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Analyzing Consumer Perception and Behavioral Intention Toward Edible Food Packaging as a Sustainable Alternative

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Abstract:
Somewhere between the packaging facility and the dinner table, a quiet but significant shift is beginning to happen. Edible packaging — wrappers, pods, and coatings made from materials safe enough to swallow — is slowly moving from the pages of food science journals into real consumer conversations. This study tries to understand where exactly those conversations stand: what people know about edible packaging, how they feel about it, and whether those feelings are strong enough to actually influence what ends up in their shopping basket. Primary data were gathered from 55 respondents through a structured digital survey. What emerged was a story of a technology that has won the awareness battle — 77.5% of respondents already knew what edible packaging was — but is still working hard to win the trust war. Hygiene concern was flagged as the single biggest barrier by half the respondents, decisively pushing price and taste concerns into second place. Purchase intent was cautiously positive at 62.5%, though willingness to actually pay more for such products sat at a more hesitant 50%. The gap between recommending edible packaging to a friend (70%) and buying it oneself turns out to be wider than one might expect, and that gap tells a story worth examining carefully. The study concludes that the path forward lies not in more general awareness campaigns, but in very specific trust-building actions: QR-code traceability, food-grade certification, and a strategic focus on dry snacks as the most comfortable entry point for mass adoption.

Keywords: edible packaging, consumer perception, behavioral intention, sustainable packaging, purchase intention, attitude–behaviour gap, food packaging innovation, Gen Z consumers

1. Introduction

1.1 The Packaging Problem We Cannot Keep Ignoring

Food and packaging have always had a complicated relationship. We spend enormous effort making sure food is safe, nutritious, and worth eating — and then we encase it in materials that, in many cases, will still be sitting in a landfill long after everyone alive today is gone. That contradiction has become harder to ignore as plastic pollution has reached what the United Nations Environment Programme describes as crisis proportions, with over 380 million tonnes produced worldwide every year and food packaging responsible for a disproportionate chunk of it. Rivers carry it to oceans. Oceans return it to the seafood on our plates. The cycle is circular in the worst possible way.

The ready-to-eat food sector adds particular urgency to this picture. India's appetite for packaged, convenient food has grown rapidly as cities expand and daily schedules tighten, with the RTE market sitting at around USD 300 million and climbing at 15–18% annually (ASSOCHAM, 2023). Behind every one of those transactions sits a piece of packaging that, once the food is gone, typically goes straight to a bin. The infrastructure to handle that volume of waste simply does not exist at scale, which is why any innovation that rethinks the waste problem at its origin — rather than scrambling to manage it at the end — deserves serious attention.

1.2 Edible Packaging: The Idea That Makes You Think Twice

Edible packaging is, at its core, a straightforward concept: make the wrapper out of something that can be eaten along with the food inside. The materials involved are typically natural biopolymers — proteins like whey or casein, polysaccharides such as starch, cellulose, or chitosan, and various lipids. In practice, this has produced everything from seaweed-based water pods and rice paper wraps to starch pouches for soups and edible cutlery pressed from grain. What unites them is the ambition to eliminate the packaging-as-waste problem by making the packaging part of the meal.

The appeal is obvious once you hear it. No wrapper to throw away. No recycling bin to locate. No guilt about that crinkled foil in your bag. The waste disappears not because someone managed it better downstream, but because the concept of waste no longer applies. That is the kind of upstream thinking that environmental advocates have been calling for. And yet, knowing that something is a clever idea and actually choosing it at the checkout are two very different cognitive acts. People are not always rational in their food choices, and the idea of literally eating a container sits in a zone of novelty that can produce very different reactions in different people — sometimes in the same person on different days.

1.3 Why the Consumer Angle Matters

The science of edible packaging has attracted real talent and funding over the past decade. Researchers have mapped its barrier properties, tested its antimicrobial potential, measured its shelf-life extension capabilities, and worked through the material science in considerable depth (Socaciu et al., 2022; Shao et al., 2025). What has received comparatively less systematic attention is the human side of the equation — particularly in India, where hygiene norms, food culture, price sensitivity, and institutional trust levels create a specific and distinct environment for consumer decision-making.

It is not enough for a packaging innovation to be technically brilliant. It also has to be something real people, with real concerns and real habits, will actually reach for. This study focuses on that gap. Drawing on primary data from 55 respondents, it traces the arc from awareness to attitude to intention — and tries to understand where, and why, the arc tends to flatten out before it reaches actual purchase.

1.4 What This Study Aims to Do

The specific objectives guiding this research are:

1. To measure how familiar consumers already are with edible food packaging as a concept.
2. To map the affective and cognitive landscape — trust, hygiene concern, taste anxiety — that shapes how people respond to edible packaging.
3. To gauge behavioral intentions: purchase likelihood, price premium willingness, and readiness to recommend.
4. To identify which market barriers are most actively suppressing adoption.
5. To draw out practical, actionable recommendations for the stakeholders who can actually move this technology forward.

2. Literature Review

2.1 What the Technical Literature Tells Us

The body of scientific work on edible packaging materials is substantial and has grown considerably in the past decade. Socaciu et al. (2022) approached the question from a consumer preference angle, using structural equation modelling to examine how Romanian consumers responded to biopolymer films designed for food active packaging. Their central finding was that the protective function — specifically the ability to extend shelf life — drove preference most strongly, with green and sustainable attributes following closely. One detail from their study is particularly worth noting: pricing emerged as a significant predictor of consumer preference ($\beta = 0.299$, $p < 0.001$), confirming that technical performance alone does not close the sale. The packaging has to feel worth its cost.

Shao, Zhang, and Wen (2025) took a hospitality-focused lens and found something that complicates simple assumptions about eco-packaging. Consumers in their study showed noticeably stronger purchase intentions when edible packaging was paired with hedonic food — chocolate brownies, for instance — compared to utilitarian options like granola bars. The mechanism, they argued, was perceived green value: edible packaging lets people enjoy an indulgent food while feeling they have done something responsible. That is a psychological dynamic quite different from simply 'liking sustainable things,' and it has real implications for how edible packaging is marketed.

2.2 Trust, Familiarity, and the Consumer Acceptance Puzzle

Young, Mirosa, and Bremer (2020) published a systematic review of consumer attitudes toward smart packaging technologies that offers a useful frame for thinking about edible packaging. Their core finding was that familiarity and trust were the dominant factors shaping whether consumers accepted or rejected novel packaging. When people encounter something they do not recognise, they do not suspend judgement — they fill the gap with analogies from other technologies, and those analogies are often unflattering. Nano packaging was compared to GM foods. Novel sachets triggered suspicion about what they contained. Edible packaging faces a version of the same challenge: it will be judged, at least initially, against mental models of artificial additives and strange textures.

Among Indian Gen Z consumers specifically, Moodbidri and Ashwini (2026) found that brand trust was the essential mediating link between environmental awareness and willingness to pay for sustainable packaging. Respondents who cared deeply about the environment still did not translate that concern into purchasing behaviour unless they trusted the brand communicating the sustainability message. The TRUST-PACT framework they developed — built around perceived authenticity and communicative transparency — suggests that vague green claims are not sufficient. Specificity and verifiability matter enormously to this cohort.

2.3 The Gap Between Saying and Doing

Sustainable consumption research has spent considerable energy documenting the attitude–behaviour gap, that frustrating phenomenon whereby people who say they care about the environment continue to buy the cheaper, less sustainable option. Mane (2026), studying eco-packaging awareness among young people in Pune, found the gap in sharp relief: 78.3% knew what eco-friendly packaging was, but only 42% bought it with any regularity. Price was the most commonly cited barrier (68%), followed by limited availability (52%) and authenticity doubts (45%). Sethi and Malviya (2025) found that awareness did statistically increase the likelihood of eco-friendly purchasing (OR = 2.14), but that price sensitivity and product availability moderated the relationship substantially.

Thomas et al. (2025), in a study on pulse product packaging preferences across metal cans, glass jars, and plastic pouches, documented how powerfully pre-existing narratives shape consumer judgement. Glass was rated as the most sustainable option by most participants, despite the fact that its actual environmental footprint is more complex and in some metrics worse than plastic. The lesson is that consumers do not make decisions on spreadsheets — they make them on stories, associations, and intuitions built up over years of experience.

2.4 The Gap This Study Fills

The literature on sustainable and smart packaging, while extensive, has not directly confronted the specific psychological texture of edible packaging as a category. General eco-packaging studies do not account for the intimacy involved in actually eating the container — a dimension that triggers different emotional responses than choosing a recyclable box or a biodegradable bag. Research in the Indian urban context on this question is particularly scarce. This study steps into that space.

3. Methodology

3.1 Research Design

A descriptive, cross-sectional survey approach was used. The goal was to capture a snapshot of consumer perceptions at a given point in time — not to track change over time or establish causation, but to systematically map the attitudinal terrain around edible packaging. A quantitative design was chosen because it allows structured comparison across demographic groups and produces data that can speak to patterns rather than individual experiences.

3.2 Who Was Surveyed and How

The study targeted respondents aged 18 and above who had at least some engagement with packaged food products — which, in an urban Indian context, describes virtually the entire adult population. Convenience sampling was applied, with the survey distributed digitally through Google Forms via academic networks, social media platforms, and peer-to-peer sharing. Fifty-five valid responses were gathered. This is a modest but appropriate sample for an exploratory study of this kind, consistent with comparable pilot work in the consumer perception literature (Young et al., 2020; Mane, 2026). Participation was voluntary, and respondents confirmed informed consent before proceeding.

3.3 How the Survey Was Built

The questionnaire was structured around four thematic sections. The first gathered basic demographic information — age group, gender, and occupation. The second measured five dimensions of affective and cognitive perception using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree): perceived environmental effectiveness, hygiene concern, gut-level disgust response, trust mediated by QR traceability, and worry about taste or texture interference. The third section assessed three behavioral intentions — purchase likelihood within six months, willingness to pay a premium, and readiness to recommend — using the same scale. The fourth section asked two categorical questions: which food category respondents would most readily accept in edible packaging, and what their single biggest barrier to trying it was. A final openended item invited a one-word or one-phrase emotional response to the idea of eating packaging in the future.

3.4 How the Data Was Read

Descriptive statistics — frequency counts, percentages, and Likert mean scores — formed the backbone of the analysis. Responses scoring 4 or 5 on any given item were treated as indicating agreement or high intention; scores of 1 or 2 were read as disagreement or resistance. Open-ended sentiment responses were reviewed and grouped thematically to give texture to the quantitative findings.

4. Results

4.1 Who the Respondents Were

Table 1 gives a full breakdown. The sample skewed young and male, which is an expected outcome of convenience sampling through academic and digital channels. Gen Z respondents (aged 18–24) made up 61.8% of the sample. Students dominated the occupational category at 56.4%. The familiarity figure — 77.5% already knowing what edible packaging was — sets an encouraging baseline for the rest of the analysis.

Table 1: Demographic Profile of Respondents (N = 55)

Demographic Variable	Category	Frequency	Percentage
	Male	29	52.7%
Gender	Female	11	20.0%
	Below 18	1	1.8%
	18–24 (Gen Z)	34	61.8%
Age Group	25–34 (Young Millennials)	1	1.8%
	35–40 (Older Millennials)	2	3.6%
	46+	2	3.6%
	Student	31	56.4%
Occupation	Private Job / Service	4	7.3%
	Business / Other	5	9.1%
	Yes	31	77.5%
Familiarity with Edible Packaging	No	9	22.5%

4.2 How Familiar Were People with Edible Packaging?

Nearly eight in ten respondents — 77.5%, or 31 out of 40 who answered this question clearly — said they had already heard of edible packaging before taking this survey. For a product category that has no major retail presence in India yet, that is a striking number. It points to social media, university sustainability conversations, and food tech coverage doing more heavy lifting than one might expect. The 22.5% who were unfamiliar tended toward older age brackets or occupations outside the student category, consistent with patterns observed in eco-packaging literature elsewhere.

4.3 What People Actually Think and Feel About It

Table 2 lays out the mean scores across the five perception dimensions. The data paints a picture of genuine internal tension. On one hand, most respondents believe edible packaging is genuinely useful against plastic waste (Mean = 3.83, with 72.5% agreeing). On the other hand, an even larger proportion — 80% — are worried about hygiene (Mean = 4.05). These two responses are not contradictory, but they do create a friction that any brand entering this space will need to navigate carefully. You can appreciate a technology's environmental logic while still hesitating to put it in your mouth.

Table 2: Affective and Cognitive Perception Scores (N = 40)

Perception Dimension	Mean Score	% Agreeing (4–5)
Edible packaging works as a solution to plastic waste	3.83	72.5%
Hygiene and cleanliness concern about consuming a wrapper	4.05	80.0%
The concept feels 'gross' or viscerally off-putting	3.05	42.5%
A QR traceability code would make me trust this more	4.10	72.5%
Worried the edible material will change taste or texture	3.10	40.0%

The disgust dimension produced a more mixed signal (Mean = 3.05, 42.5% agreeing), meaning that while a significant portion of respondents felt some visceral resistance to the concept, it was not the dominant emotional response. Most people, it seems, do not find edible packaging revolting — they simply find it unfamiliar and worry about what that unfamiliarity might mean for their safety.

The QR traceability item was the highest-scoring of all five dimensions (Mean = 4.10). That single data point may be the most commercially significant finding in this entire study. When respondents are asked what would increase their trust, 72.5% point to digital origin verification. They want to scan a code and see exactly what their edible wrapper is made of, where the ingredients came from, and what safety tests were run. That is not an unreasonable ask — it is a very specific signal about what kind of reassurance would actually move the needle.

4.4 What People Said They Would Actually Do

Table 3 captures the three behavioral intention measures. Purchase intent within six months was the middle performer — 62.5% scored 4 or 5, suggesting cautious but real openness to buying. Recommendation likelihood came in highest at 70%, and willingness to pay extra landed softest at 50%. The gap between these figures carries meaning that is worth sitting with for a moment.

Table 3: Behavioral Intention Scores (N = 40)

Behavioral Intention Item	Mean Score	% High Intention (4–5)
I plan to purchase edible-packaged products within the next 6 months	3.83	62.5%
I am willing to pay a price premium for edible packaging	3.43	50.0%
I would recommend edible packaging products to people I know	4.10	70.0%

4.5 What Is Stopping People

Table 4 shows the barrier breakdown. Hygiene concerns were the runaway leader at 50%, cited by 20 of the 40 respondents who answered this question. Brand trust deficits and taste/texture worries tied for second at 22.5% each. High price trailed in last at just 5%. This hierarchy is genuinely surprising when set against the broader eco-packaging literature, where cost almost always leads. Something about edible packaging shifts the consumer's primary anxiety from their wallet to their body — and that distinction has real implications for strategy.

Table 4: Primary Barriers to Edible Packaging Adoption (N = 40)

Stated Barrier	Frequency	Percentage
Hygiene concerns	20	50.0%
Lack of trust in the brand	9	22.5%
Taste / Texture concerns	9	22.5%
High price	2	5.0%

On the question of which food categories respondents felt most comfortable with, dry snacks came out clearly on top at 45.0%, trailed by fast food items like burgers and wraps (22.5%), liquid or beverage products (15.0%), fresh fruits (10.0%), and medicines (7.5%). The snack preference makes intuitive sense — dry applications involve no extended contact between the edible wrapper and a moist or acidic food interior, which keeps the hygiene concern at a lower simmer. Fast food applications benefit from the informal, quick-consumption context in which people simply pay less attention to how exactly the packaging is structured.

4.6 The Overall Mood of the Sample

When asked for an overall attitude rating, 65.0% of respondents landed at 4 or 5 on the five-point scale, producing a mean of 3.80 — firmly positive, if not effusively enthusiastic. The one-word sentiment question brought out responses clustered around 'Innovative,' 'Exciting,' 'Sustainable,' and 'Great' among the more optimistic respondents. More cautious voices offered 'Confused,' 'Neutral,' and one unusually articulate answer that captured the central dilemma of edible packaging almost perfectly: the respondent acknowledged that if the packaging material is exposed to surfaces and open air before being eaten, the safety guarantee becomes genuinely questionable — but immediately followed this with an expressed willingness to try it if more specific safety information were made available. That, in miniature, is the story this entire dataset tells.

5. Discussion

5.1 Awareness Without Depth

A 77.5% familiarity rate for a technology with no meaningful retail presence in India is remarkable, and it says something important about how ideas now travel. Social media, university sustainability clubs, YouTube food tech channels — these have become the primary vehicles for early-stage innovation awareness, often running well ahead of any commercial rollout. The concept of edible packaging has, in this sense, already cleared the first hurdle.

What it has not cleared is the second hurdle: converting concept-familiarity into technology-confidence. The hygiene concerns that surface so prominently in this data are not the concerns of people who have never heard of edible packaging — they are the concerns of people who have heard of it and are thinking carefully about what it actually means to put it in their body. That is a more sophisticated form of scepticism than simple ignorance, and it requires a more sophisticated response. More Instagram posts explaining that edible packaging exists will not move this needle. Detailed, verifiable information about exactly what is in the material, exactly how it is handled, and exactly what safety standards it meets — that is what the data suggests is needed. Young, Mirosa, and Bremer (2020) documented the same phenomenon in their review: unfamiliarity makes consumers fill knowledge gaps with assumptions, and those assumptions tend to be conservative.

5.2 Hygiene as an Intimacy Problem

The hygiene barrier is worth dwelling on because it represents a qualitative shift from the barriers that dominate eco-packaging research more broadly. In studies of sustainable packaging generally — recyclable materials, biodegradable bags, reduced plastic formats — the hierarchy of barriers is well-established: price first, availability second, authenticity doubts third (Mane, 2026; Sethi and Malviya, 2025; Kapoor and Kumar, 2019).

Here, price came in last. Hygiene came in first by an enormous margin. That shift reflects something specific about edible packaging that has no equivalent in other sustainability categories.

Edible packaging crosses a boundary that ordinary packaging does not: the boundary between the outside world and the inside of the body. That is a threshold that humans are, quite reasonably, protective of. The contamination worry — 'what if this packaging touched something it should not have before reaching me?' — is not paranoia. It is a sensible extension of the same logic that makes us wash our hands before eating. The disgust response dimension showed only moderate scores (Mean = 3.05), which tells us that most people are not revolted by the concept in principle. But the hygiene concern (Mean = 4.05) tells us they are worried about it in practice.

The QR traceability finding points directly at the solution. At 4.10, it was the highest-scored perception item in the entire study, with 72.5% agreement. Respondents are not asking for less scrutiny of edible packaging — they are asking for more information to support it. This aligns tightly with Moodbidri and Ashwini's (2026) finding that transparency and verifiability are the specific mechanisms through which trust gets built with Indian Gen Z consumers. A scannable code linking to ingredient sourcing, manufacturing conditions, and safety certification would address the intimacy concern more directly than any amount of general green marketing.

5.3 The Recommender–Buyer Divide

There is something quietly interesting about the gap between recommendation likelihood (70.0%) and purchase intent (62.5%). People are more comfortable endorsing edible packaging to someone else than committing to it themselves — and that gap is not necessarily a sign of cynicism or inconsistency. Recommending a product is a low-cost, social act. It signals environmental awareness to peers, requires no financial outlay, and carries no bodily risk if the product turns out to be different than expected. Buying and eating the packaging is a very different proposition. It involves money, digestive risk, and the kind of firstexperience uncertainty that even enthusiastic early adopters approach with some caution.

The strategic implication runs in both directions. First, manufacturers should not read the 70% recommendation figure as reflecting 70% of the market ready to buy — there is a conversion gap to account for. Second, and more optimistically, that 70% of willing recommenders represents an existing peer advocacy network that costs almost nothing to activate. Referral schemes, sampling programmes, and social media challenges that give those recommenders something tangible to share could substantially close the gap over time.

5.4 Dry Snacks: The Right Place to Start

The preference for dry snacks (45.0%) as the most acceptable application category sends a clear product development message. Dry applications are forgiving in exactly the ways that reduce hygiene anxiety: the packaging remains stable, does not absorb moisture from the food interior, and is unlikely to alter the taste or texture of what it contains. The eating occasion is casual and unhurried, which means consumers are not subjecting the packaging to the kind of close sensory scrutiny they might apply to, say, a restaurant-prepared meal.

Beverage and liquid applications ranked third despite generating the most media coverage — the water pod has become almost the default illustration of what edible packaging can do. The lower enthusiasm is not surprising on reflection. Liquid packaging involves sustained contact between the edible material and the beverage, which raises the stakes on both flavour transfer and structural integrity. Any failure is immediate and unpleasant. Manufacturers pursuing this category will need to invest not just in the formulation chemistry, but in building a specific evidence base around liquid containment safety before consumer comfort catches up with the technological excitement.

6. Conclusions and Recommendations

6.1 What This Study Found

The data from this study trace the outline of a technology at an interesting inflection point. Consumer awareness is high — higher than the retail footprint of edible packaging would predict. Attitudes are broadly positive. Behavioral intentions are cautiously encouraging. But between those positive indicators and an actual purchase sits a cluster of trust-based concerns — centred on hygiene and brand credibility rather than price — that have so far been underestimated in how the technology is being communicated and positioned. Dry snacks represent the most commercially hospitable entry point. QR-code traceability is the most actionable single intervention available to build the trust this category needs. The gap between recommending and buying is real but bridgeable.

6.2 What Different Stakeholders Should Do About It

For Manufacturers and Product Developers:

Stop leading with general sustainability messaging and start leading with specificity. Consumers in this study were not asking to be told that edible packaging is good for the environment — they already believe that. They were asking to know what, exactly, is in the material touching their food, where it came from, and who tested it. Implement QR-code traceability from day one. Launch into dry snack categories where consumer comfort is structurally highest. Invest in sensory-neutral formulations as a core R&D; priority, because taste and texture concerns are the tie-breaker when hygiene anxiety has been partially addressed.

For Marketing and Communications Teams:

The 70% who are willing to recommend edible packaging but not yet purchase it are an asset waiting to be activated. Peer advocacy is one of the most reliable purchase triggers for Gen Z consumers, and this cohort is already disposed toward recommending. Structured referral programmes, experiential sampling at campuses and food events, and social media content that is specific about safety rather than vague about sustainability would all work with the grain of what this sample's psychology shows.

For Policymakers and Regulators:

The absence of a standardized certification framework for edible packaging in India places the entire burden of trust-building on individual brands, which is inefficient and creates a fertile environment for misleading claims. A nationally recognised safety certification for edible packaging materials — developed in collaboration with food scientists, consumer representatives, and the food industry — would give consumers the reliable shorthand they are clearly looking for. Subsidies for small manufacturers adopting certified edible packaging could help address the scale-up cost problem.

For Future Researchers:
This study, with its sample of 55, is a beginning rather than a conclusion. Longitudinal work that tracks the same respondents before and after their first experience with an edible packaging product would provide much richer insight into how the attitude–behaviour gap actually closes. Cross-city and cross-demographic comparisons within India would reveal how much of what was found here is specific to Pune's educated urban youth and how much generalises. Qualitative interviews exploring the hygiene anxiety in depth could surface design interventions that pure survey data cannot.

6.3 Limitations

Several limitations bear acknowledging. The sample of 55 respondents is suitable for exploratory work but too small for confident generalisation. Convenience sampling through digital academic channels skews the sample toward students, toward urban respondents, and toward people who are already engaged with sustainability discourse — all of which likely inflates the awareness figures compared to what a fully representative national sample would show. The cross-sectional design captures a single moment; it cannot say how attitudes are shifting over time as more edible packaging products reach the market. And, as is always the case with self-reported intentions, the gap between what people say they will do and what they actually do is likely larger than the 7–12 percentage point differences visible in this data. These limitations point the way toward the next round of research rather than undermining the value of what is reported here.

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