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An exploratory review of motivational factors influencing plant-based protein options consumption: future growth implications for consumer goods producers

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Abstract: *This exploratory research considers the trend of plant-based protein options. Plant-based protein has been around since the late 1800s. However, the attitudes toward animal meat alternatives have evolved exponentially in recent years. Focusing upon the motivational factors around why people decide to choose plant-based protein options, this study gains consumer insights to suggest future trends for the product in both the fast food and grocery shopping industries, with potential implications for consumer packaged goods companies. Secondary literature review focuses on the SWOT analysis of plant-based protein along with understanding why people are making the switch from meat to plant-based meat alternatives. Primary research, in the form of a widely distributed survey, focuses on establishing demographic preferences, current attitudes toward plant-based protein, understanding what consumers prioritize when purchasing plant-based meat alternatives (i.e., taste, texture, nutritional components, etc.), and what these results mean for producers of plant-based protein and the industries that use this product. This study found strong results favoring consumer motivations as wanting to try something new, a desire to cut back on red meat consumption, and using plant-based products to fit into a more flexitarian diet. Implications for consumer goods companies include lowering sodium content, working to reduce retail prices, and working with fast food and quick serve restaurants for more widely available ready to eat distribution.*

Keywords: *plant-based, red meat alternatives, flexitarian, vegetarian .*

I. Introduction

Plant-based protein dates to 1896 when John Harvey Kellogg, a member of the mostly vegetarian Seventh-day Adventists, created a peanut-based "meatless meat" named Nuttose, which became popular at sanitariums. Currently, there exists 48 national restaurant chains serving some type of plant-based protein option. Plant-based protein is a substitute for animal-based proteins. Plant-based protein looks and tastes like animal-based protein but is made from plants rather than animals. They are made to mimic the taste of chicken, beef, lamb, seafood, ham, and sausage (Kumar, 2016).

Plant-based protein options such as the Impossible™ Burger and Beyond Burger® are becoming increasingly popular with consumers and have attracted considerable financial investments, media coverage, and research attention. Their success has led other food companies to produce their own versions of these products. The plant-based protein market is growing rapidly and is expected to be worth more than $30 billion by 2026 (van Vliet et al, 2020). As of 2020, a plant-based protein diet was in the top 3 for most popular food trends. 74% had tried a plant-based protein diet, while burger patties and sausages were a trendy choice and taste was important (Estell et al., 2021). By 2050, worldwide food systems will need to meet dietary demands of almost 10 billion people. To meet these demands in a healthy and sustainable manner, it is put forward those diets would benefit from a shift towards consumption of more plant-based protein and less meat, particularly in Western countries (van Vliet et al., 2021). The global plant-based protein sector is expected to have an annual growth rate of 15% by 2026 while in contrast, the meat sector is expecting to have an annual growth rate of 3.9% by 2023 (Ibid.).

II. Literature review

In a review of plant-based options and consumer motivations, Aschmann-Witzel et. al (2020) have performed a SWOT analysis on this product category and identified an upward trend. This trend helps illuminate the strengths this product exhibits being associated as healthy, environmentally friendly, and help consumers

uptake a variety in their diet. The researchers were also able to identify how the unfamiliarity of this product to our tastebuds and culture pose as weaknesses. The authors were able to unveil opportunities for plant-based protein (i.e., sustainability, improvement of food ingredients, and counteracting climate change) and keep on their radar the threats posed from plant-based protein (i.e., highly processed products and health concerns). This SWOT analysis helps support the need for further research on the current attitudes of plant-based protein to identify strategies to improve the perception around the product and the many benefits that come from his dietary choice.

Strengths	**Weaknesses**
• Plant-based foods are believed to be healthier and more "free from" concerns. • Plant-based foods are regarded as more environmentally friendly and better for the climate. • Planted-based foods can be favored for providing dietary variety, and because they are new and in trend. • More variety than there was before • Improved taste and texture than a few years ago • The steadily growing market almost double in sales than a few years ago	• Habits, tradition, familiarity, and perception of what is "proper" food/meal favor dairy and animal-based products and diets. • There is a belief that meat is nutritionally needed and more satiating. • Plant-based foods are assumed or perceived to be less tasty. • It is perceived to be less convenient to cook and eat plant based. • There is still a lack of awareness of the health and sustainability impact of animal-based foods, and the relative contribution of plant-based to health and sustainability
Opportunities	**Threats**
• **Opportunities:** The sustainability challenges fuel consumer concern and demand, as well as policy support for mitigation action in the food sector • A potential peak of meat demand in BRICS countries and development of a worldwide plant-based food trend can improve export potential for knowledge, ingredients, and foods • Protein under-consumption among the elderly can lead to efforts to improve the situation, and thus greater demand of protein • Protein quality in colder climates improves as a side-effect of climate change	• Clean label food trend-related concerns about processing and ingredients in plant-based foods can lead to negative perception. • Health concerns raised about plant-based diets or consumer insecurity about potential health risks can lead to a backlash against plant-based foods • Potential for high sodium • Texture is not agreeable

Table 1: SWOT of plant-based options

Source: Aschmann-Witzel et. Al (2020)

Animal-based meat has been a prominent staple in many diets around the world for many years. This dependency upon animal meat has created a problem for the transition for some people to plant-based protein. There are several reasons as to why a switch to plant-based protein is being made and these reasons vary from different groups. In a study conducted, it was found that the older population saw "increased fiber intake," (Lea et al., 2006) as the most critical benefit of the switch. For younger age groups, it was also found in this study that "saturated fat intake was the most important benefit" (Ibid.). More notable causes for an interest from consumers to switch to a plant-based diet are its health benefits. Some of these health benefits include "reduced

risks of type 2 diabetes, heart diseases, and strokes" (He et al., 2020). Now that plant-based protein companies are expanding outside of their niche market, it is crucial to figure out what would make people willing to try plant-based protein and become a repeat buyer.

In 2019, US plant-based protein category was worth US $939 million which was 2% of all dollar sales of retail packaged meat and 1% of total dollar sales of all retail meat (Choudhury et al., 2020). Businesses are getting smarter in marketing these products. In order to grow, they know that they need to expand their target market to flexitarians—a term for people who try to eat as little meat as possible—who make up one-third of the US population. While being marketed as a healthier and environmentally friendly, public opinion is divided as production includes heavy processing. According to a study by Lee (2020), customers seem to associate the color red with freshness, which is hard to gain for plant-based protein to achieve, unless with the use of a coloring agent. Another challenge would be the fact that plant-based protein alternative contains more energy value, total fats, saturated fats, sodium, and iron content compared to natural beef (Ibid.).

The growth of the plant-based protein industry is projected from $4.6 billion (about $14 per person in the US) in 2018 to $85 billion (about $260 per person in the US) by 2030 (Sha & Xiong, 2020). By 2035, the demand for cow products will have shrunk to 80%- 90% (Santo et. al.,2020). Thus, increased production of plant-based options should result in making plant-based protein cheaper and more cost-effective for some consumers. Plant-based meat alternatives mimic the texture, appearance, and flavors of meat products. There is much controversy with plant-based protein being called meat. In February 2018, the National Cattlemen's Beef Association filed a petition to the USDA arguing that plant-based products should not be called "meat" since they do not come from raised and slaughtered animals and will confuse the consumer (Ibid.). There are 25 states in the US that have passed a bill to prevent plant-based products from being labeled as meat.

Supermarket shelf space has seen an increase in plant-based protein as the trend towards plant-based meat alternatives has increased (Kumar, 2016). Consuming plant-based protein instead of actual meat can reduce the risk of cancer, heart disease, and high cholesterol levels (Ibid.). In addition to health benefits, plant-based protein is an appealing option to those who follow certain dietary restrictions such a kosher or halal diet (Ibid.). There are allergy concerns as some plant-based proteins are made from soy and peanuts. People with celiac disease cannot consume gluten-based proteins (Ibid.).

The adoption of meat alternatives could have many beneficial effects on the environment, as well. Meat production requires 10x more space than plant protein and roughly 40% of grain production goes to feeding animals which could be redirected towards food productions for the population. The need for fertilizer, the energy needed to maintain animals, and pesticides input went down by 34%, 54%, and 97% in a study calculating the effects of a vegetarian diet (Ibid.).

The repurposing of former livestock pastures would be able to be converted into native habitats and forests which would cause some alleviation on climate change and bring back the lost biodiversity and potentially create room for previously pushed out animals such as buffalo to come back. Food emissions are calculated to drop to about 60% by cutting down the production of red meats which produce methane. 79% of animals exit food markets that is about 947,000 animals exiting the food market which is based on estimated sales shopper data. With companies like Hormel investing about 6.5$ Billion in acquisitions, you can see that there is a definite interest in the market of meat alternatives be beneficial for environmental causes, animal welfare, health benefits such as lower risk for cardiac diseases and lower risk for diabetes but it is a growing industry that is becoming more prevalent (Ibid.).

A survey of 1039 German individuals indicated that consumers want plant-based protein to have a similar texture and taste to actual meat (Michel et al., 2021). The study concluded that such proteins may be successful in the market if they resemble highly processed meat products in taste, texture, and color while being sold at competitive prices (Ibid.).

In 2016, in Denmark and Germany, the market for plant-based protein showed an annual growth of 15–20% while the Netherlands, Sweden and the UK experienced a growth of 5–10% (Tzvia et al., 2020). The study concluded that demand for plant-based protein ultimately gave rise to innovation, depicting how norms and beliefs can influence the market (Ibid.). Regarding color, soy leghemoglobin is a popular plant-based protein that imitates the "bloody" appearance and taste of heme proteins in meat, while the extracts from red beets, red berries, carrots, or other similarly colored vegetables are often used in plant-based protein to get them the reddish "meat-like" appearance (van Vliet et al. 2021). Therefore, animal meat and plant-based protein share the same color. Plant-based protein have various functional ingredients that are required to create and mimic the type of texture, appearance, flavor, and mouthfeel of animal protein-based products (Sha & Xiong, 2020).

According to (Lee et al., 2021), when compared to natural beef, plant-based protein has more energy value, total fats, saturated fats, sodium, and iron content, which might be caused by the addition of excess fat and oil in order to mimic animal fat. For example, the Impossible Whopper, a plant-based burger at Burger King, contains 1,240 mg of sodium compared to 980 mg of sodium found in their actual beef burger (Integris

Health, 2020). Higher sodium content can pose health concerns for those trying to control their blood pressure. Furthermore, while touted for their health benefits, plant-based protein has a higher caloric content compared to beef. Critics also argue that such proteins contain several chemical substances not found in regular meat, including "methylcellulose, soy leghemoglobin and zinc gluconate" (Ibid.). So, plant-based protein differs from animal meat in that they contain higher levels of "additives, sodium, fat and calories" (Ibid.).

With plant-based protein on the rise, certain consumer products may be potentially impacted. For example, the changes in conventional beef prices have been on the rise – impacting consumer decision-making. The cost of cattle-beef is fluctuating because of supply chain disruptions, causing a rise in meat prices. While the cost of plant-based protein decreased 1%. The potential consumer products that may be impacted are as follows:

- Pre-packaged fresh ground beef, chicken, and turkey: all brands.
- Pre-packaged fresh chicken breast/tenderloins/thighs: all brands.
- Frozen beef patties, chicken breasts/tenderloins/thighs: all brands.
- Frozen chicken nuggets/chicken fries/popcorn chicken: all brands.
- Frozen fish/shrimp.

Data collection methodology

The questions to be pursued with this research include:

1. What motivational factors play into plant-based choices?
2. Why do those who try plant-based options return and re-buy?
3. What reasons would push consumers away from plant-based protein?

In the form of a survey, primary research was focused on consumer behavioral traits and how they reflect plant-based consumption and repeat purchases. The survey consisted of 20 questions, and two research questions were the main sections of the survey:

1. Why do people choose plant-based protein?
2. What is the most important when considering incorporating plant-based protein into consumers' diets? (i.e., taste, price, texture, form, variety, nutritional components)

For the sample, non-probability sampling methods, namely the chain-referral snowball method, were used to gather responses. The survey was widely distributed through e-mails and social media (i.e., Facebook, Snapchat, iMessage, WhatsApp, and Instagram) to target younger generation, health-conscious individuals, traditional meat users, and plant-based protein users. To ensure enough data was gathered, a target number of at least 250 respondents was targeted.

Question Flow

Each respondent was given the same questions, and skip logic was used to eliminate respondents who would not be willing to try plant-based protein. We were looking for connections between why people choose plant-based protein and what matters to them in this type of product.

Survey Questions

Structure of questions in the survey:

- Demographics: Gender identification, age, ethnic background, and state of residence
- Block 1 (For respondents who answered "yes" or "would try again"): Frequency of consumption, importance of different variables for purchasing or integrating into their diet, where plant-based products are bought or consumed, effect of accessibility and consumption, openness of integration in the user's diet, reason for trying plant-based protein
- Block 2 (For respondents who answered "would not try again"): reasons for not consuming plant-based protein again
- Block 3 (For respondents who answered "never tried it"): Factors that would influence the purchase or consumption of plant-based protein, something being made available so the user would be interested in consumption, effect of eating a sample on purchasing, concerns for trying plant-based protein, base protein most willing to eat, and most important reasons for consuming to plant-based protein

III. Discussion of results

Upon closing the survey, the number of respondents (n) was 307. Qualtrics was used to analyze the data, and the following is a discussion of the results.

According to Qualtrics each correlation had a strong to very strong statistically significant relationship. Many of the respondents who answered that they were omnivores simply tried plant-based protein because they

were curious about it. We had 226 of the 307 respondents answer they are omnivores. The omnivore respondents also stated they were health conscious or they wanted to integrate more plants into their diet. There was a strong statistically significant relationship between dietary preference and why respondents tried plant-based protein, with a p-value less than 0.00001 and with a correlation of .385. Respondents were proposed with a Likert scale of the importance of the features of the product: form (frozen, fresh, pre-packaged), nutritional components, price, taste, texture, and variety (burgers, nuggets, patties). 81% of the captured responses for this portion of the survey stated texture was of utmost importance when it came to trying plant-based protein. There is a p-value of 0.0073 and a correlation of .22 in the context that texture was important for plant-based protein, while 70% stated variety was important as well. There is a p-value of 0.0174 and a correlation of .21 in the context that variety was of importance when eating plant-based protein. As for the trend of plant-based protein, 131 respondents were open to integrating plant-based protein into their diet.

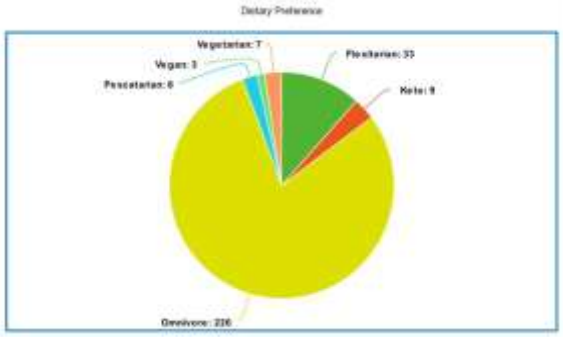

Figure 1: Number of omnivore respondents

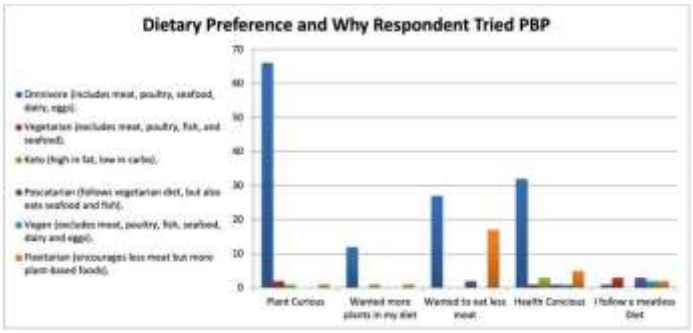

Figure 2: Dietary preference and why tried

We asked our respondents if plant-based protein were more accessible would they be more likely try it and 40.9% of our respondents answered definitely yes. When asked what their biggest concern about trying plant-based protein, no motivation to try it and flavor were the top picked responses.

IV. Implications for producers

Based on the results of our survey, producers of plant-based protein would benefit from the following key points. 31% of survey respondents reported they have never tried plant-based protein. Distribution was one of the top reasons why consumers had not tried plant-based proteins. This market segment serves as a prime opportunity for producers to expand their reach through market development, as they sell their current products to new consumers. Producers should attempt to mimic the taste and texture of real meat as both these elements ranked in the top three incentives for people to consider plant-based protein. Secondly, producers should aim to educate consumers about plant-based protein preparation and the advantages of such products as 11% of respondents reported not having enough information about the product. Thirdly, producers should try to promote their products through sampling in stores and coupons in the mail. The number one reason people were discouraged from trying plant-based protein was lack of motivation (33%). Thus, companies specializing in plant-based protein should strive to incentivize and motivate people to try their products through price discounts and intercept marketing in stores. And lastly, producers would benefit from offering a broad variety of plant-based proteins such as sausages, patties, burgers, and chicken among others. By offering an array of options for consumers, producers can better meet the diverse needs of consumers.

Limitations and future research

It is important to note this research does not have a representative sample. The data presented in this research are relatively small and mostly gathered from female Caucasian college students (age 18-23). Thus, it was difficult to glean insight from minorities, in addition to males.

Additionally, we did not specify subcategories of the "Grocery" option in our survey. For example, question 26 reads: "Please tell us from where you buy/eat plant-based protein?" Our answers were as follows: Grocery Stores, Fast-Food, Other. 149 respondents answered, "Grocery Stores". However, we cannot glean what kind of method they use for their grocery shopping. Different shopping methods offer a very different shopping experience. When people go to the physical store and shop in-person, they are influenced by impulse purchases, since they see a plethora of food items surrounding them. They may walk by the meat aisle and see plant-based protein. People who buy groceries online, on the other hand, have a very different experience. Consumers who pick up groceries through curbside services or have them delivered to their homes may not be exposed to plant-based protein to the same degree as in-person shoppers. Our survey would have been stronger had we specified different ways of grocery shopping in the answer section.

Another limitation revolves around leading questions. In our attempt to clarify question 17, we inadvertently led respondents to answer in a specific way. Question 17 reads: "What is something you would like to have available as a plant-based protein that may entice you to try it? (ex: patties, sausages, etc.)" The word cloud from survey respondents revealed that patties and sausages were the most salient answers. We likely created a leading question by including examples in parentheses. In hindsight, it would have been best to leave out examples and instead let respondents answer naturally. This would have allowed for greater accuracy in assessing consumer preferences.

We have a few suggestions for future research based on the data that we gained from this research. As plant-based protein makes its way to the market, it will be crucial to conduct supply-side research to further understand the business implications of plant-based protein. Supply-side research will help businesses determine whether it is sustainable and profitable by analyzing assortment, promotion and pricing strategies, and distribution strategies. Furthermore, future demand-side research should also be conducted to further address other factors that might influence consumers in switching or choosing plant-based proteins, such as cultural backgrounds, retailers' marketing strategies, healthy lifestyles trends, and many more. Replicated studies should aim to achieve a moderate degree of representativeness by using larger sample sizes.

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