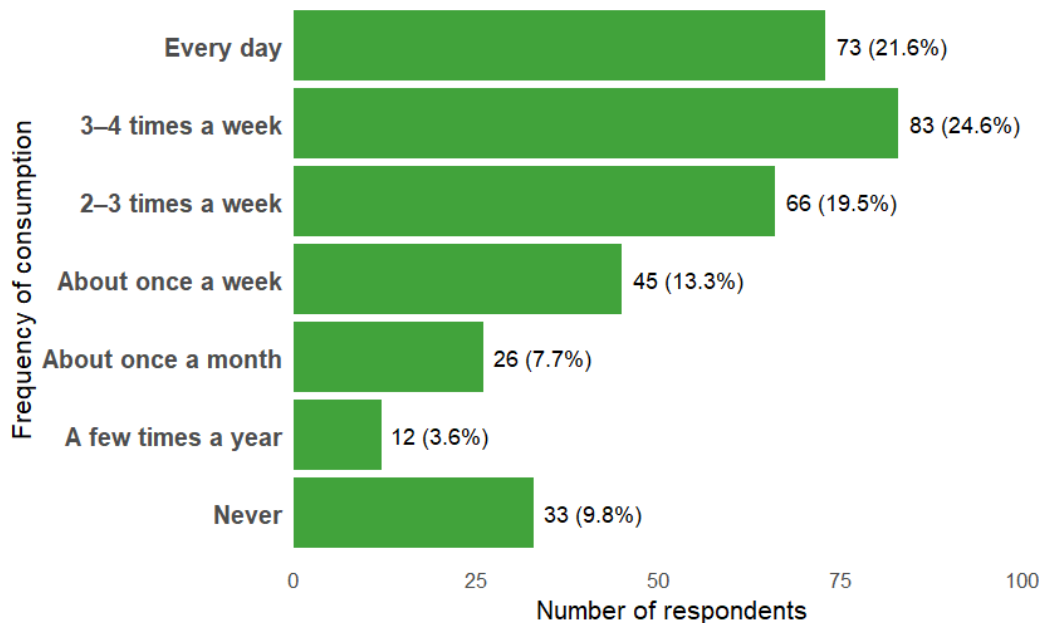
6.1 Descriptive statistics on consumers' willingness to pay

This section provides a summary of descriptive statistics for the main questions of the survey. It follows the flow of the survey, starting with screening questions about consumption, followed by motivations, perceived barriers, measurement of WTP, and lastly product attributes.

6.1.1 Consumption patterns of plant-based dairy alternatives

Figure 11 shows the frequency of consumption of PBDAs. More than half of respondents stated that they use PBDAs multiple times a week (65.7%). This screening question is a very important insight, as it helps explain consumer behavior.

Figure 11: Frequency of consumption of plant-based dairy alternatives

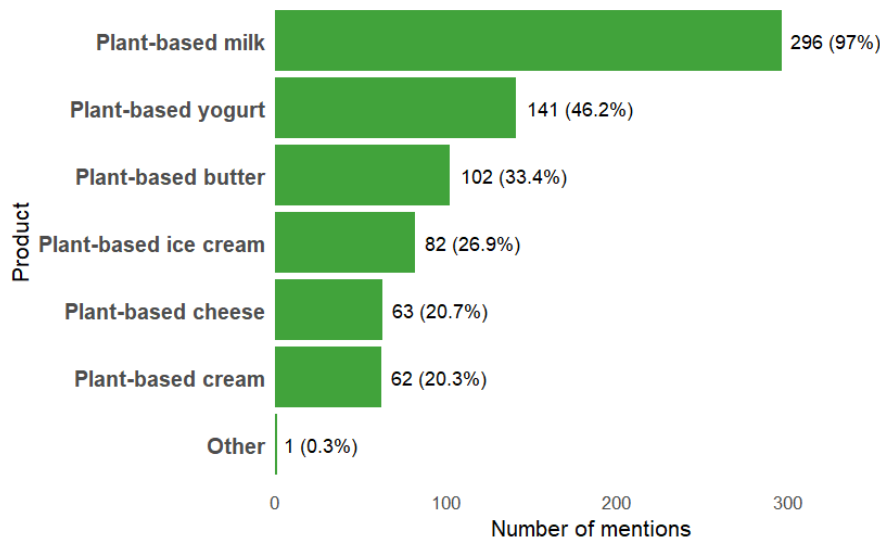


Source: own work.

The following question asked respondents which PBDAs they are consuming. Figure 12 shows that PBMAAs are by far the most popular product, followed by PBYAs and PBBAs. PBCAs, PBCRAs, and PBIAs are less frequently used. Moreover, respondents mentioned

using plant-based curd and spreads. This pattern mirrors Slovenian market trends, where PBMA's dominate in both availability and sales.

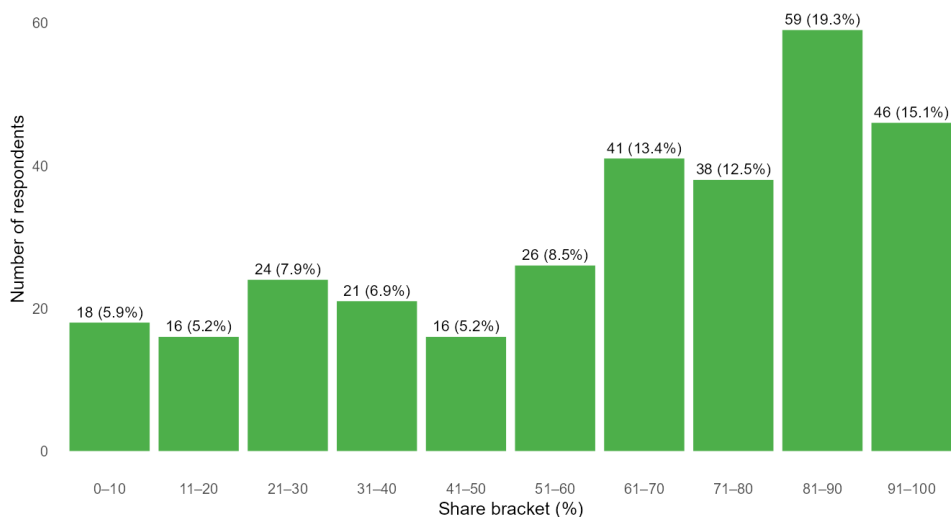
Figure 12: Types of plant-based dairy alternatives used



Source: own work.

Figure 13 shows the share of dairy consumption represented by PBDAs. Most respondents reported that PBDAs make up a large portion (over 60%) of their dairy consumption, with the 81–90% bracket being the most common (19.3%).

Figure 13: Share of dairy consumption replaced by plant-based alternatives

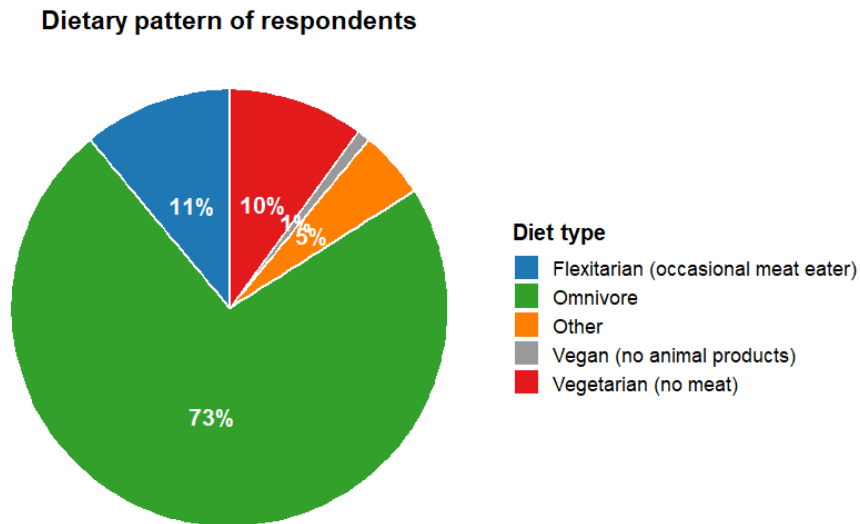


Source: own work.

Additionally, respondents were also asked about their dietary patterns. Figure 14 indicates that the majority are omnivores (73%), followed by flexitarians (11%) and vegans (10%).

Only a small share reported being vegetarian (5%) or other (1%), including pescatarians and vegans on a gluten-free diet.

Figure 14: Dietary pattern of respondents

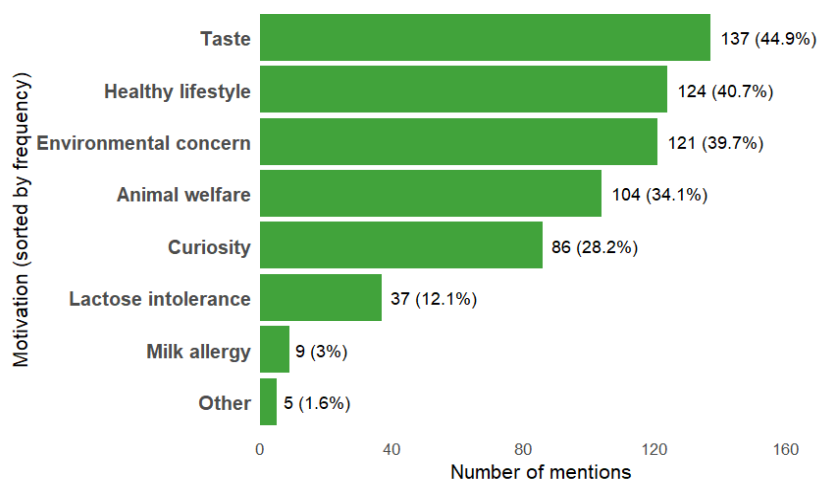


Source: own work.

6.1.2 Motivational drivers for purchasing plant-based dairy alternatives

The following section of the survey focused on motivational factors regarding PBDAs. Figure 15 represents the most frequently mentioned motivations for choosing PBDAs. Respondents could choose multiple options, but most often stated taste, healthy lifestyle, environmental concern, and animal welfare as their motivations.

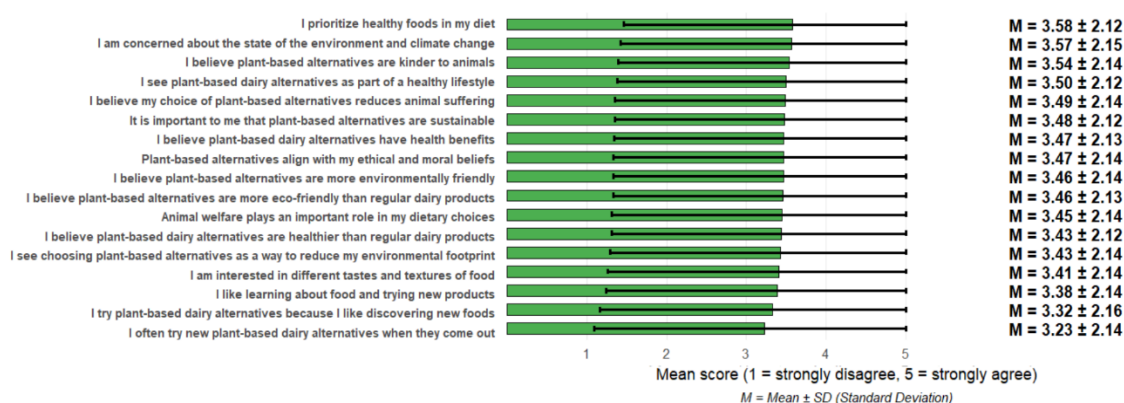
Figure 15: Most frequently mentioned motivations for purchasing plant-based dairy alternatives



Source: own work.

Figure 16 presents respondents' agreement with motivational statements that shape their WTP for PBDAs. Most participants strongly agreed with statements emphasizing health consciousness, environmental friendliness, and concern for animal welfare.

Figure 16: Agreement with statements related to motivations toward plant-based dairy alternatives

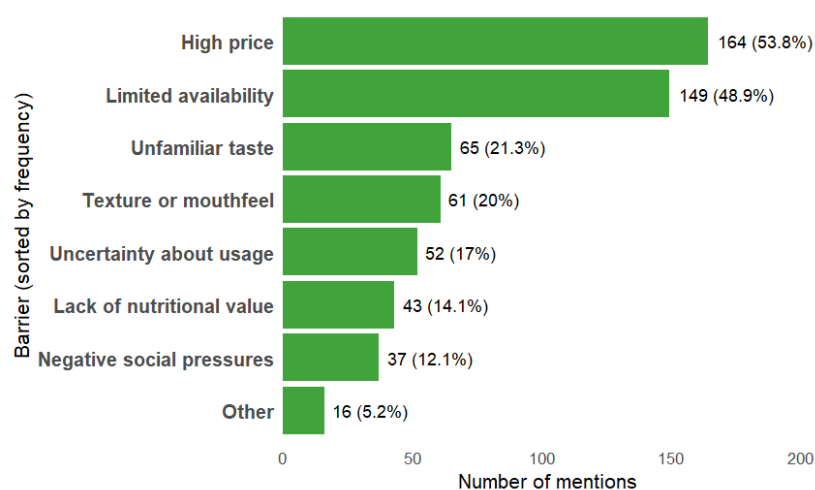


Source: own work.

6.1.3 Barriers to the adoption of plant-based dairy alternatives

The two following questions focused on perceived barriers to the adoption of PBDAs. Figure 17 represents the most frequently mentioned barriers to choosing PBDAs. Respondents could choose multiple options, but most often stated high prices and limited availability as their barriers. Some additional concerns included non-organic ingredients, excessive packaging, limited zero-waste packaging availability, and allergen content.

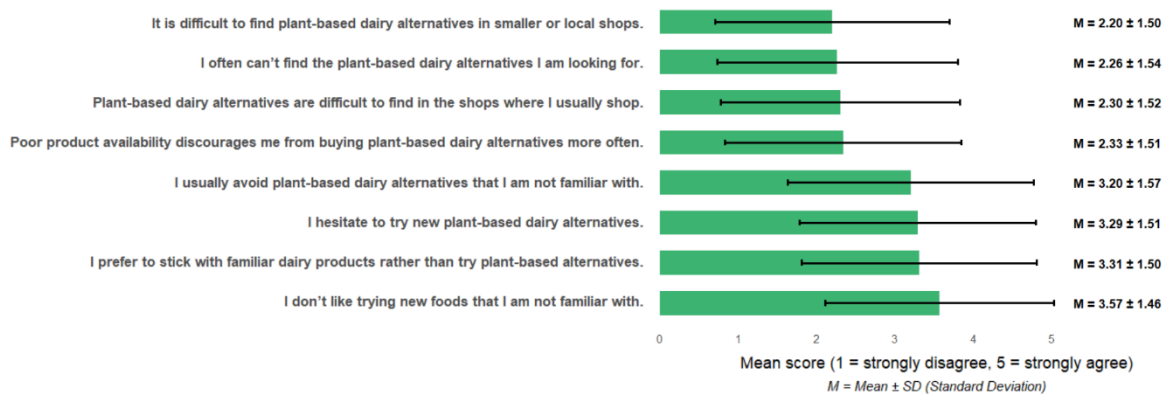
Figure 17: Most frequently mentioned barriers associated with purchasing plant-based dairy alternatives



Source: own work.

Figure 18 shows the agreement with statements about food neophobia and the availability of PBDAs. While most respondents disagreed with claims reflecting reluctance toward unfamiliar products, a substantial share agreed that it is difficult to find PBDAs in smaller or local shops.

Figure 18: Agreement with statements related to barriers toward plant-based dairy alternatives

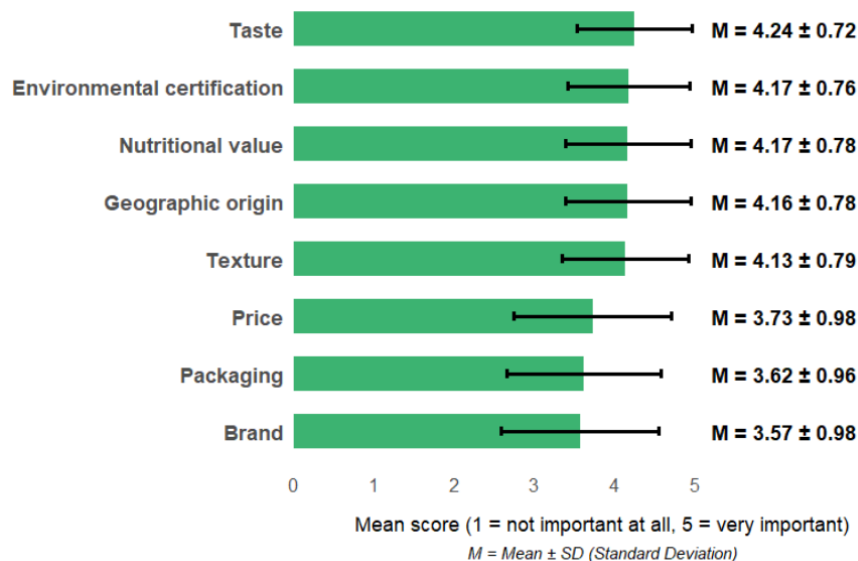


Source: own work.

6.1.4 Product attributes importance

Figure 19 summarizes how respondents rated the importance of specific product attributes. Taste, environmental certification, and nutritional value emerged as the most important factors, followed by geographic origin, texture, price, packaging, and brand.

Figure 19: Importance of product attributes

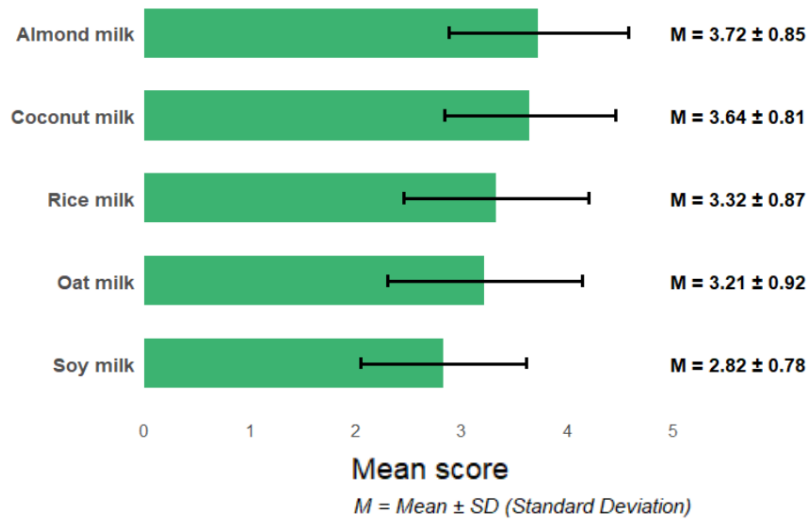


Source: own work.

6.1.5 Measuring willingness to pay for different plant-based dairy alternatives

Figure 20 shows the mean WTP for one liter of soy, oat, almond, rice, and coconut milk. The results indicate that there are differences among PBMA. Respondents indicated the highest price levels for almond and coconut milk, while soy and rice milk received lower values.

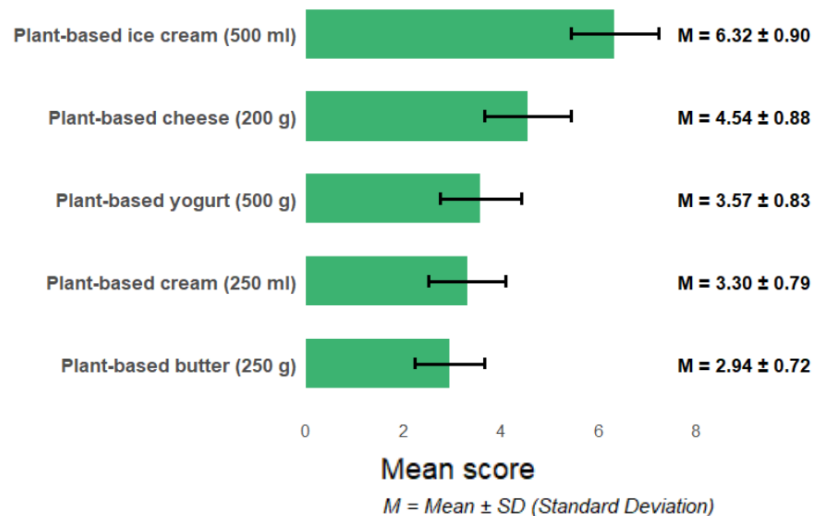
Figure 20: Willingness to pay for 1 liter of various plant-based milk alternatives



Source: own work.

Figure 21 shows the mean WTP for other PBDA. The highest average price was observed for PBCAs and PBIAs, while PBBAs and PBCRAs had lower averages. A more detailed visualization of the price distributions for each PBDA type is provided in Appendix 3.

Figure 21: Willingness to pay for different plant-based dairy alternatives



Source: own work.

WTP estimates were calculated using the payment card approach, applying several econometric models to ensure the robustness and reliability of results: Mean Linear model (ML-WTP), Interval model (IM-WTP), Double-Bounded probit and logit models (DB-WTP), Single-Bounded model (S-WTP), Ordered model (O-WTP), and Interval-Censored model (I-WTP).

Across all models, consistent WTP patterns emerged. Respondents indicated the highest willingness to pay for PBIAAs (€6.9–7.4) and PBCAs (€5.1–5.3), followed by almond and coconut milk (€4.2–4.4). The consistency across model types supports the stability of the estimates and increases confidence in the reliability of the payment card results. Interestingly, measured WTP is significantly higher than current market prices on the Slovenian market for all PBDAs, except for PBMAAs. Detailed formulas, explanations, and WTP estimates are included in Appendix 5.

Lastly, it is important to note that 70% of respondents stated that they would be buying PBDAs more often if their prices were equal to dairy counterparts.

6.2 Hypothesis testing

For the purpose of hypothesis testing, I grouped the statements in the survey into several constructs. The statements with a 5-point Likert scale were grouped in six separate constructs: health consciousness, environmental concern, animal welfare, food curiosity, food neophobia, and availability of PBDAs. These six constructs represent the attitudes towards PBDAs. Table 6 represents values of Cronbach's alpha, composite reliability, and average variance extracted values for each construct. All constructs exceed the recommended thresholds ($\alpha > 0.7$, CR > 0.7 , AVE > 0.5), indicating good internal consistency and convergent validity.

Table 6: Reliability and convergent validity of measurement constructs

Construct	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Health consciousness	0.971	0.972	0.896
Environmental concern	0.977	0.979	0.909
Animal welfare	0.958	0.981	0.927
Food curiosity	0.945	0.975	0.905
Availability	0.962	0.966	0.875
Food neophobia	0.918	0.984	0.939

Source: own work.

Each hypothesis was examined using multiple linear regression models, with the WTP for PBDAs as the dependent variable. Independent variables were grouped according to the conceptual framework: (1) demographic and socioeconomic factors, (2) psychographic factors, and (3) product attributes.

6.2.1 Testing hypotheses on demographic and socioeconomic factors

The first research question examined how demographic and socioeconomic factors are associated with consumers' WTP for PBDAs in Slovenia. To test hypotheses H1a, H1b, and H1c, a multiple linear regression model was estimated with WTP as the dependent variable and age, income, and education as explanatory variables, as shown in equation (1).

$$WTP_i = \beta_0 + \beta_1(Age_i) + \beta_2(Income_i) + \beta_3(Education_i) + \varepsilon_i \quad (1)$$

where WTP_i represents the willingness to pay of respondent i , β_0 is the intercept (baseline level of WTP), and $\beta_1, \beta_2, \beta_3$ are regression coefficients representing the expected change in WTP associated with a one-unit increase in each independent variable, holding other factors constant. The error term ε_i captures unobserved influences affecting individual WTP.

Table 7 represents regression results for demographic and socioeconomic factors. The model was statistically significant with $p < 0.001$, and achieved an $R^2 = 0.17$, indicating that approximately 17% of the variance in consumers' WTP is explained by demographic and socioeconomic characteristics.

Table 7: Regression results for demographic and socioeconomic factors

Predictor	Estimate	Standard Error	t-value	p-value
Intercept	4.465	0.357	12.52	<0.001
Age	-0.0376	0.0055	-6.68	<0.001
Income	0.2642	0.0800	3.30	0.001
Education	0.2175	0.0771	2.82	0.005
Model summary	$R^2 = 0.17$	Adjusted $R^2 = 0.15$	$F(3, 300) = 15.1$	$p < 0.001$

Source: own work.

Each additional year of age reduces the WTP for PBDAs by approximately €0.04 on average, holding all other variables constant. This confirms that older consumers are less willing to pay for PBDAs compared to younger consumers. H1a is supported.

For each higher income category, WTP for PBDAs increases by approximately €0.26 on average, holding all other variables constant. This confirms that higher-income consumers are willing to pay more. H1b is supported.

For each higher level of education, WTP increases by approximately €0.22 on average, holding all other variables constant. This confirms that more educated individuals are willing to pay more. H1c is supported.

6.2.2 Testing hypotheses on individual psychographic factors

The second research question examined how individual psychographic factors (health consciousness, environmental concern, animal welfare concern, food curiosity, availability, and food neophobia) are associated with Slovenian consumers' WTP for PBDAs. A multiple linear regression model was used to test hypotheses H2a–H2f, with WTP as the dependent variable and the six psychographic constructs as predictors, as shown in equation (2).

$$WTP_i = \beta_0 + \beta_1(Health_i) + \beta_2(Environment_i) + \beta_3(AnimalWelfare_i) + \beta_4(Curiosity_i) + \beta_5(Availability_i) + \beta_6(Neophobia_i) + \varepsilon_i \quad (2)$$

where WTP_i represents the willingness to pay of respondent i , β_0 is the intercept, and $\beta_1 - \beta_6$ are regression coefficients representing the expected change in WTP associated with a one-unit increase in each independent variable, holding other factors constant. The error term ε_i captures unobserved influences affecting individual WTP.

Table 8 represents regression results for psychographic factors. The model was statistically significant with $p < 0.001$, and achieved an $R^2 = 0.61$, indicating that approximately 61% of the variance in consumers' WTP is explained by psychographic factors.

Table 8: Regression results for psychographic factors

Predictor	Estimate	Standard Error	t-value	p-value
Intercept	1.650	0.120	13.727	$p < 0.001$
Health concerns	0.691	0.066	10.50	$p < 0.001$
Environmental concerns	0.720	0.063	11.50	$p < 0.001$
Animal welfare	0.724	0.062	11.70	$p < 0.001$
Food curiosity	0.508	0.063	8.09	$p < 0.001$
Availability	-0.036	0.060	-0.61	0.541
Food neophobia	-0.396	0.053	-7.38	$p < 0.001$
Model summary	$R^2 = 0.61$	Adjusted $R^2 = 0.60$	$F(6, 298) = 78.5$	$p < 0.001$

Source: own work.

Health concerns are strongly and positively associated with WTP, indicating that consumers who prioritize their health and believe PBDAs are healthier are significantly more willing to pay higher prices. H2a is supported.

Environmental concerns are also strongly and positively associated with WTP, indicating that consumers who are environmentally conscious and believe PBDAs are environmentally sustainable are significantly more willing to pay higher prices. H2b is supported.

Animal welfare is also positively and significantly associated with WTP, meaning that consumers who care more about animal welfare and perceive PBDAs as more animal-friendly options are prepared to pay higher prices. H2c is supported.

Food curiosity has a positive and significant association with WTP, implying that individuals who enjoy trying new foods tend to show greater WTP. H2d is supported.

Availability is not statistically significant, suggesting that perceived product availability does not have a significant impact on consumers' WTP. H2e is not supported.

Food neophobia has a negative and significant association with WTP, indicating that consumers who are more reluctant to try unfamiliar foods are less willing to pay for PBDAs. H2f is supported.

6.2.3 Testing hypothesis on product attributes

The third research question examined how product attributes are associated with Slovenian consumers' WTP for PBDAs. A multiple linear regression model was used to test hypothesis H3, with WTP as the dependent variable and the eight product attributes as predictors, as shown in equation (3).

$$WTP_i = \beta_0 + \beta_1(Taste_i) + \beta_2(Texture_i) + \beta_3(Origin_i) + \beta_4(Certification_i) + \beta_5(Brand_i) + \beta_6(Nutrition_i) + \beta_7(Packaging_i) + \beta_8(Price_i) + \varepsilon_i \quad (3)$$

where WTP_i represents the willingness to pay of respondent i , β_0 is the intercept, and $\beta_1 - \beta_8$ are regression coefficients representing the expected change in WTP associated with a one-unit increase in each independent variable, holding other factors constant. The error term ε_i captures unobserved influences affecting individual WTP.

Table 9 represents regression results for product attributes. The model was statistically significant with $p < 0.001$, and achieved an $R^2 = 0.23$, indicating that approximately 23% of the variance in consumers' WTP is explained by product attributes.

Table 9: Regression results for product attributes

Predictor	Estimate	Standard Error	t-value	p-value
Intercept	3.056	0.551	5.56	$p < 0.001$
Taste	0.285	0.128	2.22	0.027
Texture	0.086	0.189	0.46	0.647
Origin	0.283	0.124	2.29	0.023
Certification	0.529	0.198	2.67	0.008
Brand	0.015	0.154	0.10	0.923
Nutrition	0.132	0.136	0.97	0.333
Packaging	0.048	0.172	0.28	0.779
Price	-0.187	0.056	-2.90	0.004
Model summary	$R^2 = 0.23$	Adjusted $R^2 = 0.20$	$F(8, 296) = 10.75$	$p < 0.001$

Source: own work.

Taste is strongly and positively associated with WTP. Consumers who find the taste of PBDAs appealing are generally more willing to pay higher prices.

Texture is not significantly associated with WTP. This suggests that the texture and mouthfeel of PBDAs are not a decisive factor for most consumers.

Origin is strongly and positively associated with WTP. PBDAs with clearly identified origins tend to be perceived as more trustworthy among consumers, increasing their WTP.

Environmental certification had the strongest positive association with WTP among all predictors, indicating that consumers are willing to pay more for labeled PBDAs.

Brand is not significantly associated with WTP, indicating that brand name or recognition does not play a major role in determining consumers' WTP for PBDAs.

Nutritional value, interestingly, showed no significant association with WTP, despite consumers being highly motivated by health consciousness.

Packaging was not significantly associated with WTP either, implying that design or packaging sustainability does not strongly affect consumers' WTP for PBDAs.

Price was negatively and significantly associated with WTP, as price-sensitive consumers were less willing to pay for PBDAs.

H3 is thus partially supported.

6.3 Summary of main findings

The research of this thesis resulted in four main findings. Firstly, the main findings from descriptive statistics highlight key patterns in consumer behavior and preferences regarding PBDAs. Survey revealed that most consumers frequently use PBDAs, with PBMA being the most popular, which reflects current market trends. They are mostly driven by taste, health, environmental concern, and animal welfare, while high prices and limited availability remain key barriers. Taste, environmental certification, and nutritional value are the most important product attributes influencing purchasing decisions.

The second one is the confirmation of the hypotheses about the association between demographic and socio-economic factors with consumers' WTP for PBDAs. Age is negatively associated with consumers' WTP for PBDAs, while income and education levels are positively associated with WTP.

The third one is the confirmation of the hypotheses about the association between psychographic factors with consumers' WTP for PBDAs. Health concerns, environmental concerns, animal welfare, and food curiosity are positively associated with WTP for PBDAs, while food neophobia is negatively associated with WTP for PBDAs. Despite many

respondents complaining about the limited availability of PBDAs in Slovenian stores, there was no statistically significant association found.

The fourth one is the partial confirmation of the hypotheses about the association between product attributes with consumers' WTP for PBDAs. Taste, origin, and environmental certification are significantly associated with WTP, while price importance is negatively associated with it. The remaining attributes, including texture, brand, nutrition, and packaging, are not significantly associated with WTP.

Last but not least, this thesis utilized the payment card approach, applying several econometric models to estimate WTP. Across all models, consistent WTP patterns emerged. Consumers showed the highest WTP for PBIAs and PBCAs. Among PBMAAs, almond and coconut milk have the highest WTP, while soy milk has the lowest.

Table 10 presents a comprehensive summary of the proposed hypotheses and the corresponding empirical results.

Table 10: Summary of hypothesis testing

Hypothesis	Statement	Result
H1a	Age is negatively associated with consumers' willingness to pay.	Supported
H1b	Income is positively associated with consumers' willingness to pay.	Supported
H1c	Education level is positively associated with consumers' willingness to pay.	Supported
H2a	Health consciousness is positively associated with consumers' willingness to pay.	Supported
H2b	Environmental concerns are positively associated with consumers' willingness to pay.	Supported
H2c	Animal welfare concerns are positively associated with consumers' willingness to pay.	Supported
H2d	Food curiosity is positively associated with consumers' willingness to pay.	Supported
H2e	Availability is positively associated with consumers' willingness to pay.	Not supported
H2f	Food neophobia is negatively associated with consumers' willingness to pay.	Supported
H3	The importance consumers attach to product attributes of plant-based dairy alternatives is positively associated with their willingness to pay, except for price, where higher importance is negatively associated with willingness to pay.	Partially supported

Source: own work.

7 DISCUSSION

As PBDAs are still an emerging product category in Slovenia, understanding consumers' WTP becomes increasingly relevant. Based on the thesis findings, this chapter provides a discussion of findings, implications, recommendations for different industry stakeholders, and, lastly, limitations and further research.

7.1 Discussion of findings

This thesis provides several important insights into Slovenian consumers' WTP for PBDAs. Findings indicate that higher income and education levels positively correlate with WTP, while age is negatively associated with WTP, which is consistent with previous findings (Su et al., 2024; Ammann et al., 2023; De Castro Carvalho et al., 2025).

Psychographic and motivational factors, such as health consciousness, environmental and animal welfare concerns, and food curiosity, are all positively associated with WTP, while food neophobia is negatively associated with it. These findings confirm evidence from Rombach et al. (2023), Adamczyk et al. (2022), and Haas et al. (2019). Notably, this thesis found that food neophobia had a negative association with WTP, indicating that consumers reluctant to try new foods are less willing to pay. While Su et al. (2024) reported a positive association between neophobia and WTP, other research (Chen et al., 2025; Kuosmanen et al., 2025) supports the negative direction found in this thesis.

Among product attributes, taste, origin, and certification were key determinants of WTP, whereas price sensitivity acted as a major barrier, which is also consistent with previous findings (Wang et al., 2025; Madududu et al., 2024).

Overall, these findings suggest that Slovenian consumers share many behavioral patterns with broader European trends, while also reflecting market-specific dynamics that shape their WTP for PBDAs.

7.2 Implications and recommendations

From a theoretical perspective, this thesis broadens the theoretical scope by investigating consumers' WTP over the whole PBDA spectrum. Despite the growing popularity and relevance of PBDAs, the majority of research focus has remained on PBMAAs, with little academic attention paid to other categories such as plant-based yogurt, cheese, butter, and desserts. Moreover, to date, there have been no studies on the Slovenian consumers' attitudes, preferences, or WTP for PBDAs. In the Slovenian market, PBDAs are still a developing category, which requires detailed research on consumer behavior. The thesis also draws conceptual connections to behavioral models such as the TPB by considering how attitudes, subjective norms, and perceived control manifest in actual WTP outcomes. Furthermore, this thesis also contributes to methodological literature. Unlike other studies on WTP for

PBDAs, this thesis uses a special type of stated preferences method, called the payment card approach, that is particularly useful for emerging product categories such as PBDAs.

From a practical perspective, this thesis has numerous practical implications that might be insightful for businesses in this industry, retailers, marketers, NGOs, and policymakers.

For producers, the findings from this thesis provide an overview of drivers and barriers to PBDAs consumption and their associations with WTP. The results show that health consciousness, environmental concerns, animal welfare, and food curiosity are associated with higher consumers' WTP, while food neophobia is associated with lower consumers' WTP. This suggests that pricing strategies, distribution, and product positioning should be adjusted in the future. Producers should also rethink product packaging and highlight the health and environmental benefits of PBDAs more. Aside from messaging strategies, packaging should also be visually appealing, so it attracts not only environmentally motivated consumers but also those who care about aesthetics. The labels that emphasize environmental certifications, ethical production, and nutritional value might increase the perceived value of products. Furthermore, producers should constantly innovate and think about new flavors. Aside from using innovative ingredients and flavors, they might also develop different variations of PBDAs that are used at different times of day and events.

For retailers, the findings highlight the importance of taste. Retailers should promote taste sample trials, tasting campaigns, and visibility of flavor-related claims in stores. Furthermore, despite the availability not being statistically significant in the regression, many respondents stated and commented that this issue is the most significant pain point in their purchase process. The majority of smaller or local markets have limited distribution and assortment on their shelves. Therefore, expanding the share of the planograms that PBDAs can take and widening distribution is crucial for further market development. Retailers should also support PBDAs with additional second placements, wobblers, and other in-store promotion types.

For marketers, findings are crucial to reflect on communication and segmentation strategies. They should reconsider their marketing strategies to better address specific target groups. This thesis emphasizes that younger, more educated, and higher-income consumers on average have higher WTP for PBDAs. These consumers are expected to respond well to messages about health benefits and environmental sustainability. On the other hand, food neophobia is negatively associated with consumers' WTP, urging the need for education-based messages. Education can take part in all marketing materials, social media, and also in-store by implementing taste tests. Education does not necessarily need to be about nutritional value, but can also be in the form of simple recipes in order to increase familiarity with products.

NGOs and public institutions are the ones who should support these educational campaigns. These organizations have the legitimacy needed to raise awareness among people. They

should communicate the health benefits of PBDAs as well as their contribution to environmental sustainability and achieving SDGs. By doing so, they could increase familiarity and consequently acceptance and WTP.

Finally, for regulators and policymakers, findings implicate an urgent need to provide support to the PBDAs industry. As previously mentioned in the literature overview, PBDAs play an important role in sustainable food systems, and the structural shift in dietary habits is inevitable. Regulators and policymakers should rethink subsidies, implement fair taxation for PBDAs, and also support the industry with grants. Moreover, they should re-evaluate the current regulations regarding labeling, making it more favorable to PBDAs and their marketing.

7.3 Limitations and further research

While this study provides valuable insights into Slovenian consumers' WTP for PBDAs, several limitations must be acknowledged. Firstly, there are several limitations related to the methodological part that can influence the validity and generalizability of the findings. This thesis relies on self-reported data that was collected through an online questionnaire, leaving room for self-selection bias and social desirability bias. According to Ting et al. (2025), snowball sampling usually lacks control over sample composition and has limited representativeness. Additionally, the payment card approach can sometimes be affected by a range bias, centering bias, and endpoint bias. Thus, there is a possibility that participants understate or overstate their WTP, creating a gap between hypothetical and real WTP. Future studies could tackle WTP using revealed preference data, such as experiments, to reinforce the findings.

The data for this study were collected only in Slovenia, meaning that the results cannot be generalized to other contexts. Although this thesis provides valuable localized insights, further research could explore regional and cross-cultural differences in WTP across Europe. Moreover, future studies could make a generational comparison to examine long-term dietary trends. Furthermore, the research focused mostly on current consumers of PBDAs in order to gain rich insights into drivers, barriers, and product attributes preferences. Since only 33 non-consumers filled out the survey, stating their reasons for non-consumption, this study does not provide a lot of insight into the behavior of non-consumers. Future studies could adopt a more comparative approach, comparing both groups. A longitudinal study could also be performed in the future to compare this data over time, since consumer behavior is constantly evolving.

8 CONCLUSION

The purpose of this thesis was to develop a comprehensive understanding of Slovenian consumers' WTP for PBDAs. The research questions focused on examining how socio-

demographic, psychographic, and product attribute factors are associated with consumers' WTP for PBDAs. With the work above, the main goals of the thesis were accomplished by identifying the key drivers and barriers influencing consumers' WTP for PBDAs, analyzing the role of product attributes, estimating WTP among Slovenian consumers, comparing these findings with existing research, and offering practical recommendations for industry stakeholders and policymakers.

The thesis revealed several key insights into consumer behavior related to PBDAs. Firstly, descriptive statistics showed that most Slovenian consumers frequently use PBDAs daily, especially PBMA. The main drivers identified are taste, health, environmental concern, and animal welfare, while key barriers are high prices and limited availability. Taste, environmental certification, and nutritional value are the most important product attributes influencing purchasing decisions. Secondly, demographic factors reveal that age is negatively associated with WTP for PBDAs, while income and education are positively associated with WTP. Thirdly, psychographic factors indicate that health and environmental concerns, animal welfare, and food curiosity are positively associated with WTP, whereas food neophobia is negatively associated with WTP. Lastly, the most important product attributes associated with higher WTP are taste, origin, and environmental certification. On the other hand, price is negatively associated with WTP.

The main added value of this thesis is that it is the first one to provide a comprehensive analysis of WTP for the whole PBDA category. It is also the first study on WTP for PBDAs in Slovenia, which highlights its regional originality. Aside from that, it also has several methodological contributions. By applying the payment card approach across multiple econometric models, this study provides a multidimensional and robust estimation of consumers' WTP. This approach enhances the precision and comparability of results, offering a valuable methodological reference for future consumer behavior research. It also connects consumer attitudes to WTP through the TPB and integrates various factors influencing WTP, including socio-demographic, psychographic, and product attribute factors. Lastly, it outlines practical implications for producers, retailers, marketers, NGOs, and policymakers regarding PBDAs. Since this area of research is still relatively new, there are numerous opportunities for future research. Future studies might also benefit from a comparative approach involving both consumers and non-consumers and consider a longitudinal design to track evolving consumer behavior.

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APPENDICES

Appendix 1: Povzetek (Summary in Slovene language)

Vse večja osredotočenost na trajnost je znatno vplivala na vedenje potrošnikov, zlasti v živilski industriji. Evropski potrošniki se vse pogosteje odločajo za rastlinske alternative mlečnim izdelkom (PBDAs), ki vključujejo mleko, jogurt, sir, maslo, smetano, sladoled in druge sladice (Adamczyk et al., 2022). Ti izdelki spadajo v pet širših skupin: izdelki na osnovi žit (riž in oves), izdelki na osnovi stročnic (grah in soja), izdelki na osnovi zelenjave (krompir), izdelki na osnovi semen (lan in konoplja) in izdelki na osnovi oreškov (mandlji, kokos in indijski oreški). Prehranske lastnosti PBDA se zelo razlikujejo glede na surovine, obogatitev in predelavo. Vendar Craig et al. (2023) trdijo, da imajo PBDA podobno ali celo boljšo prehransko kakovost kot mlečni izdelki, saj vsebujejo zadostne količine beljakovin, joda, mineralov in vitaminov B2 in B12.

Čeprav se PBDA pogosto obravnavajo kot sodoben pojav, povezan z zdravim življenjskim slogom in trajnostjo, njihovi začetki segajo v starodavno Kitajsko v času dinastije Han. Prvi komercialni PBDA je bil sojin napitek, ki ga je leta 1910 v Parizu začel proizvajati kitajski biolog Li Yu-Ying. V šestdesetih letih 20. stoletja je prišlo do pomembnega preboja z izboljšanjem embalaže in okusa, kar je spodbudilo širitev trga. Danes številna podjetja nenehno inovirajo, dodajajo nove okuse in izboljšujejo teksturo, da bi pritegnila širši krog potrošnikov (Linné & McCrow-Young, 2017; Herring, 2024). Tudi v Sloveniji se potrošniške preference vse bolj usmerjajo v PBDA, kar je posledica večje priljubljenosti veganstva, naraščajoče laktozne intolerance in okoljske ozaveščenosti. Trg zaznamujejo povečana tržna dejavnost, močnejša konkurenca in večja cenovna občutljivost (Global Monitor, 2025). Najbolj razširjene so alternative mleku, kot so soja, mandelj, oves, riž, kokos, pira in pistacija, medtem ko alternative jogurtu pridobivajo na pomenu, druge kategorije, kot so sir, smetana in sladice, pa imajo še veliko možnosti za rast.

Razumevanje pripravljenosti za plačilo (WTP) za PBDA presega vprašanje cene, saj vključuje stališča, motive in ovire, ki vplivajo na nakupne odločitve. Teorija načrtovanega vedenja (TPB) (Ajzen, 2015) pojasnjuje, da stališča, subjektivne norme in zaznani nadzor oblikujejo vedenjske namere. Med glavnimi motivatorji za nakup PBDA so zdravstvena ozaveščenost (Rombach et al., 2023; Su et al., 2024; Martínez-Padilla et al., 2023; Mäkinen et al., 2015), okoljska in etična skrb (Haas et al., 2019; Rombach et al., 2023; Su et al., 2024), radovednost in raznolikost prehrane (Adamczyk et al., 2022; Ammann et al., 2023) ter dostopnost in družbeni vpliv (Hansen et al., 2023; Kuosmanen et al., 2025). Najpogostejše ovire so senzorične pomanjkljivosti, visoka cena in kulturna navezanost na mlečne izdelke (Haas et al., 2019; Adamczyk et al., 2022; Hansen et al., 2023; Östlund et al., 2024; Philippi Rosane et al., 2025). Raziskave o WTP so še vedno omejene in se večinoma osredotočajo na rastlinske alternative mleku (Madududu et al., 2024; Rombach et al., 2023; Su et al., 2024; Wang et al., 2025). Ugotovitve kažejo, da WTP oblikujejo zdravstvena ozaveščenost, okoljska naravnost, demografske značilnosti, okus, radovednost in dobrobit živali, medtem ko cena in stopnja poznanosti delujeta kot ovira (Szczepanski et al., 2025; Laassal

& Kallas, 2019). Poleg tega se WTP razlikuje glede na regijo in demografske skupine (Rombach et al., 2023; Adamczyk et al., 2022; Mekanna et al., 2024; Hansen et al., 2023).

Namen magistrske naloge je bil preučiti pripravljenost potrošnikov za plačilo za PBDA ter glavne dejavnike, ki vplivajo na njihove nakupne odločitve. Raziskava je obravnavala povezave med demografskimi, psihografskimi in atributnimi dejavniki ter WTP v Sloveniji. Podatki so bili zbrani s spletnim vprašalnikom prek orodja 1KA, z uporabo verižnega vzorčenja, in analizirani v programu R Studio. Za oceno WTP je bil uporabljen pristop plačilne lestvice (payment card approach).

Rezultati kažejo, da je starost negativno povezana z WTP, medtem ko dohodek in izobrazba pozitivno vplivata nanjo. Potrošniki z višjo zdravstveno ozaveščenostjo, večjo okoljsko skrbjo, skrbjo za dobrobit živali ter večjo prehransko radovednostjo izražajo višjo pripravljenost za plačilo, medtem ko tisti s prehransko neofobijo izražajo nižjo. Okus, poreklo in okoljski certifikat povečujejo pripravljenost za plačilo, medtem ko pomembnost cene nanjo vpliva negativno.

Glavni prispevek naloge je v tem, da predstavlja prvo celovito analizo pripravljenosti za plačilo za celotno kategorijo PBDA v Sloveniji, s čimer zapolnjuje vrzel v obstoječi literaturi. Metodološko uporaba pristopa plačilne lestvice v več ekonometričnih okvirih omogoča večdimenzionalno in zanesljivo oceno WTP. Študija povezuje potrošniška stališča z WTP prek teorije načrtovanega vedenja ter vključuje demografske, motivacijske in atributne dejavnike.

Rezultati imajo pomembne praktične implikacije. Proizvajalci lahko spoznanja uporabijo pri oblikovanju cenovnih in trženjskih strategij, trgovci pri širitvi ponudbe, tržniki pa pri ciljnem nagovarjanju mlajših in bolj izobraženih potrošnikov. Nevladne organizacije in oblikovalci politik lahko spodbujajo ozaveščanje o zdravstvenih in okoljskih koristih PBDA, regulatorji pa bi morali razmisliti o spremembah obdavčitve, subvencij in označevanja za spodbujanje trajnostnih prehranskih sistemov.

Kljub pomembnim ugotovitvam ima raziskava nekaj omejitev. Verižni vzorec omejuje reprezentativnost, pristop plačilne lestvice lahko povzroči hipotetična odstopanja med navedeno in dejansko WTP, spletno zbiranje podatkov pa tvega pristranskost zaradi samoselekcije in družbeno zaželenih odgovorov. Zato rezultatov ni mogoče posplošiti izven Slovenije. Prihodnje raziskave bi morale vključiti primerjalne in longitudinalne pristope ter preučiti razlike med porabniki in neuporabniki PBDA.

V zaključku naloga prispeva k boljšemu razumevanju vedenja potrošnikov glede PBDA in izpostavlja ključne demografske, psihografske ter atributne dejavnike, ki oblikujejo njihovo pripravljenost za plačilo. Ugotovitve potrjujejo, da odprtost za inovacije, etične vrednote in trajnostna naravnost pomembno vplivajo na sodobne prehranske izbire ter lahko usmerjajo industrijo in odločevalce k oblikovanju bolj trajnostnega prehranskega sistema.

Appendix 2: Survey

Spoštovani, pred vami je anketni vprašalnik, ki je sestavni del raziskave o pripravljenosti porabnikov plačati za rastlinske alternative mlečnim izdelkom v Sloveniji, na kateri temelji moja magistrska naloga na Ekonomski Fakulteti v Ljubljani. Vprašalnik je anonimen. Hvala za sodelovanje!

Q1 - Ali ste v zadnjem letu kupili ali uživali rastlinske alternative mlečnim izdelkom (npr. ovseni, mandljev ali sojin napitek, rastlinski sir, rastlinski jogurt, rastlinsko maslo)?

- Da
- Ne

Q2 - Kako pogosto uporabljate rastlinske alternative mlečnim izdelkom?

- Več ali manj vsak dan
- 3-4 krat na teden
- 2-3 krat na teden
- Približno enkrat na teden
- Približno enkrat na mesec
- Parkrat letno
- Nikoli

Q3 - Zakaj ne uživate rastlinskih alternativ mlečnim izdelkom? (označite vse, kar velja)

Možnih je več odgovorov.

- Cena je previsoka.
- Okus mi ne ustreza.
- Raje imam tradicionalne mlečne izdelke.
- Ne zanimajo me takšni izdelki.
- Težko jih je najti tam, kjer običajno kupujem.
- Nimam dovolj informacij o njih.
- Ne verjamem, da so bolj zdravi od mlečnih izdelkov.
- Ne vidim koristi v uživanju rastlinskih alternativ.
- Drugo:

Q4 - Katere rastlinske alternative mlečnim izdelkom uporabljate?

Možnih je več odgovorov.

- Rastlinsko mleko
- Rastlinski jogurt
- Rastlinski sir

- Rastlinska smetana
- Rastlinsko maslo
- Rastlinski sladoled
- Drugo:

Q5 - Kakšen delež vašega uživanja mlečnih izdelkov predstavljajo rastlinske alternative? (0-100 %)

Q6 - Ali ste glavni nakupovalec gospodinjstva?

- Da
- Ne

Q7 - Katera oznaka najbolje opiše vašo prehrano?

- Vsejed
- Fleksitarijanec (občasno uživanje mesa)
- Vegetarijanec (ne uživa mesa)
- Vegan (ne uživa nobenih živil živalskega izvora)
- Drugo:

Q8 - Kaj vas motivira, da izberete rastlinske alternative mlečnim izdelkom? (označite vse, kar velja)

Možnih je več odgovorov.

- Laktozna intoleranca
- Alergija na mleko
- Zdrav življenjski slog
- Okus
- Radovednost
- Skrb za okolje
- Dobrobit živali
- Drugo:

Q9 - Prosim, ocenite svojo stopnjo strinjanja z naslednjimi trditvami. (1 = Popolnoma se ne strinjam, 5 = Popolnoma se strinjam)

	1 = Popolnoma se ne strinjam	2 = Nekoliko se ne strinjam	3 = Nevtralno	4 = Nekoliko se strinjam	5 = Popolnoma se strinjam	Ne vem
Pri prehrani dajem prednost						

zdravim izdelkom.						
Verjamem, da imajo rastlinske alternative mlečnim izdelkom zdravstvene koristi.						
Verjamem, da so rastlinske alternative mlečnim izdelkom bolj zdrave od običajnih mlečnih izdelkov.						
Rastlinske alternative mlečnim izdelkom vidim kot del zdravega življenjskega sloga.						
Verjamem, da so rastlinske alternative bolj prijazne do okolja.						
Pomembno mi je, da so rastlinske alternative mlečnim izdelkom trajnostne.						
Izbiro rastlinskih alternativ mlečnim izdelkom vidim kot način zmanjševanja okoljskega odtisa.						

Verjamem, da so rastlinske alternative mlečnim izdelkom bolj prijazne do okolja kot običajni mlečni izdelki.						
Skrbi me stanje okolja in podnebne spremembe.						
Verjamem, da so rastlinske alternative mlečnim izdelkom prijaznejše do živali.						
Menim, da z izbiro rastlinskih alternativ mlečnim izdelkom zmanjšujem trpljenje živali.						
Rastlinske alternative mlečnim izdelkom so v skladu z mojimi etičnimi in moralnimi prepričanji.						
Dobrobit živali igra pomembno vlogo pri mojih prehranskih izbirah.						
Poskušam rastlinske alternative mlečnim izdelkom, ker						

rad/a odkrivam nove vrste hrane.						
Pogosto preizkušam nove rastlinske alternative mlečnim izdelkom, ko pridejo na trg.						
Rad/a se učim o hrani in preizkušam nove izdelke.						
Zanimajo me različni okusi in teksture hrane.						

Q10 - S katerimi ovirami se srečujete pri nakupu rastlinskih alternativ mlečnim izdelkom? (označite vse, kar velja)

Možnih je več odgovorov.

- Previsoka cena
- Omejena dostopnost
- Neznani okus
- Tekstura ali občutek v ustih
- Negativni družbeni pritiski
- Pomanjkanje hranilne vrednosti
- Negotovost glede uporabe
- Drugo:

Q11 - Prosim, ocenite svojo stopnjo strinjanja z naslednjimi trditvami. (1 = Popolnoma se ne strinjam, 5 = Popolnoma se strinjam)

	1 = Popolnoma se ne strinjam	2 = Nekoliko se ne strinjam	3 = Nevtralno	4 = Nekoliko se strinjam	5 = Popolnoma se strinjam	Ne vem
Rastlinskim alternativam mlečnim izdelkom, ki jih						

ne poznam, se običajno izogibam.						
Oklevam pri preizkušanju novih rastlinskih alternativ mlečnim izdelkom.						
Raje ostanem pri znanih mlečnih izdelkih kot poskusim rastlinske alternative.						
Ne maram poskušati novih živil, ki mi niso znana.						
Težko je najti rastlinske alternative mlečnim izdelkom v manjših ali lokalnih trgovinah.						
Rastlinske alternative mlečnim izdelkom so težko dosegljive v trgovinah, kjer običajno nakupujem.						
Slaba razpoložljivost izdelkov me odvrča od pogostejšega nakupa rastlinskih alternativ						

mlečnim izdelkom.						
Pogosto najdem rastlinskih alternativ mlečnim izdelkom, ki jih iščem.						

Q12 - Kako pomembne so za vas naslednje lastnosti pri izbiri rastlinskih alternativ mlečnim izdelkom? (1 = Zelo nepomembna, 5 = Zelo pomembna)

	1 = Zelo nepomembno	2 = Nepomembno	3 = Nevtralo	4 = Pomembno	5 = Zelo pomembno	Ne vem
Okus						
Tekstura						
Cena						
Geografsko poreklo						
Okoljski certifikati						
Blagovna znamka						
Prehranska vrednost						
Embalaza						

Q13 - Kolikšen je najvišji znesek (v EUR), ki ste ga pripravljeni plačati za 1 liter naslednjih rastlinskih napitkov? (Če vpišete 0, to pomeni, da izdelka ne bi kupili.)

	0	1	1.5	2	2.5	3	3.5	4	4.5	5
Sojino mleko										
Ovseno mleko										
Mandljevo mleko										
Riževo mleko										
Kokosovo mleko										

Q13 - Kolikšen je najvišji znesek (v EUR), ki ste ga pripravljeni plačati za 1 liter naslednjih rastlinskih napitkov? (Če vpišete 0, to pomeni, da izdelka ne bi kupili.)

	0	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Rastlinski jogurt (500 g)												
Rastlinski sir (200 g)												
Rastlinsko maslo (250 g)												
Rastlinska smetana (250 ml)												
Rastlinski sladoled (500 ml)												

Q15 - Če bi bile rastlinske alternative mlečnim izdelkom enake cene kot običajni mlečni izdelki, bi jih pogosteje kupoval/a.

- Da
- Ne

Za konec vas prosim, da odgovorite še na nekaj demografskih vprašanj. Ti podatki bodo pomagali pri analizi rezultatov, ne bodo pa povezani z vašimi odgovori.

Q16 - Kateri spol ste?

- Moški
- Ženski
- Drugo:

Q17 - Koliko ste stari?

Q18 - Kakšna je vaša najvišja dosežena izobrazba?

- Osnovna šola
- Poklicna šola
- Srednja strokovna ali splošna
- Višješolska ali višja
- Visokošolska Univerzitetna
- Podiplomski študij
- Doktorat

Q19 - Kakšen je vaš mesečni neto dohodek?

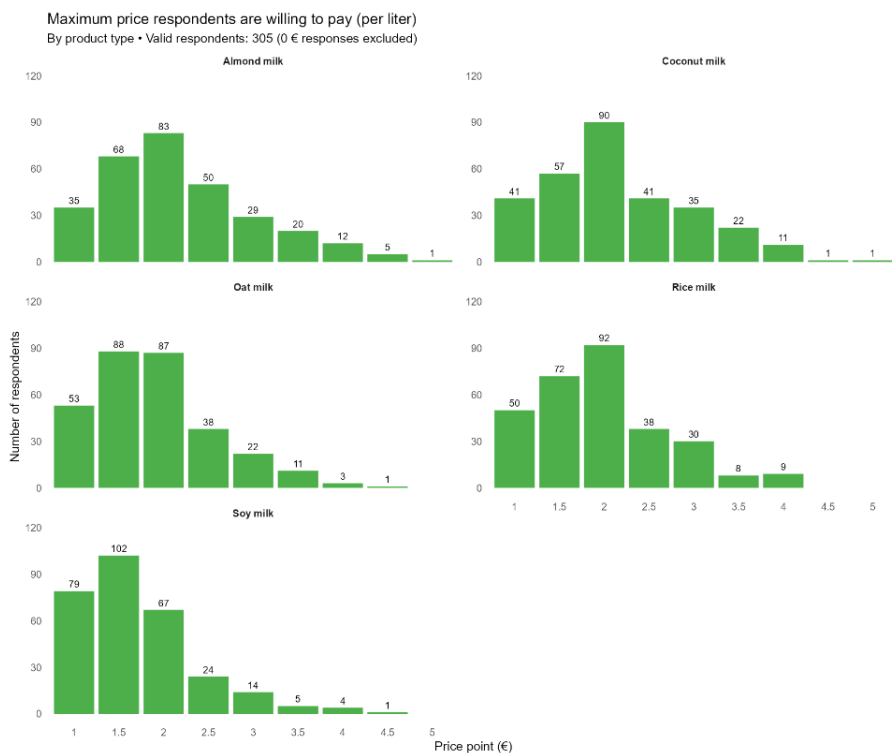
- 900–1200 €
- 1200–1600 €
- 1600–2000 €
- 2000–2500 €

- >2500 €

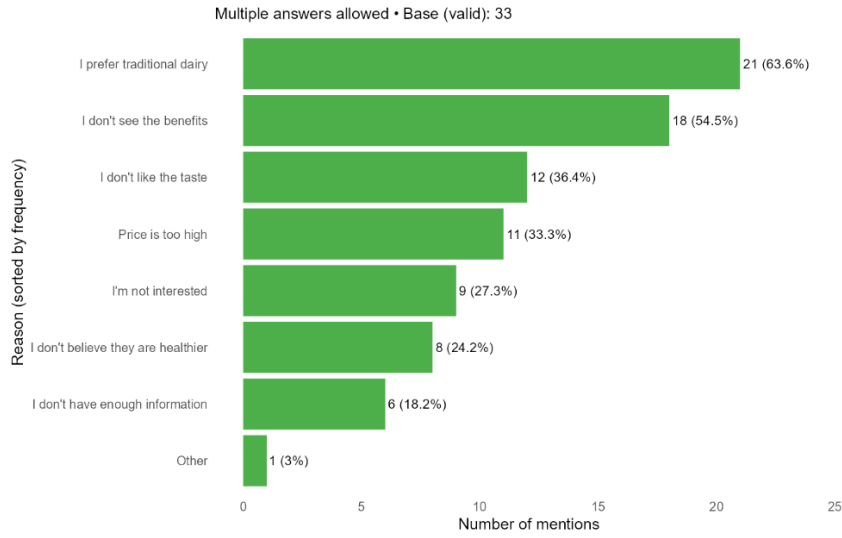
Q20 - Ali imate morda še kakšen komentar ali predlog, ki bi ga želeli dodati?

Hvala, ker ste si vzeli čas za izpolnitev tega vprašalnika.

Appendix 3: Histograms of willingness to pay distributions



Appendix 4: Reasons for non-consumption of plant-based dairy alternatives



Appendix 5: Willingness to pay model specifications and estimation results

The Minimal Legal WTP Model (ML-WTP)

$$ML - WTP = \sum_{i=0}^H A_i * P_i$$

where: A_i denotes selected payment card value and P_i denotes the proportion of respondents choosing A_i

The Interval Midpoint WTP Model (IM-WTP)

$$IM - WTP = \sum_{i=0}^H \frac{A_i + A_{i+1}}{2} * P_i + \frac{A_H + A_T}{2} * P_H$$

where: A_i denotes chosen amount, A_{i+1} denotes the next higher amount on the card, and P_i denotes the proportion of respondents choosing A_i

Payment Card Double-Bounded Model (DB-WTP)

$$DB - WTP_p = \frac{C + \beta * x}{\alpha}$$

where: C denotes the constant, β denotes vector of coefficients, x denotes a vector of variables describing the individual respondent's characteristics, and α denotes income elasticity.

Payment Card Double-Bounded Spike Model (S-WTP)

$$S - WTP = S_i * \frac{C + \beta * x}{\alpha}$$

where: S_i denotes the probability of a respondent being willing to pay (> 0), C denotes the constant, β denotes vector of coefficients, x denotes a vector of variables describing the individual respondent's characteristics, and α denotes income elasticity.

Ordered Probit and Ordered Logit Model (O-WTP)

$$O - WTP = \frac{\sum_{k=0}^n (A_k * P_k)}{\sum_{k=0}^n P_k}$$

where: A_k denotes the chosen WTP of the k^{th} respondent, P_k denotes the estimated probabilities from the Ordered Probit and the Ordered Logit model

Interval Regression Model (I-WTP)

$$I - WTP = X_i \beta + \varepsilon_i$$

where: X_i denotes a vector of variables describing the individual respondent's characteristics, β denotes a vector of coefficients, and ε_i denotes the error term

Table 5.1: Results of econometric models estimating willingness to pay for plant-based dairy alternatives using the payment card approach

Product	ML-WTP	IM-WTP	DB-WTP (probit)	DB-WTP (logit)	S-WTP	O-WTP	I-WTP
Soy milk	€2.82	€3.42	€3.49	€3.48	€3.42	€3.42	€3.49
Oat milk	€3.21	€3.81	€3.88	€3.91	€3.81	€3.81	€3.88
Almond milk	€3.72	€4.32	€4.37	€4.39	€4.32	€4.32	€4.37
Coconut milk	€3.64	€4.23	€4.29	€4.33	€4.23	€4.23	€4.29
Rice milk	€3.32	€3.92	€3.98	€4.02	€3.92	€3.92	€3.98
PBYAs	€3.57	€4.17	€4.22	€4.27	€4.17	€4.17	€4.22
PBCAs	€4.54	€5.15	€5.19	€5.32	€5.15	€5.15	€5.19
PBCRAs	€3.30	€3.89	€3.96	€4.05	€3.89	€3.89	€3.96
PBBAs	€2.94	€3.54	€3.59	€3.52	€3.54	€3.54	€3.59
PBIAs	€6.32	€6.92	€6.96	€7.38	€6.92	€6.92	€6.96

Source: own work.