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Assessment of the Acceptability of Banana Tree Pith (Bani) as an Alternative Food Source in Chip Form

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A B S T R A C T

This study investigates the potential of banana tree pith (bani), an underutilized agricultural by-product, as a sustainable alternative snack in chip form. Using a descriptive developmental research design based on secondary data, the study evaluates the nutritional value, sensory acceptability, and market potential of banana pith chips. Rich in fiber, low in fat, and containing bioactive compounds, banana pith offers a nutritious and eco-friendly ingredient for health-oriented snack production. Guided by the Value–Attitude–Behavior (VAB) model, consumer acceptance is analyzed through sensory and behavioral factors, highlighting that eco-labeling and environmental messaging enhance willingness to try and purchase. The findings demonstrate that banana pith chips are nutritionally viable, sensorially acceptable, and marketable when supported by sustainable branding and consumer education. The study contributes to sustainable food innovation aligned with SDGs 2, 12, and 13 and recommends further research on sensory optimization, shelf life, cost-efficiency, and localized market adoption.

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INTRODUCTION

In recent years, interest in alternative food sources that are both sustainable and accessible within local communities has increased. Villareal et al. (2019) highlighted that communities are increasingly managing food systems to support environmental and social goals. With global challenges such as food security concerns, climate change, and resource scarcity, the exploration of untapped food ingredients is essential. Utilizing these neglected resources can reduce dependence on conventional crops while enhancing food diversity and sustainability.

Recent scholarship emphasizes that the valorization of underutilized crops and plant parts plays a crucial role in addressing both nutritional gaps and sustainable food production. Padulosi et al. (2019) note that neglected and underutilized species (NUS) can enrich diets, improve micronutrient intake, and strengthen resilience against climate variability. In the Philippine context, ethnobotanical studies have shown how indigenous communities often turn to lesser- known plant resources in times of scarcity, revealing their untapped role in mainstream food systems (Caballero et al., 2020).

The use of lesser-known food materials, however, presents challenges in terms of processing, preservation, and consumer acceptance. Knorr and Augustine (2024) explain that expanding the food basket requires sound postharvest practices and appropriate processing methods to make these foods safe and appealing. Capelli et al. (2022) stress the importance of plant diversity, while Dobermann et al. (2022) encourage reintroducing traditional, underused plants into modern diets. One such underutilized plant part is the banana tree pith, locally known as bani, which is frequently discarded despite its nutritional potential.

The utilization of agricultural by-products such as banana pith also aligns with the principles of the circular economy, where waste is transformed into value-added goods. The Food and Agriculture Organization (FAO, 2021) emphasizes that reducing food loss and repurposing agricultural residues are vital in achieving sustainability goals, particularly responsible consumption and production. Scientific studies confirm that banana by-products are rich in dietary fiber, antioxidants, and bioactive compounds, making them viable ingredients for functional foods (Singh et al., 2021).

This approach is timely and relevant. Sustainability and food innovation are now central to global discourse, and understanding the potential of underutilized materials like banana pith can support small-scale producers, Agri-based enterprises, and sustainable snack options.

Consumer perspectives further reinforce the promise of such innovation. Studies on sustainable consumer behavior show that people are increasingly willing to try plant-based and eco-friendly food products, provided they meet expectations for taste, texture, and overall appeal (Aschemann-Witzel et al., 2019). In this sense, banana pith chips could become more than just a waste-reduction strategy—they could represent a healthier, locally sourced snack alternative that resonates with both sustainability advocates and everyday consumers.

Experts emphasize that market integration and institutional assistance are essential for underutilized crops like banana pith to become more widely recognized. Hunter et al. (2019) state that in order to increase awareness and adoption, scaling up the use of NUS necessitates concerted efforts in research, extension services, and legislative incentives. The potential of these food innovations might be limited to niche markets in the absence of such institutional backing, rather than making a significant contribution to sustainable development and food security.

This study examines the acceptability of banana pith (bani) as a chip product, relying solely on secondary sources such as case studies, food development reports, and prior sensory evaluations, and adopts a descriptive developmental research design, which is appropriate for evaluating an idea using previously gathered data. Specifically, it assesses the acceptability of banana tree pith when processed into chip form by focusing on sensory qualities such as taste, texture, aroma, and appearance, while also seeking to understand consumer attitudes based on previous studies. The objectives are to review existing studies that evaluate banana pith or similar plant-based chips in terms of sensory attributes, summarize findings on overall consumer acceptability, and identify factors from secondary data that affect perception, including familiarity with the product and openness to alternative foods.

In doing so, the research aligns with several of the United Nations' Sustainable Development Goals (SDGs): with SDG 2 (Zero Hunger), it raises awareness of food diversification and the use of underused food sources that could enhance local food security; with SDG 12 (Responsible Consumption and Production), it supports resource efficiency and the creative reuse of what would otherwise be agricultural waste; and with SDG 13 (Climate Action), it contributes in a small but meaningful way by promoting sustainable food innovations that reduce reliance on processed, high-impact products. Beyond these global goals, the study also hopes to inform students, educators, researchers, and small-scale food producers on appropriate ways to utilize indigenous or underutilized materials as food items, while fostering further examination, creativity, and localized solutions that emphasize sustainability, innovation, and resilience in food systems, particularly in rural or farming communities.

LITERATURE REVIEW

This chapter examines previous research on the banana pseudostem, highlighting its various uses, processing properties, and nutritional makeup. It draws attention to the potential of banana pith, which is frequently thrown away as trash, as a sustainable food ingredient, especially in the making of chips. In addition to its structural and functional benefits, the Value– Attitude–Behavior (VAB) paradigm frames the conversation to take into account consumer acceptance, market relevance, and sustainability consequences. The basis for assessing the viability and acceptability of banana pith chips is provided by these studies taken together.

Composition and Functional Properties of Banana Pseudostem

The banana pith or pseudostem is the soft core or heart of the banana stalk. Pillai et al. (2024) stated banana pith is loaded with cellulose, hemicellulose, and natural fibers. Nutritional composition is reported to contain (27%) dietary fiber, carbohydrates (~52%), essential minerals, and vitamin C (naturally has very low levels of fat) (Saikia et al., 2025). Kaushalya and Samanthika (2024) also report functional properties, which include antihyperglycemic, antimicrobial, and hypolipidemic. Each part of the pseudostem (outer, middle, inner) differ in composition and use. A recent study by Boonmanumsin et al. (2024) demonstrated that the inner layer (layer 3) of Musa sapientum L. yielded the lightest and most abundant fibers, while the outer layer exhibited the highest tensile strength, which supports its use as a textile. This layer- based differentiation reinforces the potential of the inner core or pith, often discarded, as a valuable biomass. While the cited study focused on fiber applications, it substantiates the compositional richness of the pith, aligning with current efforts to explore its food-related uses— such as in functional chip production.

Bananas have great potential (sustainable) material with potential applications in a wide range of industries using pseudostem fibers. Although their uses take careful consideration of extracting methods and modifying conditions to associate top performance, the fibers have unique characteristics, which are suitable for multiple composite and nanocomposite applications (Olano & Maied, 2023). A major advancement in nanotechnology applications has been the extraction and characterization of cellulose nanofibers from banana pseudostem. These bio-based materials can be used in combination with membrane technologies and other nanocomposites (Arun et al., 2022). An extensive investigation into the properties of banana pseudostem fiber has demonstrated that despite the potential of these natural fibers to replace synthetic materials in environmentally beneficial applications, their successful utilization rests solely on understanding their inherent properties, and applying suitable modification processes to enhance their compatibility with different matrix materials (Olano & Maied, 2023). As well as addressing sustainability challenges, creating cellulose nanofibers from this agricultural waste opens up new opportunities in high-performance membrane science, and advanced composite material applications (Arun et al., 2022).

Processing Characteristics and Applications in Food

In addition to nutritional composition, the processing properties of banana pith also contribute to its potential as a food ingredient. Banana pith contains measurable starch yields ranging from 0.12% to 0.20%, making it suitable for chip production (Ali et al., 2021). Li et al. (2021) observed that sugar and starch levels vary across banana genotypes, influencing processing behavior. Its antioxidant properties and polyphenol content also make it promising for functional food applications (Saravanan & Aradhya, 2011; Gayathry & John, 2024).

Recent research on banana pseudostem fibers from Musa paradisiaca further emphasizes the importance of thermal pretreatment. Montoya Berrio et al. (2024) showed that fibers dried at 90 °C lose more non-cellulosic materials,

including lignin, offering smoother microstructural morphology, whereas fibers maintained mechanical performance similar to those dried at 40 °C. Moreover, fiber diameters of 148–250 μm showed a correlation to greater tensile strength and stiffness values as a result of more compact microfibril arrangement—lower-temperature drying preserves fiber structural integrity while minimizing energy use.

Sustainability and Market Relevance of Upcycled Pseudostem

Beyond compositional and processing advantages, banana pseudostem is abundant and cost-effective, providing an opportunity for upcycling into sustainable snacks. The market for upcycled food products is worth around $97 billion and, continues to rise (Deshmukh & Ghosh, 2024). Studies demonstrate successful integration of pseudostem into biscuits, veggie balls, and flavored candies, enhancing fiber and bioactive content without compromising acceptability (Maskey et al., 2020; Marimuthu et al., 2023).

In addition to textile and nutritional uses, banana pseudostem fibers have gained traction in biomedical applications. Manjupriya et al. (2025) provide evidence that mechanically or chemically extracted banana stem fiber (BSF) achieves tensile strength ranging from 529 to 914 MPa, with further chemical treatments increasing this to approximately 1200 MPa. With a low density (~1.3–1.5 g/cm^3) and full biodegradability under composting conditions within 30 days, BSF has been functionalized with antimicrobial agents and used successfully in wound-healing biomaterials.

Repurposing the banana pseudostem also aligns with SDGs 2 (Zero Hunger), 12 (Responsible Consumption and Production), and 13 (Climate Action) by reducing waste and supporting circular economy initiatives (Santiago et al., 2022). This expanding valorization underscores that even non-edible components of the pseudostem—like pith—are chemically and structurally rich. Thus, exploring banana pith chips is aligned with broader innovation trends that repurpose under-utilized biomass for both food and functional materials.

Consumer Acceptance and Sensory Considerations

While nutritional and structural qualities are essential, consumer perception ultimately determines the feasibility of upcycled banana pith chips in real markets. Consumer acceptance depends heavily on sensory attributes and product familiarity. Olano and Maied (2022) and Karaagac and Koyu (2022) emphasize that sensory appeal and clear environmental labeling increase willingness to try new products. Lu et al. (2024) further support that highlighting sustainability and health benefits positively influences consumer perception.

To give this discussion more explanatory power, Chang et al. (2024) apply the Value– Attitude–Behavior model to upcycled foods and show that eco-conscious values shape attitudes, which in turn drive behavioral intentions. In addition, product knowledge and green perceived quality are identified as key levers that increase willingness to try upcycled food. Interestingly, price sensitivity—counterintuitively—did not deter but rather aligned with stronger intentions when environmental and quality signals were clear.

Embedding structured consumer education and transparent sustainability messaging alongside sensory optimization can therefore help overcome neophobia and strengthen acceptance of banana pith chips. Information provision and framing of product attributes strongly shape consumer preferences for upcycled foods. Experimental evidence from upcycled biscuit studies shows that presenting nutritional and environmental benefits significantly increases purchase intent and willingness to pay. When consumers were informed about these attributes, their acceptance rose, with sensory perception mediating much of the effect.

Asioli and Grasso (2021) found this for UK consumers, and a similar effect was observed in Vietnam, where detailed label information improved repurchase intent for biscuits containing upcycled brewer's grain. Complementing these findings, appropriately designed visual cues— such as certification logos, upcycled food labels, and sustainability claims—can reduce perceived risk and act as quality signals, thereby further boosting acceptance. Studies also show that framing upcycled products using values like frugality or environmental stewardship (rather than unfamiliar "waste" terminology) strengthens favorable attitudes and lowers resistance.

Lastly, more general work on food ecolabels confirms that clear sustainability labeling (with varied formats and messages) positively influences selection and purchase of environmentally preferable food products. Potter et al. (2021) synthesized experimental studies to show that ecolabels consistently shift consumer behavior toward more sustainable options.

Theoretical Framework: Value–Attitude–Behavior (VAB) Model in Upcycled Food Acceptance

This study is conceptually anchored in the Value–Attitude–Behavior (VAB) model, which posits that individuals' core values influence their attitudes, which then shape behavioral intentions. In the context of upcycled and novel food products, eco-conscious values and environmental concern foster favorable attitudes toward adopting sustainable alternatives (Chang et al., 2024). These attitudes are reinforced by product knowledge and green perceived quality, which mediate willingness to try products made from by-products such as banana pith chips.

According to the Value–Attitude–Behavior (VAB) paradigm, consumer attitudes are influenced by strongly held values, and these attitudes in turn shape behavioral intentions. It has been demonstrated that in sustainable food contexts, values like health consciousness and environmental awareness have a significant impact on favorable opinions about new food products, which in turn influence consumers' propensity to try or repurchase them. For instance, Park and Namkung (2024) highlighted that attitudes toward plant-based substitutes were important predictors of repurchase intentions and were strongly influenced by both environmental and health values. Similar to this, Huang et al. (2024) discovered that health value was the most powerful predictor of behavioral intention, despite the fact that ethical and environmental values were significant for the acceptance of upcycled food. This highlights the fact that consumer motivation is frequently linked to both sustainability and individual well- being.

Conversely, barriers like food neophobia and low familiarity may suppress this translation from attitude to behavior. By integrating the VAB perspective, this study interprets consumer acceptance not only through sensory appeal but also through cognitive and behavioral pathways, supporting the relevance of clear product labeling and environmental messaging in enhancing acceptability.

In the VAB framework, mediating factors including novelty, green perceived value, and ethical consumption, in addition to values, reinforce the relationship between attitudes and behaviors. According to Goodman-Smith et al. (2024), customers are more inclined to embrace sustainable products when they believe they are innovative and ecologically friendly, which improves their attitudes and intention to buy. Positive attitudes do not always translate into conduct, though, as evidenced by the persistence of the "value–action gap," especially in the presence of obstacles like low familiarity, food neophobia, or limited situational control (Vermeir & Verbeke, 2006). This emphasizes how crucial it is to make explicit sustainability claims, use compelling labeling, and use persuasive messaging to close the gap between consumer intention and behavior—particularly when launching innovative recycled products like banana pith chips.

When considered collectively, the reviewed research demonstrates that banana pseudostem, especially its inner pith, is rich in nutrients and functions, and that it also presents a variety of processing options, sustainability advantages, and commercial potential. According to the literature, which is based on the Value–Attitude–Behavior model, consumer acceptability of banana pith chips depends on a harmony between sensory quality, unambiguous sustainability communication, and compatibility with environmentally concerned beliefs. Therefore, a solid basis for assessing the viability of banana pith chips as a novel, sustainable, and innovative food product is provided by the combination of compositional, technological, and behavioral insights.

METHODOLOGY

This study employs a Descriptive Developmental Research Design, analyzing and synthesizing documented findings on banana pith products and sensory evaluations while exploring evidence that supports banana pith chips as a viable snack concept. Data were collected exclusively from secondary sources, including peer-reviewed articles, theses, technical reports, case studies, and market studies focused on banana pith or similar plant-based by- product snacks. Selection prioritized studies with sensory evaluation data and consumer acceptability scores accessible from credible academic databases and repositories. A systematic literature search was conducted using targeted keywords, and the collected studies were reviewed for nutritional composition, processing methods, sensory qualities, and consumer feedback. Findings were organized into thematic categories of taste, texture, aroma, and appearance, with additional themes on market perception and environmental relevance. Extracted data were synthesized against general standards for chip acceptability, and qualitative insights on consumer openness and food neophobia were analyzed to

interpret market potential. Since the study relies solely on secondary data, no human or animal subjects were involved, and academic integrity was upheld through proper citation and adherence to APA 7th edition guidelines.

RESEARCH RESULT AND DISCUSSION

This chapter presents synthesized findings from secondary literature, organized into four major themes: nutritional and functional potential, processing techniques, sensory acceptability, and consumer acceptance. This structure provides a comprehensive assessment of banana pith (bani) as a potential chip product, combining its inherent properties with market considerations.

Nutritional and Functional Potential of Banana Pith

Banana pith (pseudostem) is nutritionally promising due to its high fiber content, low fat, and functional bioactive compounds. Mohd Ali et al. (2021) reported that different pseudostem layers yield measurable starch content, with thermal properties suitable for chip processing. This fiber-rich composition contributes to digestive health, while the low-fat nature supports light snack positioning. Recent findings by Banu et al. (2024) further reinforce the potential of banana pseudostem as a functional ingredient, citing its abundance of insoluble dietary fiber and essential phytochemicals such as polyphenols and flavonoids. These compounds are associated with antioxidant, anti-inflammatory, and gut-health-promoting properties, making banana pseudostem especially suitable for the development of health-oriented snacks.

In addition, Abraham et al. (2024) emphasize that banana pseudostem biomass contains significant levels of dietary fiber, potassium, calcium, and polyphenols, and its integration into food formulations contributes not only to enhanced nutritional value but also to Agri-waste reduction and food security in banana-producing regions. Its antioxidant and polyphenol content also adds functional food value (Gayathry & John, 2024; Saravanan & Aradhya, 2011). Incorporating banana pith into biscuits and candies has previously improved fiber and bioactive content without reducing acceptability (Maskey et al., 2020; Marimuthu et al., 2023), indicating developmental viability for chip production. Moreover, because of its low lipid profile and high fiber content, banana pseudostem exhibits significant nutritional potential. Research examining the pseudostem of different banana cultivars has shown a broad range in the concentrations of polyphenolic and flavonoid compounds, with phenolic content up to 291 mg GAE/g extract and flavonoid content up to 80 mg CE/g extract—characteristics associated with potent antioxidant activity (Saravanan & Aradhya, 2011). Its naturally low-fat content makes it a desirable option for light, health- conscious snacking, and its high fiber content promotes digestive health.

Processing Techniques for Banana Pith Chips

Multiple processing methods have been documented to convert banana pith into acceptable snack formats, including dehydration, baking, and vacuum frying.

Table 1. Processing Techniques and Outcomes for Banana Pith Chips

Technique	Outcome
Dehydration	Retains crunch, controls moisture for longer shelf life
Baking	Produces a crisp but drier texture with low oil content
Vacuum Frying	Preserves color, reduces oil absorption, retains nutrients

Table 1 summarizes the three primary processing techniques used in converting banana pith into chip form, highlighting differences in texture, oil content, and nutrient retention. Vacuum frying and pre-seasoning are consistently reported to enhance chip appearance and palatability (Olano & Maied, 2022). These techniques are especially valuable for upcycled plant- based snacks, as they preserve nutritional quality and increase consumer appeal through uniform color and crispness.

When looking at the three processing techniques, each one brings unique advantages for turning banana pith into a snackable product. Dehydration is a simple yet effective method because it helps extend shelf life by lowering moisture while still keeping the chips crunchy. Researchers note that this technique can retain much of the natural fiber and nutrients, making the chips not only shelf-stable but also health-supportive (Kumar et al., 2022). Baking, on the other hand, creates a crisp texture with very little oil, which fits well with the increasing demand for healthier snack options. The drawback, however, is that baked chips sometimes come out too dry or hard, so careful control of temperature and time is important to maintain consumer acceptability (Rathore & Singh, 2020).

Vacuum frying stands out as the most modern approach because it not only reduces oil absorption but also helps preserve the chips' natural color and nutrient profile. Studies have shown that vacuum-fried products retain more antioxidants and bioactive compounds compared to traditional frying methods, which gives them an edge in terms of both nutrition and appeal (Shyu & Hwang, 2011). Taken together, these methods suggest different pathways for developing banana pith chips—dehydration for longer storage, baking for a low-fat profile, and vacuum frying for maximum nutrient retention and sensory quality. Choosing the right technique may ultimately depend on whether the focus is affordability, health positioning, or premium quality.

Sensory Acceptability Based on Secondary Literature

The sensory qualities of banana pith chips determine their market viability. Collated findings indicate the following patterns:

Table 2. Summary of Sensory Attributes of Banana Pith Chips Based on Secondary Data

Sensory Attribute	Findings from Literature
Taste	Neutral to earthy; becomes more palatable with seasoning
Texture	Naturally fibrous; produces a crunchy, acceptable chip if moisture is controlled
Aroma	Mild and inoffensive; flavoring or umami seasonings enhance appeal
Appearance	Golden brown and uniform shape rated most appealing

As summarized in Table 2, key sensory attributes such as texture and appearance were found to be the strongest predictors of consumer acceptability, while taste and aroma can be optimized through seasoning and flavoring. This aligns with a sensory-first approach to food product development, through which consumer preference is initially based on visual and textural aspects, followed by taste and aroma at consumption. Therefore, enhancing formulation and processing by addressing these sensory components can enhance the commercial potential of banana pith chips as a potential alternative snack food.
The taste profile of banana pith chips is another important aspect that can be enhanced by seasoning, in addition to appearance and texture. Even while neutral or earthy basic flavors are healthy, they frequently need to be improved to satisfy customer demands. According to studies on plant-based snacks high in fiber, using salt, spices, and umami ingredients strategically improves palatability and customer approval (Spence, 2015). Similar to this, subtle and unremarkable natural scents might not have a significant impact on taste, but when combined with spices like herbs or savory powders, aroma becomes an enhancer that improves the entire dining experience (Lawless & Heymann, 2010).

When it comes to initial impressions, appearance is also crucial. Even before tasting, consumers frequently link consistent forms and golden-brown coloring to superior quality and higher expectations for taste (Hutchings, 2011). This visual cue is especially important for banana pith chips because a golden crisp that appeals to consumers can make up for their lack of familiarity with the raw ingredient. These results collectively imply that the key to guaranteeing market acceptability of banana pith chips as a competitive alternative snack option will be to optimize both extrinsic cues (flavor and scent through seasoning) and intrinsic features (texture and color).

Consumer Acceptance and Behavioral Insights

The final measure of whether a new food product, such as banana pith chips, can transition from experimentation to mass consumption is frequently considered to be consumer approval. Since familiarity helps close the

psychological gap between traditional snacks and new, plant-based alternatives, research repeatedly demonstrates that items structured in a familiar format—like chips—tend to lessen customer hesitancy (Asioli et al., 2017). Beyond format, consumer interest and trust are further increased by labeling that emphasizes sustainability and health benefits. Because many consumers believe they are protecting the environment and their own well-being when they buy upcycled food goods, Olano and Maied (2022) found that eco-conscious branding and consumer education greatly boosted perceptions of these products.

These patterns can be helpfully explained by behavioral models like the Value– Attitude–Behavior (VAB) paradigm. Chang et al. (2024) claim that customers who have high eco-conscious values are more likely to have favorable opinions of sustainable and upcycled goods, which in turn increases their propensity to try and repurchase. That being said, this journey is not simple. While obstacles like food neophobia and unfamiliarity tend to stifle adoption, mediating factors like product knowledge and perceived quality might increase it (Sogari et al., 2019). It's interesting to note that when quality and environmental cues are communicated properly, price sensitivity—which has historically been a barrier to the adoption of sustainable products—seems to have less of an impact. Customers were prepared to pay more for products with strong sustainability promises, according to Chang et al. (2024), indicating that cost concerns can be mitigated by effective marketing.

In encapsulation, these findings suggest a two-pronged approach for banana pith chips: making sure the product meets sensory expectations for crunch, color, and taste while simultaneously including sustainability, health, and novelty cues into its branding. Manufacturers can satisfy the sensory demands and value-driven incentives of contemporary consumers by promoting banana pith chips as both a delicious snack and an eco-friendly option. Acceptance thus goes beyond simply enjoying the product; rather, it becomes a component of a larger identity and way of life that is in line with sustainability and mindful consumption.

Integrated Discussion/Summary

Synthesizing the literature shows that banana pith chips are viable both nutritionally and developmentally, with their fiber-rich and low-fat profile supporting a strong health- oriented positioning in the snack market (Kumar et al., 2020). Processing techniques such as vacuum frying not only retain nutrients but also enhance palatability by preserving color and reducing oil absorption, while the addition of appropriate flavoring helps balance the naturally earthy taste of banana pith (Ramos et al., 2021). These factors indicate that, from a technical perspective, banana pith can be transformed into a snack that aligns with modern consumer preferences for healthier alternatives without compromising sensory quality.

However, nutritional and sensory qualities alone are not sufficient to guarantee adoption. Market acceptance depends heavily on how consumers perceive and connect with the product. Literature on food innovation highlights that acceptance relies on a combination of sensory appeal and cognitive-

behavioral drivers (Olano & Maied, 2022). This is particularly well-explained by the Value–Attitude–Behavior (VAB) model, which suggests that consumers' eco-conscious values foster positive attitudes toward sustainable products, which in turn shape behavioral intentions such as willingness to try or purchase (Chang et al., 2024). For upcycled or novel foods like banana pith chips, bridging familiarity with innovation becomes essential.

Practical strategies have been identified to support this bridge. Transparent eco- labeling and consumer education can build trust and reinforce the environmental benefits of banana pith utilization (Reinders et al., 2017). Likewise, visual cues such as appealing packaging and golden-brown appearance signal both quality and normalcy, helping consumers overcome initial hesitation toward unconventional ingredients (Aschemann- Witzel & Peschel, 2019). Interestingly, recent findings also show that even price sensitivity—a common barrier for sustainable products—does not strongly suppress willingness to buy when environmental and quality signals are clear (Chang et al., 2024).

Taken together, integrating sensory optimization with behavioral insights can bridge the gap between technical feasibility and market success. In other words, banana pith chips are not just nutritionally and environmentally viable; they can also resonate with consumer values when marketed effectively as a healthy, sustainable, and palatable alternative snack.

CONCLUSIONS AND RECOMMENDATIONS

This study synthesized existing literature to assess the acceptability of banana tree pith (bani) in chip form, focusing on sensory attributes (taste, texture, aroma, appearance) and consumer perception factors. As a descriptive developmental study, the analysis relied solely on secondary data, drawing from prior sensory evaluations, market reports, and product development studies. Banana pith chips demonstrate strong nutritional and functional potential, being high in fiber, low in fat, and rich in compounds that support health. Processing methods like dehydration, baking, and especially vacuum frying can produce chips with appealing texture and color while minimizing oil absorption, and flavoring helps improve their taste. Sensory acceptability is driven by appearance and texture, with seasoning enhancing taste and aroma to match familiar snacks. Consumer acceptance also depends on values and attitudes, where eco-labeling, education, and positive framing of upcycled benefits can boost openness, though food neophobia and unfamiliarity remain challenges. Overall, banana pith chips can transition from an underused by-product into a sustainable and marketable snack that contributes to food security, waste reduction, and climate action. Clear eco-labeling, consumer education, and positive framing of upcycled benefits can strengthen acceptance, while food neophobia and unfamiliarity remain challenges. Although based on secondary data, this synthesis shows that banana pith chips can move from an underutilized by-product to a sustainable, marketable snack, aligning with SDGs on food security, waste reduction, and climate action.

While the result of the study shows provides valuable insights for the potential of banana pith chips, limitations must also be acknowledged. First, the reliance of the study exclusively on secondary data sources which means findings are unexpected on the scope, methodology of the study , and the quality of the original studies that were reviewed. The absence of primary sensory evaluation conducted specifically limits the validation of the findings in a controlled, context-specific manner. Second, most of the studies that were reviewed focused only on the application of pseudo stem rather than the specific formulation of the chips. With that, the unique challenges and opportunities in the development of banana pith chips may not be fully captured as a potential commercial snack product. Third, in terms of the cultural and regional variations in consumers' preferences were not exclusively explored which means that the generalizability of acceptability findings across various market is still uncertain. In addition, this research did not take into account about the critical production factors which include shelf-life stability, cost-effective at scale, and logistic concerns for the real word implementation. Finally, the Value-Attitude-Behavior model is largely theoretical and needs to be tested by consumers and it must also be observed in the actual market for its market purchase behavior.

ADVANCED RESEARCH

To advance the study's findings and near market readiness for banana pith chips, a number of areas noted herein may deserve further investigation. Moving forward, further sensory evaluation research must be conducted with target consumer groups and the under controlled conditions, to assess empirical references for taste, texture, aroma, and appearance. Moreover, shelf-life research should be undertaken, to evaluate ideal storage conditions and packaging while also having an evaluation of the stability of nutritional and sensory attributes overtime. Finally, cost benefit analysis of banana pith chips production and packaging should be undertaken too for small-scale producers as well as rural enterprises that may consider banana pith chips economically accessible.

Conducting pilot market trials in practice may additionally provide what will be learned about consumers' reception of banana pith chips, distribution and pricing. Further investigation towards the use of the banana pith chips in the larger food systems like school feeding programs or community-based food-security projects might have social and environmental impact. Driving this research forward will not only advance the technical and commercial viability of banana pith chips but will also improve its relevance to sustainable food innovation and the circular economy.

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