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Market Insights to Business Strategy: A Foundational Study for a European Insect-Based Food Start-up

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ABSTRACT

English:

This thesis investigates the industry for insect-based products with a focus on German-speaking countries and aims to provide a comprehensive analysis of the market landscape, consumer acceptance, and potential marketing strategies for start-ups in this emerging field. A mixed methods approach was used for the research, including a comprehensive literature review, competitive analysis, consumer survey, market analysis, and market segmentation. Key findings indicate a growing trend in the acceptance of insect-based products, particularly among the population's younger, educated, and physically active segments. The market analysis revealed the potential for value innovation via a blue ocean strategy that addresses untapped niches such as fitness and health enthusiasts, and environmentally conscious consumers. Given the unique and novel challenges associated with marketing insect-based products, a multi-faceted marketing strategy that leverages niche marketing, online presence, influencer collaboration, and educational initiatives is recommended. While this study provides valuable insights into the insect-based products industry, it also reveals the need for further research, particularly in areas such as the regulatory landscape, sustainability issues, multiple product categories, and consumer behavior psychology. Overall, this work provides a foundation for future academic research and practical strategies for start-ups seeking to compete in the insect products industry.

Keywords: Alternative Protein, Start-up Strategy, Consumer Behavior, Market Analysis, Environmental Sustainability, Circular Economy

Title: Market Insights to Business Strategy: A Foundational Study for a European Insect-Based Food Start-up

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Portuguese:
Esta tese investiga a indústria de produtos à base de insetos, com foco nos países de língua alemã, e visa fornecer uma análise abrangente do cenário de mercado, aceitação do consumidor e potenciais estratégias de marketings para start-ups neste campo emergente. Uma abordagem de métodos mistos foi utilizada para a pesquisa, incluindo uma revisão abrangente da literatura, análise competitiva, pesquisa de consumidores, análise de mercado e segmentação de mercado. Os principais resultados indicam uma tendência crescente na aceitação de produtos à base de insetos, particularmente entre os segmentos mais jovens, educados e fisicamente ativos da população. A análise de mercado revelou o potencial para inovação de valor através de uma estratégia de oceano azul que atende a nichos não explorados, como entusiastas de fitness e saúde, consumidores ambientalmente conscientes. Dado os desafios únicos e novos associados ao marketing de produtos à base de insetos, é recomendada uma estratégia de marketing multifacetada que aproveite o marketing de nicho, presença online, colaboração com influenciadores e iniciativas educacionais. Embora este estudo forneça informação valiosa sobre a indústria de produtos à base de insetos, também revela a necessidade de mais pesquisa, particularmente em áreas como o cenário regulatório, questões de sustentabilidade, múltiplas categorias de produtos e a psicologia do comportamento do consumidor. No geral, este trabalho fornece uma base para futuras pesquisas acadêmicas e estratégias práticas para start-ups que buscam competir na indústria de produtos de insetos.

Palavras-chave: Proteína Alternativa, Estratégia de Start-up, Comportamento do Consumidor, Análise de Mercado, Sustentabilidade Ambiental, Economia Circular
Título: Perspectivas do Mercado para a Estratégia Empresarial: Um Estudo Fundamental para uma Start-up Europeia de Alimentos à Base de Insetos
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B2B	Business to Business
B2C	Business to Consumer
CAGR	Compound Annual Growth Rate
DACH	Germany (D), Austria (A), and Switzerland (CH)
EU	European Union
EUR	Euro
GHG	Green House Gas
Kcal	Kilocalorie
KPI	Key Performance Indicator
NPD	New Product Development
R&D	Research and Development
SEO	Search Engine Optimization
USD	United States Dollar
USP	Unique Selling Point
WTB	Willingness to Buy

CHAPTER 1: INTRODUCTION

1.1 Background

It is commonly acknowledged that there will be around 9.7 billion people on the planet by 2050 (Neil Ruiz et al., 2020). There will be a large gap between the amount of food we produce today, and the amount needed to feed everyone by that time. The land is limited, and increasing the area used for agriculture is rarely a practical or sustainable solution. Oceans are overfished, and water shortages brought on by climate change may have significant effects on food production and human life. What we eat and how it is produced need to be reevaluated to meet the food and nutrition issues of both now and generations to come. In 2022, 349 million people across 79 countries were facing acute food insecurity (World Food Programme, n.d.). This insecurity is caused by many environmental aspects. To tackle these problems, food waste must be decreased, inefficiencies must be fixed, and emissions must be reduced drastically (Janet Ranganathan et al., 2018). Livestock, which includes beef, pork, chicken, sheep, and other common animals which are mainly used for the production of milk and meat, has been a significant source of protein for human consumption for centuries, but research also shows, that the livestock industry is a major contributor to environmental problems such as water pollution and deforestation. The total emissions from global livestock represent 14.5% of all anthropogenic Green House Gas (GHG) emissions per year (Food and Agriculture Organization of the United Nations, 2013).

In recent years, alternative sources of protein such as plant-based, have gained popularity due to their potential to address these environmental issues. Another source is insects, which have been consumed by humans, in many of the eastern parts of the world, for centuries counting over two billion consumers already (van Huis et al., 2013). Insects have a much smaller environmental footprint compared to traditional livestock, and their production requires significantly less land, water, feed, and resources (Statista Research Department, 2016). Insects, rich in protein, vitamins, and minerals, can compete with common protein sources in nutritional value. While most edible insects originate from forests, mass-rearing techniques are emerging worldwide. Despite less-developed research compared to other protein sources, insects offer a unique opportunity in both developed and developing countries to blend traditional knowledge with advanced research. Since the research and production processes are not as developed and advanced as they are for the “conventional” protein sources which are mentioned above, the prices for insects (around USD 4.25 per 200kcal) are the highest after cultured beef (around

USD 6.25 per 200kcal) compared to pork (around USD 0.3 per 200kcal) or beef (USD 0.6 for 200kcal) and therefore only available for a specific customer group (Lisa Sweet, 2019).

The increasing demand and production for meat alternatives, which are mostly plant-based are increasing worldwide. From 2019 the production capacity (in tons) of meat alternatives in Germany has increased by 68.0%, compared to 2022 (Destatis, 2022). This suggests that there is a potential market for insect-based food products among consumers who are looking for more sustainable protein sources. Especially in countries with economic wealth, consumers' awareness and interest in alternative proteins are growing (Bashi et al., 2019). This is supported by law from the European Union, which approved the dried yellow mealworm (Latin: Tenebrio molitor) as the first edible insect, in May 2021 (European Commission; Representative in Germany, 2023). However, it is currently a very small niche market in the EU (European Commission, 2023).

The growing interest in insect-derived protein is evident in both academic and business spheres, as companies explore developing insect-based products throughout the entire supply chain. While there may be some reluctance in Western societies, the potential of these products is substantial, presenting a sustainable and cost-effective alternative to traditional protein sources. In addition, there's a promising opportunity for start-ups targeting the sale of insect-based products or supplements. This dissertation will shed light on this topic, particularly timely given the recent legislation in Europe allowing the sale of such products. The global market for protein supplements is projected with a compound annual growth rate (CAGR) of 8.0% from 2022 to 2030 (Grand View Research, 2021). Since this thesis primarily focuses on a launch of an insect-based product in the German-speaking market, the market value of edible insects in Europe is forecasted with a CAGR of 27% from 2018 to 2023 and a value of 262.6 million USD, which is higher than in Latin America with 250.6 million USD (Bloomberg & Meticulous Research, 2018), where insects are already consumed regularly. Consumers who are concerned about sustainability and the environmental impact of their food choices may find insect-based products to be a unique offering in the market, given their capacity to provide a sustainable source of protein.

1.2 Problem Statement

As the global population continues to increase, so does the demand for protein. However, traditional livestock protein production is associated with significant environmental and ethical concerns. Insect-based protein supplements have emerged as a potentially sustainable alternative, but their market potential and consumer acceptance in German-speaking countries, which include Germany, Austria, and Switzerland, remain largely unexplored. This thesis aims to investigate the market potential and develop a marketing strategy for a German-based start-up that aims to sell insect-based products as a sustainable source of protein. The study will also examine consumer attitudes toward insect-based protein products, while simultaneously exploring the potential of crowdfunding as a financial strategy. The goal is to navigate possible barriers and promote the adoption of more sustainable protein sources, while also gauging consumer support for the start-up through their willingness to contribute to its crowdfunding efforts.

Therefore, this dissertation will be examining the three following research questions:

1) What are the key demographic and behavioral characteristics influencing consumer acceptance and willingness to purchase insect-based food products in the German-speaking market?
2) Considering the competitive landscape and consumer attitudes in German-speaking regions, what effective strategies can be used for insect-based protein supplements?
3) How can the insights from consumer attitudes and preferences be leveraged, along with competitive e-commerce performance, to design a unique value proposition for a start-up in the European insect-based food industry?

1.3 Relevance

This thesis enriches the existing body of knowledge understanding consumer behavior and market dynamics in the insect-based products industry through a detailed market, competitors, and consumer analysis, aiding in business strategy formulation. It investigates the insect-based food sector's current status, trends, potential, and competition, spotlighting market opportunities and challenges. This information facilitates the identification of untapped niches, marketing strategy development, and competitive differentiation. The competitive analysis offers an in-depth assessment of key industry players, their product offerings, pricing strategies, and distribution channels, guiding improvements in market positioning. A consumer survey will identify key factors to draw conclusions about consumer behavior and acceptance of insect-

based products. This aids in tailoring marketing and product strategies to specific segments for increased adoption. In conclusion, this thesis addresses the gap in the literature by providing a multifaceted analysis of the insect-based industry in German-speaking markets, blending market and competitor analyses with consumer insights. The findings promote a deeper understanding of consumer acceptance, market opportunities, and effective marketing strategies, enabling companies to make informed decisions in this burgeoning industry.

CHAPTER 2: LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

The review of the literature shows that insect-based products are academically not very well researched since they are a so-called Novel Food by law in the European Union (EU). Novel Food is defined as food that had not been consumed to a significant degree by humans in the EU before May 15th, 1997. Additionally, foods that have recently been invented or are traditionally consumed outside of the EU may fall under the Novel Food category, as well as foods produced using new technology and manufacturing techniques. For example, chia seeds, which are well-known and widely consumed in Europe, also fall into the Novel Food category (European Commission, n.d.). The investigation demonstrates that interest in edible insect substitutes for animal protein is growing quickly. This trend is supported by the recent legalization of the dried yellow mealworm in 2021 and the inclusion of an increasing number of insect species in the EU (European Commission, 2023) which has drawn further attention from both the media and consumers. Nevertheless, consumer acceptance of insect-based food like protein powder, ready-to-drink shakes, or convenience food has not been extensively researched.

The literature review is divided into three main sections to investigate how potential consumers can be targeted. The first part focuses on market analysis. The second section examines potential customers, their behavior, and factors that influence acceptance of Novel Foods, specifically insect-based food. Lastly, the final parts investigate crowdfunding as a financing tool as well as possible marketing strategies and marketing channels for that start-up.

2.1 Market and competitor analysis

Market and competitor analysis is vital for business strategy, offering insights into a market's current and future conditions. This process systematically evaluates factors like competition, consumer behavior, and regulations, influencing a company's success. It provides a market overview, helping businesses identify opportunities, assess risks, and formulate product, marketing, and sales strategies. Competitor analysis allows a start-up to identify existing businesses and potential consumer groups. It offers a comprehensive view of the market's size, growth potential, and trends, aiding firms in understanding their target market and strategizing effectively.

2.1.1 Competitor and Market Segmentation

Competitor segmentation involves categorizing market competition based on specifics like customer segments, location, pricing, product range, and marketing. This helps businesses comprehend their competition, identify opportunities or threats, and formulate strategies for competitive advantage. Useful for businesses from start-ups to multinational corporations, it offers a detailed understanding of the competitive landscape, enabling informed decisions on effective competition. Market segmentation is used for two purposes: (1) to identify new product opportunities or markets that may perform well in the positioning of current products, and (2) to improve advertising communications by better understanding the target audience (Beane et al., 1987).

Even though Steenkamp & Hofstede (2002) state that international segmentation is becoming an increasingly crucial marketing strategy as the corporate world gets more globalized, this will not be considered in the beginning lifecycle of this start-up, due to limited resources which will be available. The business will primarily focus on a multi-national or marketing strategy for German-speaking countries which include Austria, Switzerland, and Germany since these markets are very homogenous.

A suited tool to do this segmentation could be a classical X- and Y axes (or an adapted Boston Consulting Group matrix) approach to visualize the current market situation.

2.1.2 Porter Five Forces

Competitor identification is an essential component to understand competitive dynamics (Gur & Greckhamer, 2019). In today's digital age, competitors can be identified and analyzed with the aid of the internet. One of the most popular frameworks for competitor analysis is Porter's Five Forces Model, introduced by Michael Porter in 1979. This model identifies five key forces that determine the intensity of competition in an industry: the threat of new entrants, the bargaining power of suppliers and buyers, the threat of substitute products, and lastly, the rivalry among existing competitors (Porter, 1979).

Although this model remains widely used, recent research has proposed that it may not be adequate for analyzing competition in the modern business environment. One critique is, that the model underestimates the rapidly changing customer preferences, as their choices and consumption have become increasingly irrational (Cummings et al., 2015). Another aspect that is not implemented in this model is the shift toward collaboration: In numerous industries, companies are partnering with their competitors to achieve mutual benefits and advantages (Gnyawali & Park, 201; Rizvanović et al., 2023).

2.1.3 Red and Blue Ocean Strategy

As insect-based products are classified as Novel Foods and remain a niche product in Western countries, therefore the competition could be relatively low. A few players have already entered the market and will be analyzed later on. A blue ocean strategy emphasizes the creation of new markets and demand, along with establishing uncontested spaces within existing markets, as opposed to directly competing with rivals in saturated markets. Characterized by new demand and significant profitable growth, these markets offer promising opportunities (Kim & Mauborgne, 2015).

In red oceans, growth and profits are limited due to the crowded market. Although competition in blue oceans is considered irrelevant because it is not yet established, the start-up would still encounter some competitors. Blue ocean's strategies create value for both customers and companies. This approach is based on the idea that market boundaries and industry structures are not static and can be reshaped by the actions and beliefs of industry players. This contrasts with the competitive red ocean strategy, which assumes that the structural conditions of an industry are predetermined and that companies must compete within these constraints. Moreover, those adopting a reconstructive perspective acknowledge that market structures and boundaries are mentally constructed and choose not to be limited by them. One of the greatest challenges for organizations that identified this blue ocean is that they lack market-creating tools and guidance to turn their vision into reality (Blue Ocean Team, n.d.). They identify untapped demand potential and seek ways to unlock this additional demand (Kim & Mauborgne, 2005).

2.2 Consumer

2.2.1 Historical Food Habits

What is perceived as food can change over time in societies and their cultural surroundings. The practice of eating insects as food is known as entomophagy (Huis et al., 2013). Insects are a regular source of protein in many cultures all over the world. Historically insects are consumed in countries like Asia, Africa, South America, and Central America (Mancini et al., 2019). Consumption includes mealworms, crickets, grasshoppers, ants, and beetles. Entomophobia is seen as insect disgust contrary to entomophilia which is associated with the liking of insects. Societies change their food consumption patterns over time and food which has been consumed in other regions of the world or has been developed due to new industrialization methods like plant-based meat alternatives are adapted into these societies. At

the same time, numerous locally available biological resources have vanished from European cuisines. (Svanberg & Berggren, 2021) state that we are presently in a new scenario with insect food ready to be given in society. Food choices can have a huge impact on our environment, but many European citizens are not aware of the bad impact that meat production has (Hartmann & Siegrist, 2017).

2.2.2 Consumer Acceptance

Current food consumption patterns extend beyond socio-demographic factors, requiring a broader academic understanding. This section explores the acceptance of edible insect products, focusing on historical and present drivers, barriers, and trends for these Novel Foods. It delves into the challenges including social, cultural, and environmental aspects, particularly in German-speaking countries, and how neophobia acts as a barrier to acceptance. The study also uncovers ways to overcome aversion to food ingredients to enhance consumer acceptance. Kröger et al. (2022) summarized the conclusions of numerous publications on the acceptance of insects as Novel Food. The key takeaways of these quantitative, experimental, and taste investigations on the acceptance of insects as Novel Food are compiled were compromised in their paper. Their review was extended and closed a research gap by adding another 39 articles that had been published in 2020 and the beginning of 2021. This enhances the analysis's accuracy and timeliness. Their research honed in on drivers and barriers in the Western world, specifically insect-based foods, not other protein alternatives. However, their study encompassed North America, Australia and New Zealand, Israel, and Europe (excluding southeastern countries), broadening the scope rather than concentrating on German-speaking countries alone. The acceptance is dependent on countries food culture as well as on other people's opinions (Huis et al., 2013). Consumer sociocultural and psychological attributes are the primary factors that influence customer choice (Mancini et al., 2019). Several studies found out, that the acceptance is much higher when the actual product, in this case, the insect, is not visible (Hartmann & Siegrist, 2017). Western societies associate entomophagy with feelings of disgust and primitive behavior and is strongly rooted in culture (Huis et al., 2013). In addition, the effect of images, which can be used in marketing, is also important, as they have been found to influence attitudes toward perceived risk and purchase intention of insects (Septianto et al., 2022).

2.2.3 Factors Influencing Consumer Acceptance

In a nationwide online survey, Lammers et al. (2019) researched which factors have the highest influence on the willingness to consume insect-based burgers and mealworms. They investigated the sociodemographic factors as well in the field of entomophagy. The study focused on the underexplored variables of sensation seeking, sustainability consciousness, and food disgust. Despite increased media attention on entomophagy in Europe and other Western nations, consumer acceptability remains a major barrier. The survey found 41.9% were willing to try an insect burger, while only 15.9% would eat buffalo worms, a primary ingredient. However, as the survey was online without a practical confrontation with the product, further investigation like product testing in real-life circumstances is suggested. Furthermore, Verbeke (2015) found, that the willingness to replace meat with a substitute of insects of males (12.8%) is higher than females (6.3%). The study investigated gender, age, familiarity, food neophobia, convenience, and environmental food choice motives, as well as meat-related attitudes and future meat consumption intentions as significant predictors. Food neophobia was the highest indicator of the acceptance of insect food. Another factor influencing their acceptance was convenience orientation and the environmental impact of the food choice, which increased the likelihood to adapt. Lensvelt and Steenbekkers, (2014) defined three key areas for understanding consumer acceptance of insect-eating: (1) product-related factors, such as price, quality, health advantages or drawbacks, naturalness, and ease of use; (2) elements of trust and societal norms; and (3) mental aspects, including personal attitudes and cultural influences. The highest likelihood of being an early adopter was among young males (Alhujaili et al., 2023; Verbeke, 2015), who see insects as a sustainable protein source (environmental impact of their food choice), with a weak attachment to meat and while being open to trying new things.

The acceptance of insects-based food can be increased, when consumers had tried insects or when a familiarity toward these insects was created (Hartmann & Siegrist, 2017). However, many consumers are not even aware of the positive environmental and nutritional benefits that arise with the consumption of insects (Huis et al., 2013). Naranjo-Guevara et al. (2021) investigated within a survey the acceptance among students in Germany and the Netherlands and found that the concerns which influence their acceptance are similar to those in other European nations, such as visual aspects and awareness of the benefits. Due to the relatively new implementation of insect-based products in the Western hemisphere, there is a lack of knowledge among consumers. Within their studies, Lammers et al. (2019) found that the willingness to consume insects has increased in recent years in several European countries such as Belgium, Hungary, Switzerland, Poland, and the Netherlands. The aversion can be decreased

when insects are less visible in the product and when they are combined with food that the consumer is familiar with, in regards to taste, smell, and structure (Sogari et al., 2019; House, 2016).

Rogers (1983) notes that not everyone adopts new products or services simultaneously. Consumer acceptance often starts with "innovators", early-stage adopters keen on new ideas, followed by "early adopters" who are well-integrated into their social system and exert substantial opinion leadership. Their closeness to the average individual makes them ideal role models. They are trailed by the "early majority", "late majority", and "laggards". In terms of adoption, innovators and early adopters account for 2.5% and 13.5% respectively, and the early majority makes up 34.0%, as depicted in Figure 1.

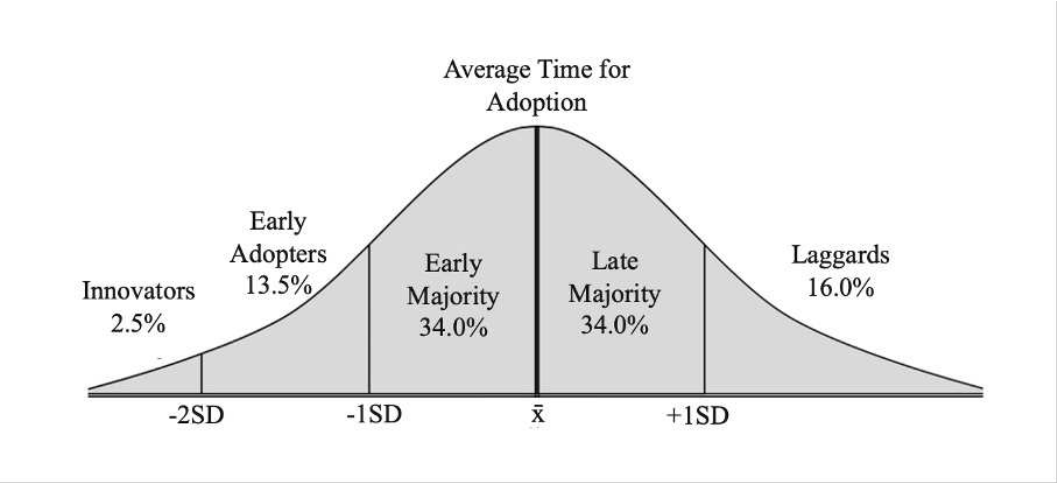

Figure 1: Adopter Categorization Based on Innovativeness
Source: (Rogers, 1983)

2.3 Crowdfunding as a Tool for Product Launch

Crowdfunding has emerged as a new method of raising funds to support projects and businesses. By facilitating the collection of monetary contributions from numerous individuals through online platforms, crowdfunding primarily caters to the needs of burgeoning businesses and start-ups seeking alternative funding solutions, often in return for future products or equity. This approach presents a novel means of procuring capital for fresh ventures, enterprises, or concepts (European Commission, n.d.; Mollick, 2014). This part will discuss the benefits, challenges, and various types of crowdfunding available to start-ups.

Cooper and Kleinschmidt (2011) investigated product launches across industries and analyzed factors that influence success. They came up with the most important indicators which are: (1) understanding users' needs, (2) attention to marketing and launch publicity, and (3) efficiency of development as the most crucial indicators. Therefore, the firm needs to offer a unique,

superior product in the eyes of the customer with enough differentiation to other products, existing in this market. The success is likely to be greater if the research and development (R&D) process is well planned and executed, the market launch is sufficient and backed by profound resources, the products have a high margin, and when the product is introduced into the market at an early stage. Several factors influence the success of a crowdfunding campaign including the quality of the pitch (e.g., no spelling errors), they should at least create one video to explain the project, the size of the social network of the founders, regular updates of the project and geographic location (Mollick, 2014) and the idea or product itself (Joshua, 2020). Investigations across numerous academic fields propose that individuals display prosocial behavior when they deem their actions to have a beneficial impact (Kuppuswamy & Bayus, 2017). The impact in this case would be the overall environmental benefits that arise with the consumption of insect-based products as an alternative to traditional protein.

Many novel products fail primarily due to their misalignment with consumer needs. These failures should be mitigated in any case. Statistics show that 80% can't secure a market foothold within two years. These innovative offerings often necessitate alterations in consumer behavior (Trott, 2017). A useful tool to avoid the failure of a market launch is to use crowdfunding with the main goal to raise money from potential consumers (Dai & Zhang, 2019; Stanko & Henard, 2016), while it enables entities and individuals to secure financial backing that might be inaccessible through conventional channels, including banks, angel investors, and equity markets (Brown et al., 2017; Laffey et al., 2021).

Effective crowdfunding initiatives hold significant promise in promoting new products via word-of-mouth communication and the potential to go viral on social media. Moreover, such campaigns create a platform, enabling contributors to offer constructive feedback (1) (understanding consumer needs) and innovative suggestions enriching the development process (Stanko & Henard, 2016). Additionally, crowdfunding campaigns can create attention (2) of a small base of potential consumers serving as a marketing tool (Brown et al., 2017; Chen et al., 2016). To be able to raise money, the start-up needs to create a certain amount of content that engages the customers' emotions, and cognition (Robiady et al., 2021), the content must then be used for storytelling and marketing on crowdfunding websites (Chen et al., 2016; Joshua, 2020) like Indiegogo, Kickstarter, Patreon, Fundable or SeedInvest.

There are various types of crowdfunding available for start-ups, such as peer-to-peer lending, equity crowdfunding, rewards-based crowdfunding, donation-based crowdfunding, profit-sharing/revenue-sharing, debt-securities crowdfunding, and hybrid models (European

Commission, n.d.). Each type offers unique advantages and disadvantages, catering to different start-up needs and projects.

2.4 Marketing

2.4.1 Niche Marketing Strategies for Start-ups

Start-ups nowadays must compete with a market that is increasingly more competitive and changing quickly. These early-stage companies require a profound marketing strategy that helps them stand out from their rivals and explain their value offer to potential clients to thrive and gain traction in the market. Due to a lack of resources, industry knowledge, customer engagement, and retention (Rizvanović et al., 2023) many start-ups have great difficulty developing and implementing an efficient marketing strategy. Therefore, the objective of this section of study is to examine the crucial elements of an effective start-up's marketing strategy within a niche and how the business can develop and execute a successful go-to-market plan.

Customer loyalty is a very important factor for the success of a company and therefore its sales (Brusch et al., 2019). Niche marketing means positioning into small, profitable homogenous market segments which have been ignored or neglected by others and is a bottom-up approach, where the company focuses on the needs of a small customer base and builds upon this. The key factor for niche marketing is strong long-term relationships (Dalgic, 1998). This relationship needs to be developed and even though Copulsky & Wolf (1990) described this process before the rise of the internet, they identified three key elements which are market-proven concepts: (1) identifying and building a database of current and potential customers, (2) Deliver differentiated messages to these customers through established and new media channels based on the consumer's characteristics and preferences and (3) tracking of costs for the acquisition of the relationship as well as monitoring the lifetime value of each of them.

2.4.2 Digital Marketing

E-commerce and therefore digital marketing has been growing very fast in recent years and especially Covid-19 was an accelerator. Start-ups often favor digital marketing for reasons that go beyond sales and marketing. This could be due to practical reasons in other areas such as experimentation, community building, and customer relationship management. This makes digital marketing one of the most significant factors for start-ups. Data can either be primary by analyzing traffic data from their website or social media profile via analytic tools, to have a better understanding of the customers' behavior and improve marketing activities or secondary

data from external sources. Reviews, comments, and analytics should be used by the start-up to improve their products (Rizvanović et al., 2023). The paper further underlined the importance of daily and continuous engagement and marketing activities, which avoid stagnation. The above-mentioned partnerships between corporations, which can be in the form of e-books, reports, webinars, podcasts, and other content forms, can help start-ups within the trust-building process toward their customers (Rizvanović et al., 2023). Digital content which is tailored to its niche provides space for experimentation and creativity and can have a strong impact on a start-up's innovation outcome as well as a learning experience. As companies gather more data, they become more efficient in their targeting and information may be utilized to improve the product. However, it is important to define and extract and extract which metrics are monitored (Corral de Zubielqui & Jones, 2020). Since start-ups have less structure than established companies, the founders have more freedom, which allows them to be creative and try new things (Rizvanović et al., 2023). This freedom enables companies to try several marketing strategies on a low budget and check for the best results quickly.

2.4.3 Micro and Nano Influencers

Micro-influencers act and engage on social media platforms like Instagram, Facebook, or TikTok and are defined as accounts ranging from 10,000-50,000 followers (Ehlers, 2021).
The other group, called nano-influencers have up to 10,000 followers on their social media accounts (Bradley, 2023). Recent research shows, that consumers are more likely to trust, relate and engage with these two groups of influencers, since they tend to have a more devoted follower base than mega or macro-influencers with more than 1 million followers (Janssen et al., 2022). Micro-influencers can have higher purchase intentions (Kay et al., 2020) and they can have an up to 20% higher conversion rate, which directly affects the brand's sales (Ehlers, 2021). Due to the polarization of opinions around the practice of entomophagy, each of the multiple stakeholders needs to have unique communication strategies (Huis et al., 2013). Since these nano and micro-influencers act and engage in a specific niche, they can be the perfect fit for communication strategies and educational programs for Western societies which are required, to overcome the disgust factor against the consumption of insects (Huis et al., 2013). Kay et al., (2020) found that consumers show a significantly higher product knowledge when they were exposed to micro-influencers.

CHAPTER 3: METHODOLOGY

3.1 Research Design

This dissertation adopts a mixed-methods approach, integrating an online survey and literature review to explore consumer acceptance of insect products. The data gathered was meticulously analyzed using quantitative and qualitative techniques to explore consumer preferences, ensuring validity, reliability, and ethical considerations.

This study will delve into market and competitor analysis, complemented by a consumer survey to comprehend consumer behavior toward insect-based products. These methods will facilitate a thorough investigation by evaluating diverse sources and gathering critical information.

The market analysis examines the insect-based food sector's status, considering market trends, size, growth potential, and competition. Utilizing tools like SimilarWeb, alongside benchmarking and segmentation tools, enables an exploration of successful competitors and their e-commerce KPIs. This process will help identify consumer needs and potential niches to inform product development and marketing strategies.

Competitor analysis includes evaluating companies in the insect-based product industry using an adapted BCG matrix, even though it is traditionally used for portfolio analysis within a single company. This approach will uncover opportunities and threats within the market, providing insight into the competitive landscape and competitor strategies.

The consumer survey aims to offer an understanding of consumer behavior and acceptability within the insect-based product market. This survey, conducted via Qualtrics, collects demographic data, attitudes, and consumption patterns related to insect-based products, and price acceptability. Based on an extensive literature review, the variables identified were integrated and expanded in the construction of the survey in this study. It was disseminated through platforms like Facebook groups, WhatsApp, and SurveyCircle, and a platform for professional survey participants (Clickworker.de) was also used for a representative demographic sample for the DACH region. The objective is to uncover if a business can be established based on these insights, targeting a specific product or (niche) group. The survey's analysis identifies correlations, patterns, and trends influencing the adoption of insect-based products, facilitating product development, marketing strategies, and distribution channel recommendations to enhance the success of insect-based products in the market.

3.2 Data Collection and Preparation

Initially, 460 participants took part in the Qualtrics survey, subsequently reduced to 414 valid observations following a rigorous data cleaning process. This process removed responses from outside the DACH region and entries from participants answering the control question incorrectly. Outliers and responses without clear statements were also discarded. The dataset offered a 95% confidence level that the real value is within ±5% of the surveyed value (Qualtrics, n.d.). However, the age and income distribution of the dataset did not perfectly mirror the actual population size, likely due to the survey's distribution on SurveyCircle, which is predominantly utilized by students.

Gender distribution was equal, with males and females each representing around 50% of responses. To refine the survey data analysis, certain variables were adjusted. Groups with smaller representation, such as participants under 18 years, were merged with adjacent groups to enhance statistical robustness. Similarly, dietary groups with similar habits, such as vegetarians, pescatarians, and vegans, were combined. Adjustments were made to the education, physical activity, and shopping habits categories, as well as the willingness to buy/purchase (WTB) responses.

Analyzing and adjusting the data allowed for calculating proportions to understand demographic groups influencing WTB. This simplified the process of pinpointing factors shaping consumer behavior and motives to buy insect-based products. Demographics were vital, enhancing understanding of the link between acceptance of insect-based products and consumer acceptance.

CHAPTER 4: RESULTS AND DISCUSSION

4.1 DATA ANALYSIS

4.1.1 Quantitative Analysis: Descriptive Statistics

After creating a robust dataset, critical factors, which influence purchasing and consumption willingness, were identified to easier to predict purchasing behavior and develop appropriate strategies to meet the needs of specific consumer segments. With the exploration of the dataset, the following findings were made:

Gender appears to play an important role, with male participants showing higher acceptance (44.4%) of insect products than their female (23.9%) counterparts (Figure 2).

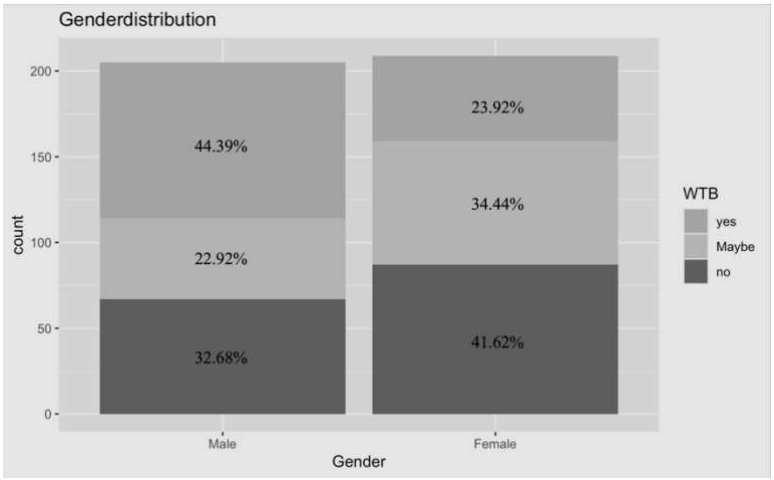

Figure 2: WTB by Gender
(Source: Survey data)

Participants younger than 55 years have the lowest level of rejection. From 55 years on, acceptance of insects decreases strongly (15.9%) [Figure 3]. The target group is therefore most likely to be younger than 55 years, showing the highest acceptance rates.

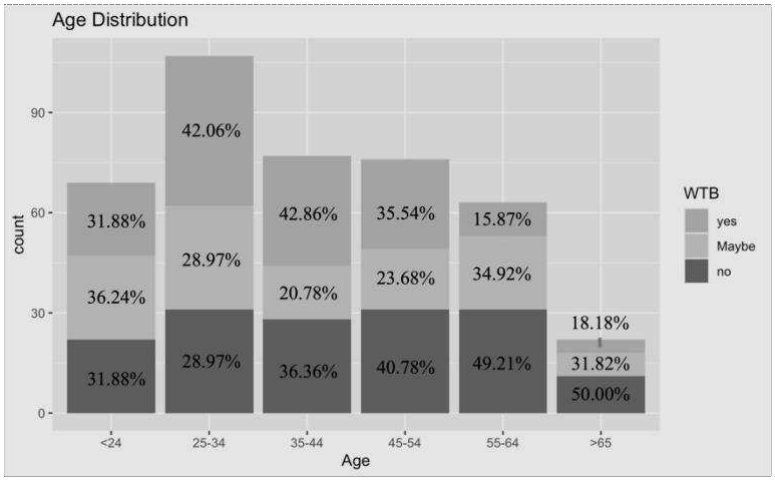

Figure 3: Age Distribution and WTB
(Source: Survey data)

A clear pattern appears within the education variable. Individuals with higher levels of education are more likely to try insect-based products, a reason could be that they are more aware of the sustainability shifts and the safety. When examining the role of education, small differences between groups could be observed with slightly increasing acceptance among those. The acceptance for medium/lower school was 10.4%, high school 19.3%, apprenticeship 21.3%, bachelor 22.7%, and academic degree 25.4%.

It's interesting to consider that willingness to purchase insect products (WTB) does not seem to be related to net income. Although the data indicated some differences at the higher income levels, a Kruskal-Wallis test was conducted on the net income variable with the result of a p-value = 0.1371 that is not statistically significant (Figure 4) and was therefore not included in the model.

```
        Kruskal-Wallis rank sum test

data:  Master2$WTB[x] by Master2$Net_income[x]
Kruskal-Wallis chi-squared = 8.3687, df = 5, p-value = 0.1371
```

Figure 4: Kruskal-Wallis Rank Sum Test WTB ~ Net_income
(Source: Survey data)

The analysis of the correlation between physical activity and acceptance of insect-based food reveals "very active" individuals (22.7% of the dataset) have the highest acceptance at 45.7%, followed by the "active" group at 37.5%. Conversely, the "occasionally active" group (20.3% of the dataset) shows the lowest acceptance at 19.0%. The physically inactive respondents

express the strongest aversion toward consuming insects. However, most responders claim to lead an active lifestyle.

Figure 5 clearly shows that the group of individuals who identify themselves as at least pescatarian had a high rejection (64,6%) compared to other dietary groups, and thus was included in the modeling, even though this group has the lowest count. An omnivore diet (plant as well as animal foods) has an acceptance rate of 34.7%, flexitarian (mainly plant-based foods, but occasionally animal products) of 41.7% while pescetarian (which was merged by vegan, vegetarian, and pescetarian) had an acceptance of 21.5%.

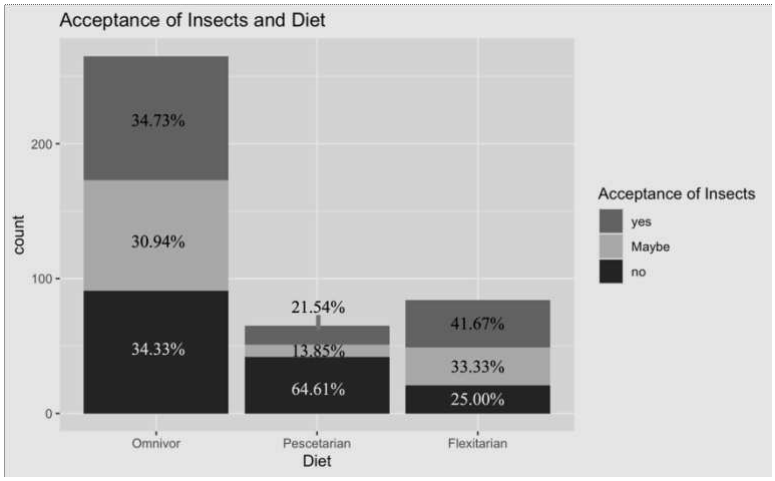

Figure 5: Acceptance of Insects and Diet
(Source: Survey data)

The Pearson Chi-squared test (Figure 6) confirmed that a participant's diet, categorized as "mostly healthy" or "mixed," significantly impacts their WTB (p-value = 0.003877). However, Cohen's effect size (w = 0.1638) suggested a modest influence of dietary behavior on WTB. Positive WTB was 35.7% for the "mostly healthy" group, and 31.0% for the "mixed" group.

```
Pearson's Chi-squared test

data:  Master2$WTB and Master2$Eating_behavior
X-squared = 11.105, df = 2, p-value = 0.003877
```

Figure 6: Pearson Chi-squared test WTB ~ Eating_behavior
(Source: Survey data)

In terms of sustainable purchase habits, individuals who “mostly” purchase sustainable products have an acceptance rate of 35.9% for insect-based products and individuals who stated that they “sometimes” buy 44.9% and “rarely” only 19.1%. However, the effect is quite small

and not statistically significant with a p-value = 0.3396 and was therefore not included in the model.

Figure 7 reveals prior insect consumption significantly boosts the WTB for insect-based products. Those with experience show higher acceptance, while those unsure of previous consumption display more openness than first-timers. Of all participants, 306 haven't tried insects, and 98 have.

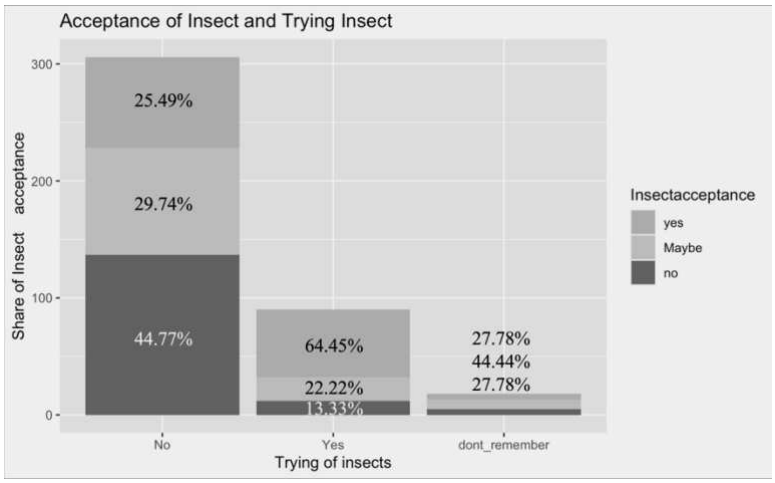

Figure 7: Acceptance of Insect and Trying Insect
(Source: Survey data)

The overview of the WTB for the products investigated in the survey showed that next to the already existing products like protein bars or powder, convenience food showed a high WTB (Figure 8).

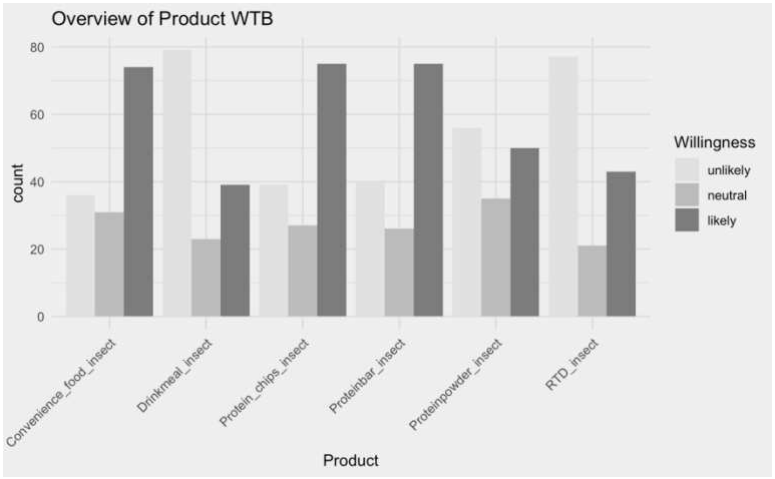

Figure 8: Overview of Product WTB
(Source: Survey data)

The data analysis showed that the brand wasn't important for 23.6% of respondents, whereas 90.2% prioritized flavor and texture, and 80% considered nutritional value "very" or "extremely" important (Figure 9).

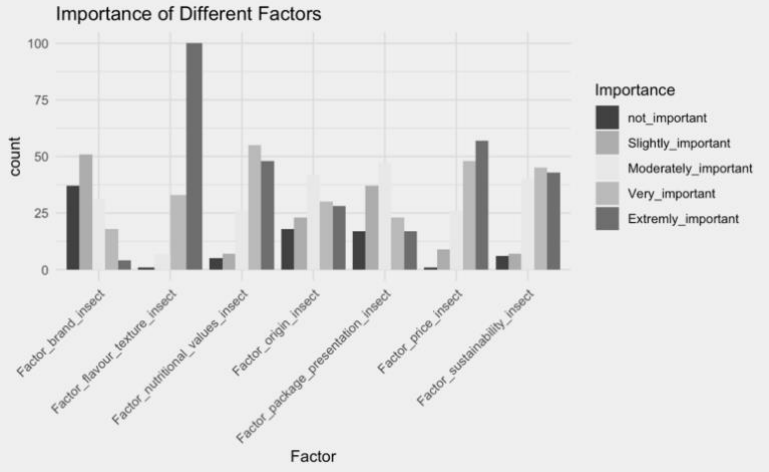

Figure 9: Importance of Different Factors
(Source: Survey data)

Figure 10 shows that the brand wasn't important for 23.6% of respondents, whereas 90.2% prioritized flavor and texture, and 80% considered nutritional value "very" or "extremely" important.

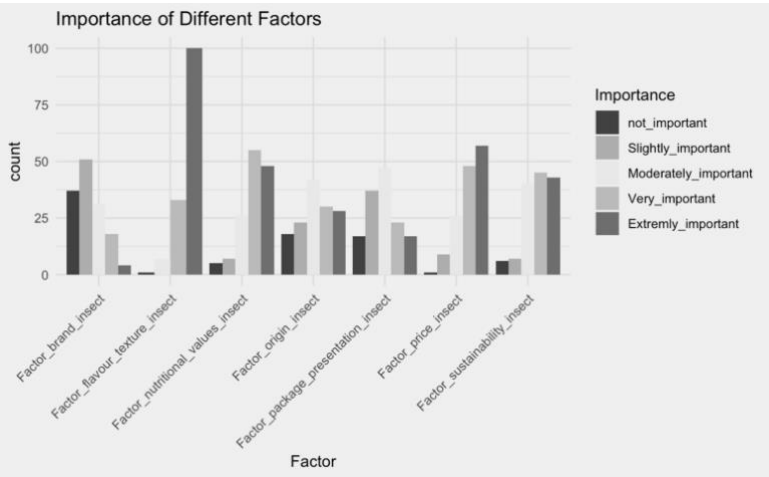

Figure 10: Importance of Different Factors
(Source: Survey data)

In this study, the factors influencing consumer acceptance of insect-based products were examined in detail. Factors examined included gender, age, education, physical activity, diet, and eating behavior. Males and younger individuals (under 55 years of age) were found to be more willing to try such products, while acceptance decreased among those over 55 years of

age. Higher levels of education correlated with greater acceptance of insect-based products, as did higher levels of physical activity. Dietary habits also played a role, with omnivorous and flexitarian respondents showing higher acceptance than those who described themselves as pescetarian, vegan or vegetarian. A "mostly healthy" or "mixed" diet had a slight effect on willingness to purchase insect-based foods, but the effect was minimal. Similarly, a preference for sustainable products was associated with slightly higher acceptance, but this effect was not statistically significant. In addition to demographic characteristics, aspects such as taste, texture, perception, and food safety information and sales channel played an important role in consumer acceptance and WTB of insect-based products. The highest propensity to purchase was found for convenience food, protein chips, and protein bars, highlighting the importance of these factors in product design and development. Contrary to initial expectations, the survey showed that product packaging and presentation are not of great importance to consumers, although they should still be appropriate and aligned with the final product, as they can subtly contribute to product acceptance. In summary, consideration of these factors is critical to developing targeted marketing strategies that successfully promote consumer acceptance of insect-based products. These findings provide valuable insights for entrants into the insect products market, particularly in the development of product and marketing strategies.

4.1.2 Predicting a Target Group via Decision Tree Modeling

After all, variables describing the sociodemographic and lifestyle, behavior, and interest of the target group were evaluated. The target group was then separated from the non-target group using a decision tree. The decision tree allows to identify the key variables that make the difference between the target group and the non-target group. Since the dataset had different types of variables, the decision tree was helpful in terms of handling categorical and numeric variables without the need for preprocessing such as dummy coding or scaling, and it can capture nonlinear relationships and interactions between variables that may be missed by regression. The importance of the variables for the decision tree was calculated resulting that “age” has an importance of 100%, followed by “sport activity” at 93.57%, “diet” at 47.45%, and “gender” at 66.37%. To avoid overfitting the model, the data was split into test data and training data and tested afterward by using 10-fold cross-validation with 5 repeats. The complexity level was set to cp = 0.02, 0.05, 0.1. For even smaller cp (e.g., cp = 0.005), the accuracy became slightly higher, but the model became very complex, and the accuracy increased thereby only slightly. The aim was to get a target group that is as clear as possible. In addition, the instability of the tree became even greater. The accuracy of this chosen model is

0.43, while the null model was at 0.37. In addition, using ordinal logistic regression was used to validate the results of the tree (Table 1). The results of the regression were that the factors "eating behavior", "education" and "job" do not influence the model. Linear (. L) cubic (. C) and square (. Q). Only Age ($p < 0,05$), Gender ($p < 0,01$), Diet ($p < 0,01$), and Sport ($p < 0,05$) are significant parts of the model. This was confirmed by the results from the decision tree.

Table 1: Results from the Ordinal Logistic Regression
(Source: Survey data)

Variable	**Estimate**	**Std. Error**	**z value**	**Pr(>|z|)**
Age.L	1.052639	0.485239	2.169	0.03006 *
Age.Q	0.666074	0.389523	1.710	0.08727
Age.C	-0.039084	0.287674	-0.136	0.89193
Age^4	-0.006887	0.233863	-0.029	0.97651
Age^5	-0.010306	0.227446	-0.045	0.96386
GenderFemale	0.599545	0.212968	2.815	0.00487 **
Education.L	-0.994710	0.639022	-1.557	0.11956
Education.Q	-0.534957	0.500769	-1.068	0.28540
Education.C	-0.237390	0.280175	-0.847	0.39683
JobParttime	0.446757	0.330037	1.354	0.17585
JobEntrepreneur	-0.066958	0.309834	-0.216	0.82890
JobJobless	1.105.563	0.751588	1.471	0.14130
JobPensioners	-0.498062	0.556699	-0.895	0.37096
JobStudent	-0.117479	0.346552	-0.339	0.73461
JobPupil	-0.735357	0.728151	-1.010	0.31255
JobApprenticeship	0.084096	0.980962	0.086	0.93168
Sport_activity.L	0.524657	0.242963	2.159	0.03082 *
Sport_activity.Q	-0.084809	0.206253	-0.411	0.68093
Sport_activity.C	-0.169699	0.187703	-0.904	0.36595
DietPescetarian	0.313700	0.313700	3237	0.00121 **
DietFlexitarian	-0.481269	0.249537	-1.929	0.05377
Eating_behavior.L	-0.131945	0.153345	-0.860	0.38954

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

The classification of the tree in Figure 11 was done in several steps.

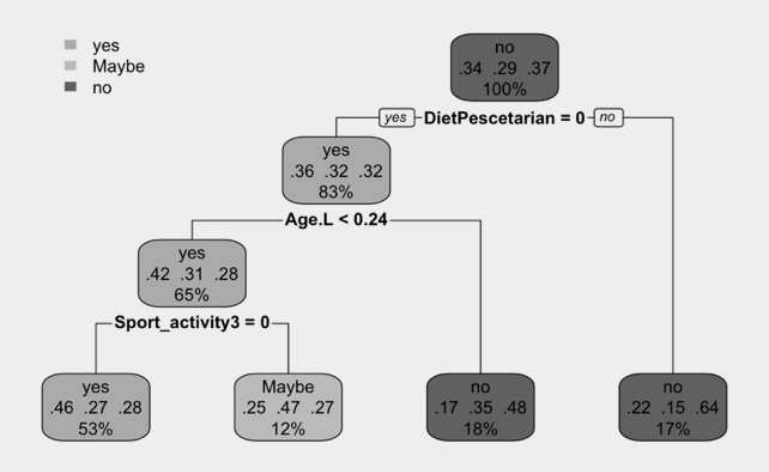

Figure 11: Decision Tree of the Target Group
(Source: Survey data)

First, the groups are divided into pescatarians (including vegan, vegetarian and pescatarians) and non-pescatarians. All at least pescatarians are assigned to the no group (17% of respondents), while non-pescatarians are further split. The next criterion is age. The younger ones (< 55) are assigned to the yes group (65% of the respondents), while the older ones are assigned to the "no" group (18% of the respondents). After that, the sportiness of the respondents becomes relevant. The sporty, younger non-pescatarians are assigned to the group yes (53%), and the non-athletic ones to the group maybe (12%). The accuracy of the actual tree is at 42.5% and the test data is at 43.2%.

This identifies a target group: Insect-interested males and athletics non-pescatarians, younger than 55 years. Another group that could be targeted are young, insect enthusiasts and non-athletic non-pescatarians.

4.1.3 Target Group Analysis

To find out what size this specific male target group has it was then separated from the rest of the dataset, resulting in 55 observations, which is around 13% of all participants.

In summary, the output reveals that participants were generally more hesitant to consume insect-based products in liquid forms. A ready-to-drink protein shake is unlikely to be consumed by 57.9% of that group and drink meals at 57.1% compared to solid forms, protein bars at 43.7%, and protein chips at a rate of 45.4%. It also shows that protein powder has a low acceptance as well with 48.7%. In the “maybe” group, the aversion to all products predominates (unlikely > 40), which also shows again how sensible it is to focus on those who are interested in insect-based products and therefore a positive WTB. The study found a stronger aversion to

liquid insect-based products, except the powder form. Among both genders, a more pronounced trend was noted in women, showing a greater aversion to liquids and favoring other forms. This was also seen among those familiar with insect products, suggesting other appealing product categories may exist. Taste, texture, price, nutrients, and sustainability stood out as key factors. Packaging, though rated unimportant, may influence buying impulses, necessitating a detailed re-examination, particularly for exotic products.

4.1.4 Cluster Analysis

A hierarchical cluster analysis was performed, in order to divide the large amount of data into groups that have similar characteristics. This method helped to identify exact target groups and determine market segments. Moreover, it can handle different types of data, such as demographic, geographic, psychographic, or behavioral data. The results of the cluster analysis help to develop a suitable business idea, to design an appropriate marketing strategy, or to find optimal pricing.

Demographic, lifestyle, and insect-specific questions are covered, but the product section is incomplete, although important aspects are covered by the interests. After collecting and adjusting the variables for the analysis, the dendrogram showed that four factors might be the optimal option and that cluster three is the biggest one (Figure 12) and has a total of 141 observations.

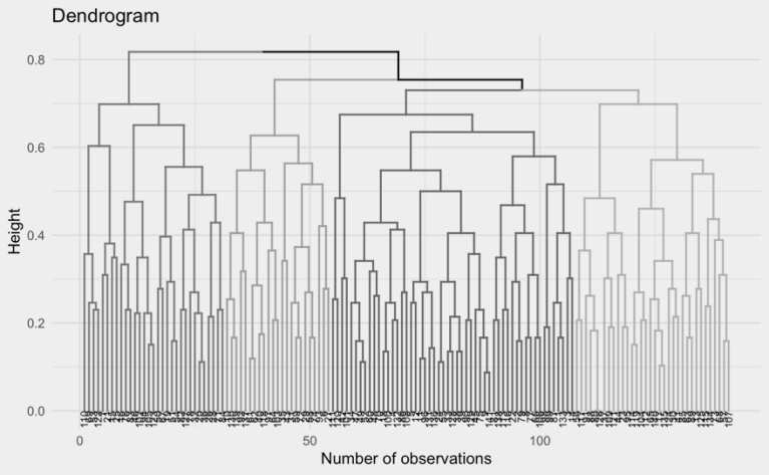

Figure 12: Dendrogram showing four Clusters
(Source: Survey data)

The following heatmap in Figure 13 was analyzed in an Excel format.

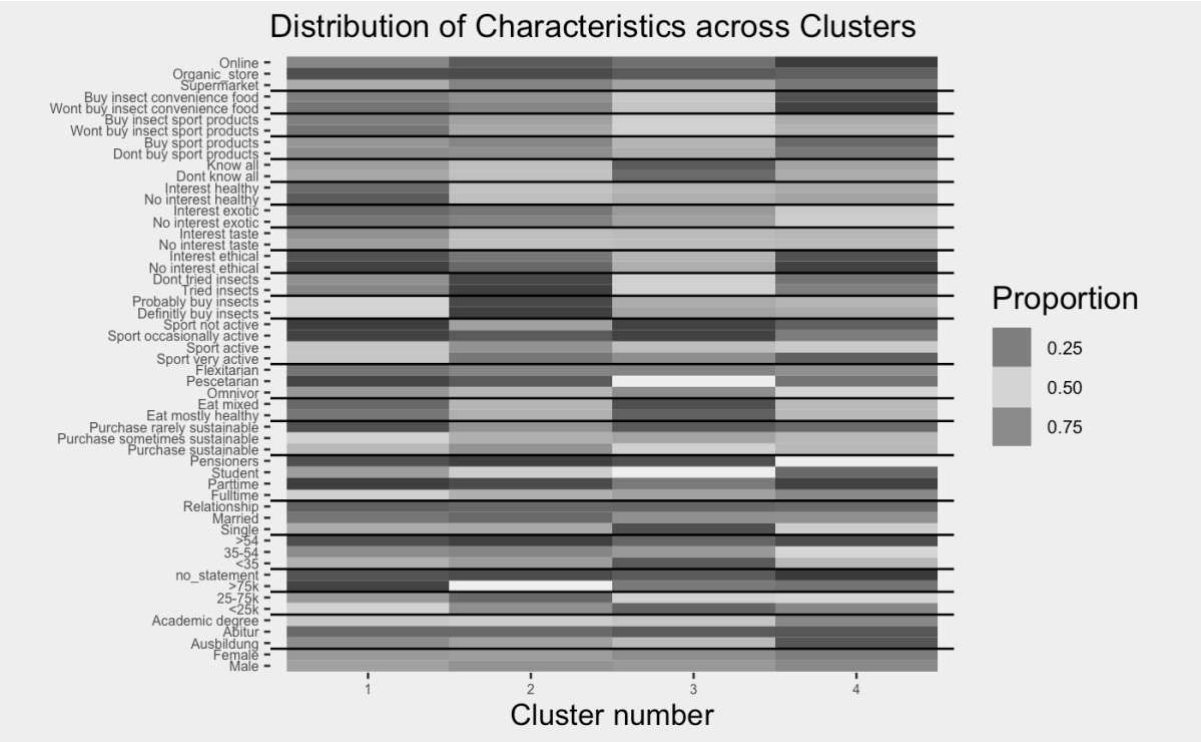

Figure 13: Distribution of Characteristics across Clusters
(Source: Survey data)

This resulted in four clusters, which are described below.

The "Ethical Health Enthusiasts" (Cluster 1): Predominantly, 73.6% of individuals have not tried insects, while 26.4% have. The main preferred sales channel is supermarkets (64.2%), followed by online purchases (26.4%). Gender distribution is 67.9% male and 32.1% female. Sports activity is widespread, with 45.3% active in sports and 45.3% very active in sports. Interest in ethical aspects and healthy proteins is high (94.3% and 86.8%, respectively).

The "Potential Explorers" (Cluster 2): In this cluster, 95.7% of individuals have not yet tried insects. The main sales channel is the supermarket (78.3%). Gender is 69.6% female, and 30.4% male in this group. The majority of individuals are active in sports (30.4%) or very active in sports (21.7%). Interest in ethical aspects and healthy proteins is high (82.6% and 86.8%, respectively).

The "Insect Adopters" (Cluster 3): In this cluster, about half of the individuals have tried insects (51.6%). The main sales channel is the supermarket (67.7%). Gender: 70.9% male, 29.0% female. Sports activity is widespread, with 58.1% sports active and 29.0% very sports active. Interest in ethical aspects and healthy proteins is high (61.3% and 61.3%, respectively).

The "Convenience Food Consumers" (Cluster 4): Here, 79.4% of people have tried insects. The main sales channel is the supermarket (82.4%). Gender is 76.5% male and 23.5% female. Sports activity varies, with 47.1% active in sports and 23.5% very active in sports. Interest in ethical

aspects is high (94.1%), while interest in healthy proteins is mixed (64.7%). The majority of people in this cluster would buy insects in the form of convenience food (94.1%).

4.2 MARKET AND COMPETITOR ANALYSIS

4.2.1 Overview of the Insect-Based Product Market

The insect-based product market in German-speaking countries is experiencing growth, driven by the heightened awareness of the health and sustainability advantages they offer. This has led to a surge in consumer interest and a wide assortment of offerings, from whole insects to protein bars, powders, pasta, and even insect-infused lollipops, catering to various tastes and dietary needs. In terms of the competitive landscape, the market for insect-based products in German-speaking countries is quite fragmented, with several companies competing for market share. The key players range from start-ups to established companies in the food industry. With a compound annual growth rate (CAGR) of 6.28% for the forecast period from 2023 to 2029, the subsegment of sports/performance nutrition supplements is anticipated to report the fastest growth rate in end-use application in the German protein market. The market value of edible insects in Europe is forecasted with a CAGR of 27% from 2018 to 2023 and a value of 262.6 million USD, which is higher than in Latin America with 250.6 million USD (Bloomberg & Meticulous Research, 2018). The German market dominated the European overall insect-protein market by country in 2020 and is expected to continue to be a dominant market through 2027. This research included feed and food, which means it includes pet food, food and beverages, pharmaceuticals, dietary supplements, and personal care and cosmetics, and does not solely focus on food for human consumption (Research and Markets, 2022). According to Deloitte, in 2022 Germany recorded a 10.8% increase in fitness memberships to 10.3 million (Hollasch & Ludwig, 2023). The insect protein market in German-speaking countries has significant growth potential, with environmental and health awareness, and technology boosting demand and product cost-effectiveness. Challenges like regulatory uncertainties and consumer acceptance could impede growth. Still, the increasing sector investment implies opportunities for innovation, growth, and more cost-effective products.

4.2.2 Market and Competitor Analysis

This section focuses on market and competitor analysis methods within the insect-based products sector in German-speaking countries. Understanding the current market, its trends,

growth potential, and competition is crucial. Detailed competitor analysis aids in assessing the strengths, weaknesses, and strategies of current market players.

Key competitors in this market were identified using the Internet and social media. Table 2 outlines these competitors, their specializations, product range, price range, distribution channels, and other details. The aim is to better comprehend the competitive landscape and factors shaping consumer preferences in the insect-based products sector, thus informing product development, marketing, and distribution strategies.

Table 2: Overview of Key Competitors in the Insect-based Products Sector in German-Speaking Countries (Source: Company Websites)

Company name	Specialisation	Whole insects (plain or flavored)	Protein Powder	Plain Powder	Burger Pattys	(Protein) Bars	Pasta	Chocolate	Granola	Chips	Cookies/ Cracker	Others	Pricerange [€]	Distribution	HQ/ Founded
Essento Insect Food (Swiss Insects, Ensectable, Gourmetbugs)	Development/ Production/ Sales	x		x	x	x	x				x		3,89-40,9	Onlineshop, Retailers in Switzerland and Italy, Restaurants[4]	CHE/ 2013
Fricket	Production/ Insect breeding (crickets, heimchen)	x											NA	B2B	GER/ NA
Snack Insect	Finishing/ Sales/ Education	x		x		x	x		x			x[1]	2,99-24,99	Onlineshop, Amazon, B2B, B2C	GER/ 2013
ZIRP Insects	Sales	x		x	x	x						x[2]	4,49-19,90	Onlineshop, B2B	AT/ 2011
MyBugbar	Fitness		x	x								x[3]	19,95-149,95	Onlineshop	GER/ 2019
Sensfoods	Sales (production partner in Thailand for the powder)		x	x		x	x			x	x		1,99-78,00	Onlineshop, Amazon, B2B	GER/ 2016
Jiminis	Production and Sales	x				x	x		x		x		2,99-22,80	Onlineshop, B2B	FRA/ 2012
Catch your Bug	Production and Sales	x		x		x				x		x[1]	2,49-49,99	Onlineshop, B2B,	GER/ 2018
Bugfoundation [sold to Kupfer]	Burger pattys				x									Onlineshop, B2B	GER

1) Lollipops; 2) Baking Mixtures; 3) Peanutbutter; 4) Hans im Glück Restaurant (Burgerpattys)

Based on the information contained in the table, the following observations can be made about competitors in the market for insect-based products: Most competitors offer a wide range of insect-based products, including whole insects, protein powders, bars, and various snack items. Some companies, including Bugfoundation and MyBugbar, focus on specific product categories, such as burger patties and fitness products, respectively. This suggests that the market is relatively fragmented, with companies targeting different niches within the insect-based products sector.

The Prices between competitors vary, with some companies like Essento Insect Food offering products in a higher price range (€3.89-40.9) than others like ZIRP Insects (€4.49-19.90) and Jiminis (€2.99-22.80), but this can also include bundle offerings. This suggests that different pricing strategies are being employed, with some companies targeting premium segments while others may be focusing on more affordable options for a broader customer base.

When looking at the distribution channels it can be observed that the majority of competitors are using their own online stores as their primary distribution channel, with some also using

additional platforms such as Amazon, B2B, and B2C channels. This indicates that e-commerce plays an important role in the distribution of insect-based products and companies must have a strong online presence to effectively reach their target audience. In addition, some companies such as Essento Insect Food also distribute their products via retailers and restaurants, suggesting that expanding sales channels beyond online platforms can provide a competitive advantage. Competitors are located in various countries, including Switzerland (Essento Insect Food), Germany (Fricket, Snack Insect, MyBugbar, Sensfoods, Catch your Bug, Bugfoundation), Austria (ZIRP Insects), and France (Jiminis). This shows that the market for insect-based products is not limited to a specific region but extends across various countries in Europe. The geographic diversity of these companies shows the potential for growth in different markets, with each company addressing specific local preferences and requirements. The years these companies were established range from 2011 (ZIRP Insects) to 2019 (MyBugbar), showing that the market for insect-based products has evolved over the past decade. Newer companies such as MyBugbar have entered the market, implying that there is still room for growth and opportunity for new entrants. Based on the competitor analysis, the following potential opportunities can be identified:

Given the diversity of product offerings and price ranges, businesses can differentiate themselves by targeting specific market segments or consumer needs, such as fitness enthusiasts, environmentally conscious consumers, convenience food, or the premium segment in general. As the market spreads across different European countries, there are opportunities for the start-up to expand its presence into new markets, addressing local preferences and tapping into unexploited consumer segments. Pointing out, that the start-up could consider not only targeting German-speaking countries, but further investigations need to be done. Additionally, it could develop new and innovative insect-based products, such as convenience food, which can help the start-up to differentiate itself from its competitors and reach a different audience.

In terms of distribution channels, it showed that mainly online distribution channels are used, the start-up could explore additional channels such as specialty food stores, or collaborations with restaurants and cafes to increase their reach and visibility. Supermarkets were identified in clusters 2 and 3 as the main sales channel. These distribution channels should be in line with the final product.

In summary, the market for insect-based products offers several opportunities for growth and expansion, with companies having the potential to differentiate themselves through market segmentation, geographic expansion, innovative product development, and new distribution

channels. By using these opportunities, the new company could gain a competitive advantage and establish a strong presence in the market.

4.2.3 Porter's Five Forces Framework

4.2.3.1 Threat from New Entrants

The founding years of these companies range from 2011 (ZIRP Insects) to 2019 (MyBugbar), indicating that the market for insect-based products has evolved over the past years. Newer companies such as MyBugbar have entered the market, showing that there is still room for growth and opportunities for new entrants. On the other side, other start-ups (e.g. Isaac) failed. However, the diverse product line and pricing strategies of these existing competitors may be a barrier to new entrants, but since the market is predicted to grow in the upcoming years, the threat of new entrants can increase. As soon as insect production can be scaled up, prices will decrease, attracting new entrants, and targeting a larger audience. Therefore, the threat is currently perceived as medium.

4.2.3.2 Bargaining Power of Buyers and Suppliers

The insect-based product market relies on insect and other raw material suppliers. Given the industry's fragmentation with only a handful of suppliers with the allowance to sell in Europe, their bargaining power could be medium to high. Few suppliers can control the prices. Building strong supplier relationships and ensuring a consistent raw material supply is therefore critical. The insect-based product market is relatively small and has currently high raw material prices, that were analyzed above. Unlike chicken breeding, cricket farming lacks extensive research, despite its clear advantage in resource consumption. With future advancements, this sustainable protein could also become more affordable, by scaling up the production. This can increase the bargaining power to a higher level.

The diversity of product offerings and price ranges in the insect food market provides buyers with only a few options to choose from. This gives the consumer a low amount of bargaining power since there are only a few or even single options to choose from. With more competitors entering the market, the bargaining power of the consumer can be increased, because they have a broader range to choose from. Moreover, as competition intensifies and more products become available, price dynamics could shift, potentially leading to more competitive pricing and further empowering consumers.

4.2.3.3 Threat from Substitute Product

The market for insect-based products competes with other protein products such as plant-based or traditional animal-based products, which are currently much cheaper, and plant-based products compete in the sustainability factor. Even though insect-based products offer uniqueness and novelty and have the innovation potential, this threat is high. To tackle this threat, the start-up needs to focus on creating innovative products, which could be ready-to-eat (convenience) meals or drinks, that can differentiate them from their competitors and reach a wider or different consumer audience. The scaling process of insect-based products plays also an important role, in order to compete with the low prices of traditional and plant-based proteins.

4.2.3.4 Competitor Rivalry

The insect-based products market has several companies with different geographical presences, product portfolios, pricing strategies, and distribution channels. This indicates a high level of competition in the market. The further rivalry could come from firms, currently operating in the traditional protein sector, such as dairy or meat, trying to expand their product range with insect-based products or firms with a well-known brand name in other product categories (e.g. YFood with its RTD products). To gain a competitive advantage, new entrants will need to focus on market segmentation, geographic expansion, innovative product development, and distribution channel diversification.

In summary, the market for insect-based products offers opportunities for new entrants as it continues to grow but faces challenges due to the strong bargaining power of suppliers and high competition from substitute products. Consumer bargaining power is currently low due to limited choices, but this could change as the market expands. Given the high competition, innovative products, market segmentation, and geographic expansion should be emphasized to gain a competitive advantage in this evolving market.

4.2.4 Red and Blue Ocean Strategy

Given the analysis of the insect-based food market, it's clear that the startup should focus on a blue ocean strategy. This strategy is particularly suitable as this industry is relatively novel in Europe, characterized by plenty of untapped niches and several opportunities for an early-stage company to find the right value proposition. In such a blue ocean market, competition is limited, as the market boundaries are still flexible and not yet set. Consequently, new demand is created,

and the rules of the market are waiting to be established. Additionally, price dynamics in this emerging sector are perceived as high, which presents a unique opportunity for positioning and competitive advantage. Therefore, exploring this blue ocean provides a promising avenue for the startup to carve out its niche and shape the emerging market dynamics.

Insect-based products offer an exclusive mix of nutritional value, environmental sustainability, and novelty, providing a unique and new value proposition. This differentiates them from conventional protein sources and creates a unique value innovation that defines a blue ocean strategy (Kim & Mauborgne, 2005). In addition, studies show that the acceptance of insect-based foods is increasing, especially among younger, educated, and physically active people. Market growth expectations showed that future demand is at a relatively high level. The analysis showed that while there are some competitors in the market, most are generalists offering affordable products. Only a few companies, like MyBugbar, specialize in premium segments. The start-up can take advantage of this situation to differentiate itself and create its market positioning. In addition, the growing trend toward sustainable and environmentally friendly products offers the firm an excellent opportunity to present insect-based foods as a sustainable alternative to traditional protein sources, adapting to social change and consumer preferences. Given that red oceans require significant financial capabilities due to resource-intensive operations in a competitive and low-profit margin environment, a red ocean strategy is not recommended (Kim & Mauborgne, 2005). Additionally, it would compete with established players, which makes it even more challenging.

The blue ocean strategy provides the startup with several positioning advantages, including the ability to create a unique value proposition, high margins, and lower financial resource intensity, coupled with an environmentally efficient approach that aligns with the company's purpose, as well as the potential to leverage pricing dynamics and shape the competitive landscape.

4.2.5 Market Segmentation

The segmentation focuses on two major factors: pricing strategy, which spans from affordable to premium, and assortment, which distinguishes between generalist and specialized offerings of products, to fully understand the numerous aspects of competition analysis. This additional approach enables a profound investigation of the competitive environment and provides valuable insights for start-ups. The competitor segmentation based on the gained information from the *Overview of Key Competitors in the Insect-based Products Sector in German-Speaking Countries* (Figure 14) indicates in which area the firms on the market compete. The

majority of the companies are generalists, offering an affordable product, while only MyBugbar is specialized in the premium segment, offering mostly protein powder in different flavors and a few other products like protein porridge or peanut butter.

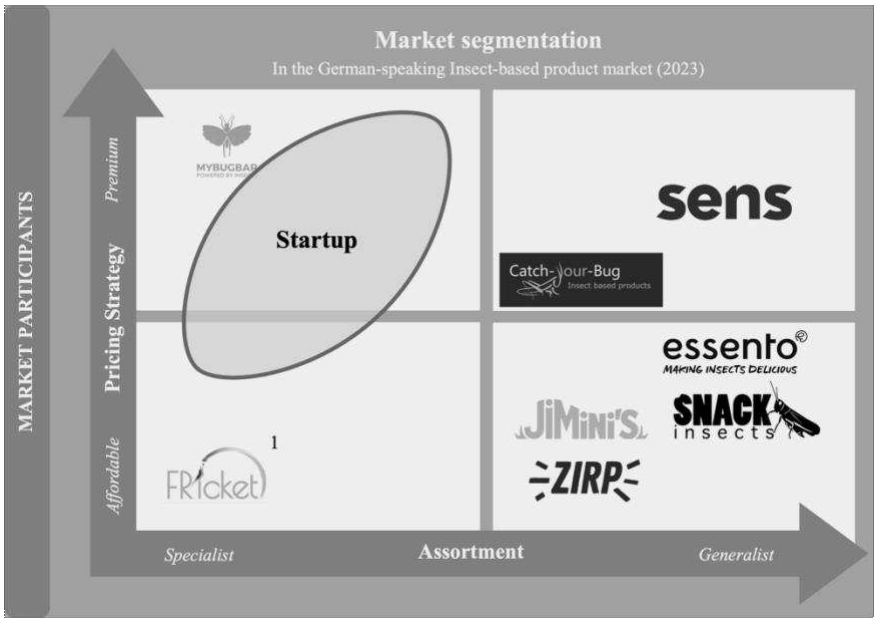

Figure 14: Insect-based Product Market Segmentation: Assortment and Pricing Strategy (Source: Company Website and own Analysis)

4.2.6 Competitor E-Commerce Analysis

A useful tool to analyze the competitors' web performance, is SimilarWeb. This tool provides insights including total visits, monthly visits, average time spent on the site, visits over time, and an overview of marketing channels, providing a detailed and informative analysis of e-commerce performance. These competitors (Essento Insect Food, Snack Insect, Jiminis, ZIRP Insects, MyBugbar) were selected for e-commerce performance analysis for the following reasons: The above companies have a significant position in the market and a certain brand recognition for insect products, which makes them relevant for the analysis. These competitors, located in different European countries, offer insights into different markets and how they operate. In addition, the selected companies serve different customer segments, providing valuable insights for other market players. Lastly, comprehensive data availability, including information such as website visits, dwell time, and marketing channels, enables a detailed analysis of their e-commerce performance.

Figures 15 and 16 indicate that Essento leads in visits and website duration, while Jiminis, second in visits, trails in duration. Mybugbar, despite having the least visits, maintains the second-highest average duration of 4.57 minutes. Both Essento and Jimmies are generalists,

which shows that they target a broader audience, resulting in high traffic, while Mybugbar is a specialist that has a larger segment of consumers who are more likely to convert in the marketing funnel, which contributes to why they have a comparatively good average duration. In Q1, ZIRP Insects peaked with 26,269 visits in January, and Essento experienced a substantial rise in visits from January to February, jumping from 18,692 to 22,333. Meanwhile, MyBugbar consistently attracted fewer visits, albeit showing a modest increase from February to March, going from 7,243 to 10,151.

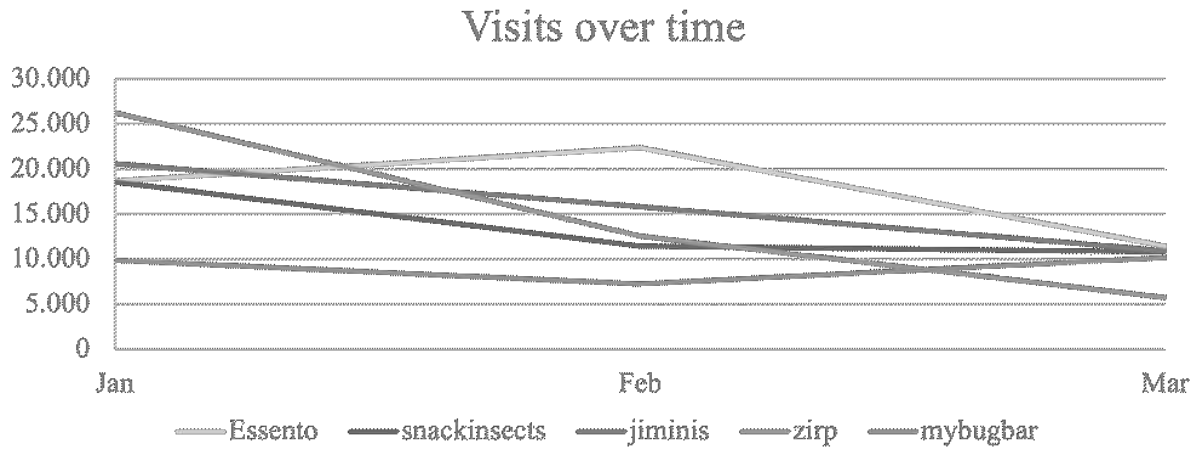

Figure 15: Three-month Website Visit Comparison Among Competitors
(Source: Adapted from SimilarWeb data)

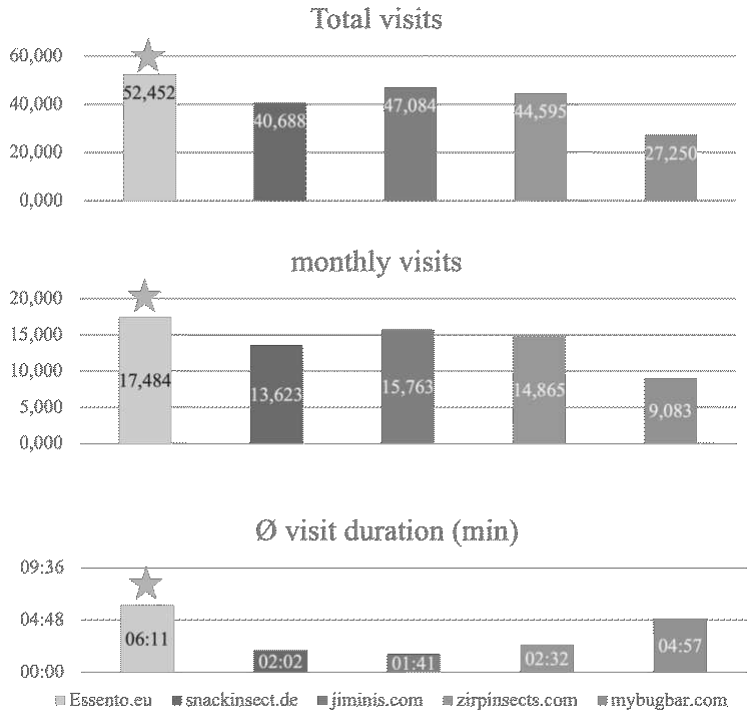

Figure 16: Overview of the Visits and Average Duration [January-March]
(Source: Adapted from SimilarWeb data)

Essento and Snackinsects have a similar distribution of marketing channels, with organic search making the biggest contribution at 64.3% and 67.3% respectively indicating that they have a relatively established brand reputation in the market (Figure 17). Jiminis also relies highly on organic search (64.8%) but has a higher Paid Search share (5.06%) compared to Essento and Snackinsects. ZIRPinsects has a more diverse distribution of channels, with the highest shares of direct (33.1%) and paid search (18.6%). Mybugbar stands out for its strong focus on social networks (13.5%) and organic search (64.5%), with little focus on other channels (*SimilarWeb*, n.d.).

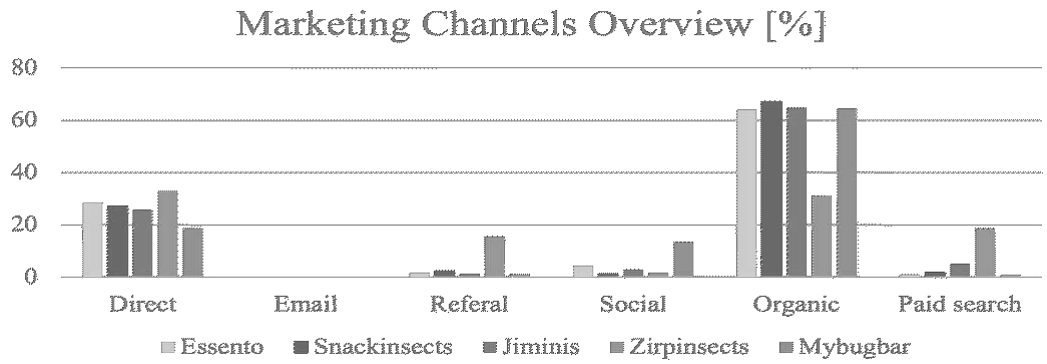

Figure 17: Competitors' Marketing Channel Distribution Breakdown
(Source: Adapted from SimilarWeb data)

4.3 MARKETING OPPORTUNITIES AND STRATEGIES

4.3.1 Potential Market Niches and Opportunities

In the field of insect-based foods, there are still many untapped niches and opportunities to be explored. In particular, the European market holds promising potential given the increasing awareness and acceptance of sustainable and alternative protein sources. First, the fitness and health industry are important niches to consider. Fitness enthusiasts and health-conscious consumers are always on the search for protein-rich, nutrient-dense, and sustainable food options. An untapped niche in this area is convenience food, which had a high WTB in the survey and the majority of people in cluster four would buy insects in the form of convenience food (94.1%). Furthermore, the increasingly busy lifestyle and higher incomes, decreasing household sizes as well as urbanization are identified as key drivers for the growth rate of 13%, from 2010 to 2023 reaching an amount of 5.3 billion EUR in Germany alone in the convenience food sector, which includes ready meals. (Zierlein et al., 2022). Since consumers are expressing a strong preference for nutrient-dense products that promote a healthy way of living, insect-based convenience food could be an additional option for this target group. Another niche is

that of the environmentally-conscious consumer. Since awareness of the environmental impact of traditional livestock farming grows, consumers are considering more sustainable protein sources. By communicating the lower environmental footprint of insect farming, the start-up can attract this environmentally conscious audience.

The pet food industry might also gain from insect-based proteins, given the rising pet owner concern for nutrition and sustainability. This field would need a deeper investigation though.

In summary, the insect-based food industry is rich with potential market niches and opportunities. A thorough understanding of consumer behavior, and market trends, and a willingness to innovate are critical to capitalizing on these potential opportunities.

4.3.2 Niche and Online Marketing Approaches

This thesis investigated several marketing approaches for this new firm. Considering that the potential start-up has limited financial resources in the beginning, it could use crowdfunding and pre-sales which help to finance initial production and avoid market failure (Stanko & Henard, 2016; Dai & Zhang, 2019). This way, it is possible to not only attract potential investors via the crowdfunding platform but also helps to get in touch directly with potential consumers. It provides an excellent platform for the start-up to test consumer interest and market validity, thus mitigating the risks associated with the introduction of new products. Successful crowdfunding campaigns can significantly increase awareness and help build trust and credibility in the brand at an early stage, even if these factors were not perceived as being overly important in the survey. In addition, backers can become brand ambassadors, as the people funding the project usually have a personal interest in the product and its success. This can happen through word-of-mouth stories, or social media activity by these financiers. For a successful crowdfunding campaign, however, the approach should be carefully considered. The campaign should effectively and efficiently communicate the unique selling proposition (USP) of insect-based products, highlight the nutritional and environmental benefits, and address any concerns about taste and texture. A high-quality video, a story that generates attention, and attractive reward levels (for investors) can greatly increase the attractiveness and success rate of the campaign.

Online marketing in general, especially social media engagement, is crucial to reach the younger target group as they are very active there and this group has shown the highest WTB insect-based products with up to 42.9% in the survey. The firm should create its own social media accounts and the most used platforms like TikTok, Instagram, and Facebook, this helps

to create an online community to share valuable and high-quality content with product information, health benefits, sustainability facts, educate on disgust factor, depending on the products the start-up will sell. Since most of the competitors showed a high organic search rate, it demonstrates the importance of search engine optimization (SEO) and brand recognition while differentiating the brand from the companies on the market. The effectiveness of online marketing should be regularly measured, reviewed, and adapted. In this way, the start-up can track which strategies are most effective in driving engagement and revenue. Metrics such as click-through rates, conversion rates, bounce rates, shares, likes, comments, and overall follower base growth should be monitored to optimize strategies over time.

Using micro- and nano-influencers (follower base ranging from 1.000 to 50.000), known for their high engagement rates and specific follower base, can increase brand visibility and credibility while having an increased conversion rate. Additionally, consumers showed higher product knowledge when they were exposed to micro-influencers (Kay et al., 2020). Because these nano and micro-influencers act and engage in a specific niche, they can be the perfect fit for communication strategies and educational programs which are required, to overcome the disgust factor against the consumption of insects (Huis et al., 2013). These influencers could be either active in any kind of sport, sustainability area, outdoors and adventures, educational areas, or diet and nutrition. In addition, working with a wide range of influencers can help the start-up reach a more diverse audience and tap into different sub-segments of the target market. This diversity of range allows the start-up to test different market niches and adjust its strategy accordingly. Ideally, they have young followers targeting an audience of up to 55 years. These collaborations could include product reviews, recipe creation, or hosting giveaways, offering benefits to both the influencers and the start-up. The products can then be sold through affiliate links, with the advertisers then earning a percentage of the sale.

The start-up also might consider strategic partnerships with other sustainable brands or platforms that align with its mission and target audience. This can increase the brand's reach and attract potential customers who already have an interest in sustainable products. An additional approach could be to create workshops with educational content and product testing. Due to the novelty and potential of the “disgust factor“ of insect-based products, a focus on education and raising awareness, while lowering the disgust factor could be useful.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 SYNTHESIS OF FINDINGS AND DISCUSSION

This thesis provides a comprehensive insight into the dynamic market for insect-based products in German-speaking countries. In particular, it focuses on market analysis, understanding consumer acceptance and perception, and exploring potential marketing and financing strategies. The market analysis revealed a diverse landscape with a promising niche for startups in the insect-based food sector. Although the market is dominated by a few generalists, it offers potential for the application of a "blue ocean" strategy, where startups can avoid low-margin direct competition by creating their own unique market space. Market segmentation has shown that there is a gap in specialized premium offerings and convenience foods, the survey showed the latter to be highly accepted by consumers. Current industry players mainly target general and affordable product lines. The analysis of the competitors' e-commerce performance revealed that there are a few players on the market and new firms entered this niche, showing that there is space for competition The e-commerce analysis sheds light on competitors' web performance and marketing channels, highlights the scope for competition, and offers strategic insights for a startup to improve its online presence and implement effective e-commerce strategies. Digital marketing channels can help the firm make data-driven decisions when developing effective e-commerce strategies and improving its web presence. It not only highlights the potential of the much-analyzed and favored e-commerce sector but also the prospects of retail, which emerged as the favored channel in the survey. Given the intense competition in the retail sector, the study highlights the importance of having contingency plans in place, especially if the primary e-commerce strategy does not pan out.

In terms of consumer acceptance, demographic factors such as age, gender, education, sports activities, and dietary habits have a significant impact on consumer attitudes toward insect-based products. When consumers have already consumed insects, their willingness to purchase increases. Acceptance is also strongly influenced by taste, texture, and safety information. These findings provide important insights for developing marketing strategies that address consumer concerns and increase product acceptance. Identified potential market niches such as the fitness and health industry, environmentally conscious consumers, the prepared foods market, and the pet food industry represent untapped opportunities for the start-up. Targeting these niches offers unique opportunities to differentiate and appeal to often underserved customer segments. Given the limited resources typical of startups, the study recommends a multi-faceted marketing strategy. This strategy includes a mix of online marketing techniques,

partnerships and educational outreach. The use of micro- and nano-influencers with high engagement rates, partnerships with local fitness centers, and promotion of an online community are suggested as cost-effective promotional techniques. Simultaneously, fostering an online community and conducting instructional workshops can significantly enhance brand recognition and foster trust among consumers. In addition, a crowdfunding campaign could serve as the financial backbone and initial launching point for the startup.

In summary, this study provides valuable guidelines for start-ups looking to enter the market for insect-based products in German-speaking countries. The opportunities and challenges highlighted require a sophisticated understanding of consumer perspectives, the exploitation of untapped niches, and the implementation of innovative, resource-efficient marketing strategies to drive the uptake of insect-based foods. Ultimate success in this emerging industry requires not only solid financial strength and partnerships with suppliers, but also a strategic approach that comprehensively addresses these factors.

5.2 THEORETICAL AND PRACTICAL IMPLICATIONS

5.2.1 Theoretical Implications

The results contribute to the existing literature on consumer acceptance of Novel Foods, especially insect-based products. They confirm the influence of various demographic and psychographic factors on consumer acceptance, such as age, gender, physical activity level, and dietary preferences. However, the research also shows that perceived taste, texture, and food safety information play an important role in acceptance, suggesting a differentiated understanding of the consumer psyche. Furthermore, the study confirms the applicability of the blue ocean strategy in the context of insect-based product start-ups. It shows that innovation and niche marketing, combined with the engagement of early adopters and influencers, as well as the right distribution channel could pave the way for start-ups to navigate the untapped market and achieve sustainable growth.

5.2.2 Practical Implications

From a practical perspective, the findings are a guide for start-ups of insect-based products on their way to market penetration and acceptance. They make it clear that start-ups should not only focus on the demographic characteristics of potential consumers but also their dietary preferences and sustainability orientation or sporting activity. The research findings suggest that companies should place great emphasis on the taste, texture, and safety information of their

products in their marketing communications to encourage consumer adoption. The sales channel can play a major role to reach the audience. In addition, start-ups could benefit from a product innovation strategy that focuses on creating and capturing new demand, achieving differentiation, and reducing costs through economies of scale. Market segmentation analysis helps to have a very clear picture of the competitive landscape and enables start-ups to gain a unique market position by offering different products at competitive prices. E-commerce analytics tools like SimilarWeb can help them analyze their online performance and make necessary adjustments to improve their digital marketing strategies. Finally, the potential market niches and opportunities identified highlight the importance of adaptability and innovation in meeting developing consumer demands and preferences. By serving niches such as the fitness industry, and environmentally conscious consumers, through the right channel, start-ups could gain a competitive advantage in the market.

5.3 CONCLUDING REMARKS

This research began with the goal of obtaining comprehensive market insights for a start-up in the European insect-based food industry, with a focus on the German-speaking region. As the journey from the initial analysis to strategy formulation continues, observing how understanding the market directly impacts a start-up's strategic decisions demonstrates the title's truth: "Market Insights to Business Strategy: A Baseline Study for a European Insect-Based Food Start-up." The market landscape was analyzed and key players were identified, as well as the competitor's e-commerce performance. The industry shows promising potential for product innovation, especially in untapped niches such as the fitness industry, environmentally conscious consumers, convenience food, and the pet food sector. Another important aspect of the research was understanding consumer acceptance. It showed that the "disgust factor" associated with eating insects can be mitigated through awareness and education. Men, younger people, and those with active lifestyles showed a greater willingness to try insect-based products, indicating potential target audiences. In terms of marketing strategies, a mix of niche and online marketing supported by collaborations and education initiatives was identified as effective, especially for a start-up company with limited initial resources. The industry's potential for insect-based products is exciting but has its challenges. The industry is infant, and societal perceptions of insect consumption must be carefully considered. In consideration of these findings, the final recommendation for any start-up company in this space is to continually invest in innovation, engage with its consumer base, and focus on educating the market about

the benefits of insect-based foods. Future research should address consumer behavior and the sustainability implications of insect-based products.

The industry is on the edge of making a significant contribution to global food sustainability. With strategic market positioning and targeted marketing efforts, a start-up company in the insect-based food industry could realize its commercial potential and make a remarkable impact on the field of sustainable food consumption. This journey is just the beginning, and the development of the insect-based food industry will be a fascinating area to watch in the years to come.

5.4 RECOMMENDATIONS FOR FUTURE RESEARCH

This thesis has illuminated the insect-product sector, mainly in German-speaking areas, offering key insights into its competitive landscape, consumer acceptance, and marketing strategies. However, due to the varied and non-homogenous product offerings of insect-based companies, a precise price comparison proved challenging, indicating an area for future research. Yet, it sets the stage for further exploration. Future research could be expanded by the geographical scope could beyond German-speaking regions to cover more of Europe or even globally for a comprehensive view of the insect-product market. A look beyond protein supplements into diverse product categories like snacks, convenience food, pet food, or culinary-grade insects would uncover unique possibilities and challenges. A longitudinal study could track changes in consumer acceptance, market growth, and regulatory framework development over time. Within the gathered data from the survey conducted for this thesis, a particular group was isolated from the overall participants, creating a subset that comprised a relatively small sample size. This group consisted of 55 observations, which equates to approximately 13% of all participants. This limitation in sample size represents a potential constraint in the study as it might affect the statistical power and the generalizability of the results. Future research could aim to overcome this limitation by aiming for a larger sample size. A more focused study of marketing channels, for instance, social media, influencer marketing, SEO, or content marketing, could offer insights into their efficacy in promoting insect-based products. In addition, the retail sales channel and its conditions could be analyzed in order to gain further insights into this sales channel, which was favored in the survey. The “disgust factor” associated with insects as food warrants a closer look into psychological and sociocultural factors influencing consumer acceptance. The still-evolving regulations for insect-based foods require a detailed examination, with an analysis of their impacts on the industry. And given the

sustainability factor of insect farming, a deeper analysis of its environmental impact versus traditional livestock farming could make a stronger case for consumers and regulators.

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APPENDICES

Consumer Survey

Insect based Food

Survey Flow

Page Break

Start of Block: Block 1

Q31 As part of my master's thesis, I am conducting a survey on the topic of alternative protein sources.

The aim of this survey is to investigate the perception and acceptance of different protein sources in our diet.

I would greatly appreciate it if you could take a few minutes (5-7 minutes) to participate in this survey. Your opinion is of great importance to me and will help develop a better understanding of the topic.

The survey is completely anonymous and the results will be used for scientific purposes only.

If you have any questions, you can contact me at s-fhufnagel@ucp.pt.

Thanks in advance for your valuable support and time.

Felix Hufnagel

Q33 First, I need your help to keep the robots away. Please confirm.

Page Break

Q1 Is your regular place of residence in the German-speaking area (D-A-CH)?

- ○ Yes (1)
- ○ No (2)

Skip To: Q24 If Is your regular place of residence in the German-speaking area (D-A-CH)? = No

Display This Question:

If Is your regular place of residence in the German-speaking area (D-A-CH)? = No

Q24 Thank you for taking part in our survey! Your opinion is very important to us and helps us to better understand the market and develop optimal products.

If you would like to take part in the draw for the vouchers, please enter your e-mail address below. All data will be kept confidential and will not be passed on to third parties.

Skip To: End of Survey If Condition: Thank you for thinking of... Is Equal to . Skip To: End of Survey.

Skip To: End of Survey If Condition: Thank you for thinking of... Is Not Equal to . Skip To: End of Survey.

End of Block: Block 1

Start of Block: Block 4

Q2 How would you rate your sports activity and intensity?

- ○ Very active - I do intensive sports (e.g. strength training, HIIT, running) several times a week (1)
- ○ Active - I exercise regularly, at least once a week (e.g., yoga, cycling, swimming) (2)
- ○ Occasionally active - I exercise irregularly, but at least once a month (e.g., hiking, dancing, tennis, golf) (3)
- ○ Little active - I rarely exercise, less than once a month (e.g., occasional walks, recreational activities) (4)
- ○ Inactive - I do not do any sports or physical activity (5)

Q22 What is your main diet?

- ○ Omnivorous (plant as well as animal foods) (1)
- ○ Pescetarian (fish and seafood, but no meat or poultry) (2)
- ○ Vegetarian (no meat or fish products, but dairy products and eggs) (3)
- ○ Vegan (only plant foods) (4)
- ○ Entovegan (abstaining from animal products, except insects, and consuming mainly plant-based foods) (5).
- ○ Flexitarians (mainly plant-based foods, but occasionally animal products) (6)
- ○ Other (None of the above categories describe my diet) (7)

Q3 How would you describe your current eating habits?

- ○ Very healthy: Make sure you eat a balanced diet with fresh ingredients. (1)
- ○ Mostly healthy: mostly healthy foods, occasionally unhealthy snacks. (2)
- ○ Mixed: sometimes healthy, often unhealthy meals or snacks. (3)
- ○ Mostly unhealthy: Mainly processed foods, fast foods, sweet snacks. (4)
- ○ Very unhealthy: no focus on healthy eating, regularly eat unhealthy foods. (5)

Q4 Which of the products pictured above do you consume most regularly? - the brand does not matter here

	Daily (1)	Several times a week (2)	Once a week (3)	Once or twice a month (4)	Less frequently than once a month (5)	Never consumed (6)
Ready-to-drink protein shake (e.g. chocolate, vanilla, banana, strawberry) (1)	○	○	○	○	○	○
Protein powder (milk or vegetable based) (2)	○	○	○	○	○	○
Drinking meal (e.g. YFood) (3)	○	○	○	○	○	○
Protein bars (4)	○	○	○	○	○	○
Protein chips (various flavors) (5)	○	○	○	○	○	○

Q28 To what extent have you consciously bought sustainable and environmentally friendly products in the last 3 months?

- ○ Always (1)
- ○ Mostly (2)
- ○ Sometimes (3)
- ○ Rare (4)
- ○ Never (5)

End of Block: Block 4

Start of Block: Insect-based food

Q23 Before moving on, a few **benefits of** insect-based products: Approximately **2 billion people** eat insects worldwide (similar number to WhatsApp users).

Ecological and health benefits:

Sustainable: compared to livestock, insects require 95% less water, 99% less land, 50% less feed, and produce 80% less greenhouse gas emissions.

Nutritious: crickets, for example, have 65% protein, 20% more than beef.

Versatile: Insect products are available as snacks, main dish ingredients, or protein powders. Over 2,000 species of insects are consumed worldwide.

Animal welfare: insect farms offer better conditions than conventional animal husbandry. Insects have fewer space and environmental needs.

Question: Before reading this infographic, were you aware of the following benefits of insect-based products? (multiple choice possible)

- ☐ Lower environmental impact compared to conventional livestock farming (1).
- ☐ High nutritional value (proteins, vitamins, minerals, essential fatty acids) (2)
- ☐ Versatile uses (snacks, main dishes, protein powder) (3)
- ☐ Better animal welfare compared to conventional animal husbandry (4)
- ☐ None of the benefits mentioned were known to me (6)

Page Break

Q5 In 2021, insects were allowed in food for the first time in the EU. How does that thought make you feel? (multiple choice possible)

- [ ] Interest - I am interested in how insects taste in food and what benefits they provide. (1)
- [ ] Excited - I am excited to try this new protein source. (2)
- [ ] Neutral - I have no particular feelings or opinions about it. (3)
- [ ] Skeptical - I am unsure if I can accept insects as food. (4)
- [ ] Concerned - I am concerned about possible health or environmental effects. (5)
- [ ] Averse - I find the thought of insects as food unappetizing or disgusting. (6)
- [ ] Fear - I am afraid of possible negative effects on my health or the environment from insects in food. (7)

Q26 Have you tried insects or insect-based products?

- ○ No (1)
- ○ Yes (2)
- ○ I do not know anymore (3)

Q7 Which of the following aspects related to insect-based foods pique your interest? (multiple selection possible)

- ☐ Environmental friendliness and sustainability of insect production (1)
- ☐ Health benefits of insects as a source of protein (2)
- ☐ Exoticism and novelty of insects as food (3)
- ☐ The ethical treatment of insects in food production (4).
- ☐ Taste and texture of insect-based dishes (5)
- ☐ The challenge of overcoming personal prejudice or feelings of disgust (6).
- ☐ Social acceptance and the influence of friends and family on the decision to eat insects (7).
- ☐ The potential of insects to replace or supplement conventional protein sources (8).
- ☐ none of the above (9)

Q6 Would you be willing to buy/consume insect-based foods or supplements?

- ○ In any case, I am very interested in it. (1)
- ○ Probably, I am open to new foods and experiences. (2)
- ○ Maybe, I would have to have more information or try it first. (3)
- ○ Rather not, I am unsure or have concerns. (4)
- ○ No way, that's out of the question for me. (5)

Skip To: Q8 If Would you be willing to buy/consume insect-based foods or supplements? = Maybe, I would need to have more information or try it first.

Skip To: Q8 If Would you be willing to buy/consume insect-based foods or supplements? = Rather not, I am unsure or have concerns.

Skip To: Q8 If Would you be willing to buy/consume insect-based foods or supplements? = Absolutely not, this is out of the question for me.

Skip To: Q11 If Would you be willing to buy/consume insect-based foods or supplements? = Definitely, I am very interested in it.

Skip To: Q11 If Would you be willing to buy/consume insect-based foods or supplements? = Probably, I am open to new foods and experiences.

Page Break

Q8 In your opinion, what are the reasons against consuming insect-based foods or supplements? (Multiple selection possible)

- ☐ Disgust or aversion to the idea of eating insects. (1)
- ☐ Allergies or intolerances to insects or insect products. (2)
- ☐ Ethnic or cultural reasons that prohibit the consumption of insects. (3)
- ☐ Nutritional philosophy or personal belief (e.g., vegetarianism, veganism). (4)
- ☐ Concerns regarding manufacturing processes or food safety. (5)
- ☐ Lack of availability or awareness of insect-based products. (6)
- ☐ High price or poor value for money compared to alternative protein sources. (7)
- ☐ Other reasons, please specify (8) _____

Page Break

Q11 To what extent do the following factors negatively influence your willingness to consume insect-based products?

	not at all (1)	minor (2)	mediocre (3)	clear (4)	strong (5)
Emotions (e.g., disgust, curiosity, or excitement): (1)	○	○	○	○	○
Social pressure (e.g. opinions of friends, family or colleagues) (2)	○	○	○	○	○
Familiarity (e.g., familiarity or experience with insect-based products): (3)	○	○	○	○	○
Personal ethical or moral beliefs (4)	○	○	○	○	○
Dietary needs or restrictions (e.g., allergies, vegetarian/vegan diet) (5)	○	○	○	○	○
Brand attractiveness (6)	○	○	○	○	○

Page Break

Q12 Which insect-based product variant would you be most likely to buy and consume?

	Never (6)	Very unlikely (14)	Rather unlikely (15)	Neutral / Draw (16)	More likely than not (17)	Very likely (18)
Ready-to-drink protein shake (e.g. chocolate, vanilla, banana) (1)	○	○	○	○	○	○
Protein powder (based on plant protein mixed with insect protein, e.g. chocolate, vanilla, banana) (2)	○	○	○	○	○	○
Drink meal (such as YFood) (3)	○	○	○	○	○	○
Protein bar (various flavors) (4)	○	○	○	○	○	○
Protein chips (seasoned in different flavors) (5)	○	○	○	○	○	○

Convenience food (with insect-based protein chunks similar to veg. substitutes) (6).	○	○	○	○	○	○

Q13 If you were to purchase insect-based products, through which distribution channel would you most likely purchase them?

- ○ Organic and health food stores (1)
- ○ Online stores and mail order (2)
- ○ Supermarkets and grocery stores (3)
- ○ Gyms and sports nutrition stores (4)
- ○ I would not buy insect-based products (6)

Q20 What factors are most important to you when choosing insect-based products?

Taste and texture (1)	☆	☆	☆	☆	☆
Nutritional content (e.g. proteins, vitamins, minerals) (2)	☆	☆	☆	☆	☆
Environmental friendliness and sustainability (3)	☆	☆	☆	☆	☆
Price (4)	☆	☆	☆	☆	☆
Packaging and presentation (5)	☆	☆	☆	☆	☆
Brand awareness (6)	☆	☆	☆	☆	☆
Origin of insects (local or imported) (7)	☆	☆	☆	☆	☆

Page Break

Q29 On average, a protein drink costs **4.35€ for 500ml**. What would you be willing to pay for a similar drink based on insect protein (500ml)? [specified in X,XX]

_____

Q30 On average, the classic protein (Whey) costs **39€ per kilogram**. What would you be willing to pay for protein powder based on insect protein (1Kg)? [Indication in XX,XX]

_____

Q32 Please select the answer that shows you are paying attention:

- I am not attentive. (1)
- I focus on my surroundings. (2)
- I'm thinking of something else. (3)
- I am very attentive (4)

End of Block: Insect-based food

Start of Block: Sociodemographics

Q1 How old are you?

- younger than 18 (1)
- 18-24 (2)
- 25-34 (3)
- 35-44 (4)
- 45-54 (5)
- 55-64 (6)
- older than 65 (7)

Q2 Please give information about your highest education level so far

- ○ No school diploma (1)
- ○ Secondary school diploma (2)
- ○ Realschulabschluss (secondary school leaving certificate) (3)
- ○ Technical college entrance qualification (Fachabitur) (4)
- ○ General qualification for university entrance (Abitur) (5)
- ○ Vocational training or apprenticeship (6)
- ○ Bachelor's degree (college or university) (7)
- ○ Master's degree (college or university) (8)
- ○ MBA (Master of Business Administration) (9)
- ○ Diploma degree (college or university degree) (10)
- ○ Doctorate (PhD) (11)
- ○ Other (please specify) (12)

Q3 Please provide information about your marital status

- ○ Single (1)
- ○ Married (2)
- ○ Widowed (3)
- ○ Divorced (4)
- ○ In a partnership (5)

Q4 Please provide information about your professional activity

- ○ Full time employment (1)
- ○ Part-time employment (2)
- ○ Independence (3)
- ○ Unemployment (4)
- ○ Pensioner (5)
- ○ Student (6)
- ○ Pupil (7)
- ○ Vocational training (8)

Q5 Net income

- ○ Under 10,000 euros per year (1)
- ○ 10,000-25,000 euros per year (2)
- ○ 25,000-50,000 euros per year (3)
- ○ 50,000-75,000 euros per year (4)
- ○ 75,000-100,000 euros per year (5)
- ○ Over 100,000 euros per year (6)
- ○ I do not want to give any information about this (7)

Q6 Gender

- ○ Male (1)
- ○ Female (2)
- ○ Divers (3)
- ○ not specified (4)

Q30 Thank you for taking part in our survey! Your opinion is very important to us and helps us to better understand the market and develop optimal products.

End of Block: Sociodemographics