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CONSUMER PERCEPTION OF PERSONALIZED DESSERTS PRODUCED BY 3D PRINTING TECHNOLOGY

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Abstract: *This study examines consumer perceptions of personalized desserts produced using 3D-printing technology. The findings indicate that additive manufacturing in food production remains at an early stage of consumer adoption, with attitudes shaped by curiosity, technological apprehension, and interest in the possibilities of customization. Personalized nutritional profiles and complex geometries are particularly attractive to younger and more technologically oriented consumers; however, broader acceptance depends on sensory quality, perceived safety, and the perceived naturalness of the product. Consumers show strong interest in visually intricate desserts that are difficult to produce using conventional methods, creating an initial 'wow effect'. At the same time, food neophobia and the perception of 3D-printed products as artificial or highly processed remain important barriers. Secondary data were analysed using general methods of analysis and deduction, while primary survey data were processed using descriptive statistical methods.*

Keywords: *consumer acceptance, personalized desserts, sensory evaluation, 3D food printing, food neophobia*

1. INTRODUCTION

The contemporary food industry is positioned at the intersection of traditional production methods and the digital transformation enabled by additive manufacturing, commonly referred to as 3D food printing. Although 3D printing is already established in many industries as a prototyping and manufacturing tool, its application in gastronomy, particularly in the production of personalized desserts, raises important questions concerning design, nutritional customization, and sustainability [1, 2]. Its principal advantage lies in the ability to create complex geometric structures and individualized nutritional profiles that cannot readily be achieved through conventional pastry-making techniques [2, 3]. Nevertheless, the market success of 3D-printed desserts depends not only on technical precision but also on the psychological and sensory factors that shape consumer attitudes. While the visual 'wow effect' may attract younger consumers, perceptions of artificiality and unfamiliar processing methods can impede wider acceptance [2]. The market therefore remains in an early-adoption phase, characterized by both enthusiasm for innovation and apprehension toward unfamiliar food technologies. This study investigates consumer attitudes toward personalized 3D-printed desserts and identifies the principal factors that facilitate or inhibit their acceptance, with particular emphasis on visual appeal, perceived safety, taste expectations, and product naturalness.

2. PERSONALIZED DESSERTS PRODUCED BY 3D PRINTING TECHNOLOGY

Within contemporary pastry arts, where the boundaries between craftsmanship and technology are increasingly blurred, 3D food printing (3DFP) has emerged as an innovative production method. Originally developed for industrial applications, the technology offers a new approach to personalized confectionery by combining digital precision with gastronomic design. Its principal advantage is the capacity to create geometries that are difficult or impossible to produce manually. Edible materials such as chocolate, fruit purées, sugar pastes, and creams are deposited layer by layer, most commonly by extrusion, to create complex lattice structures, fractals, and customized inscriptions [3]. In this context, the dessert becomes not only a food product but also a digitally designed object tailored to individual preferences. The technology also enables precise control over ingredients, allowing products to be formulated with a specified energy value, without selected allergens, or with added vitamins and proteins. Such functionality is particularly relevant to personalized and functional nutrition. Despite these advantages, consumer acceptance remains a decisive factor. Technological scepticism may arise from the perception that machine-produced food is artificial or inferior to products prepared by skilled pastry chefs [3]. This barrier may be reduced through co-creation: when consumers participate in designing a dessert through a digital application, they may develop a stronger emotional connection with the product and perceive it as a distinctive, premium experience rather than as an anonymous industrial product.

3. TECHNICAL REQUIREMENTS FOR PERSONALIZED DESSERTS PRODUCED BY 3D-PRINTING TECHNOLOGY

The successful implementation of 3D printing in pastry making requires the synchronization of hardware, software, and the specific chemical properties of food materials. Unlike standard 3D printing of plastics or metals, food printing faces unique challenges such as raw material variability and strict hygiene standards.

The most commonly used system is syringe-based extrusion, which often utilizes compressed air:

- Dosing precision: The system must ensure a constant flow of material without air bubbles to achieve standardized layers.
- Temperature control: For materials like chocolate or specific creams, the printer must feature a built-in heating and cooling system (thermoregulation). If chocolate is not kept at an exact temperature, it will lose its gloss and structural stability.
- Nozzle diameter: Standard food-printing nozzles generally range from 0.8 to 1.5 mm. Smaller diameters enable finer detail and improved aesthetics but increase the risk of clogging [1, 3].

For a dessert to be successfully printed, the material must meet three critical technical parameters:

Viscosity: The material must be fluid enough to pass through the nozzle, yet viscous enough not to spread out after extrusion.

Solidification capability: Immediately upon exiting the nozzle, the layer must become firm enough to support the weight of subsequent layers.

Layer adhesion: Each new layer must bond physically or chemically with the preceding layer to prevent delamination [1, 3].

The personalization process begins in a digital environment:

- CAD modeling: Creating 3D models in software such as Fusion 360 or dedicated co-creation applications.
- Slicing: The software converts the 3D model into G-code, which instructs the printer regarding movement speed, material flow, and toolpath. For personalized confectionery products, printing speed must be optimized to balance product quality and production time [3].

From a technical standpoint, the printer must be designed according to "Food Grade" standards:

- Component materials: All parts coming into contact with food (cylinder, tubes, nozzles) must be made of stainless steel or certified corrosion-resistant polymers.
- Hygienic design: The device must be easy to disassemble to permit thorough cleaning and sanitization and to prevent microbial growth in inaccessible areas of the extrusion system.
- Post-processing requirements: Production requirements may extend beyond the printing stage. Many printed desserts require rapid cooling, baking, dehydration, or another finishing process to achieve the desired final texture. Consequently, the printer may need to be integrated with supporting laboratory or kitchen equipment [3, 4].

4. EXPERIMENTAL STUDY

4.1. CONSUMER PERCEPTION OF PERSONALIZED DESSERTS PRODUCED BY 3D-PRINTING TECHNOLOGY

Consumer perception is a key determinant of the wider adoption and commercialization of 3D-printed food. Although 3D food printing is increasingly presented as an innovative approach to producing nutritionally tailored, visually appealing, and functional food products, consumer acceptance remains uncertain. Consumers often respond cautiously to unfamiliar food technologies, particularly when products depart from traditional methods of preparation and consumption [6, 7]. This caution is commonly associated with limited knowledge of the technology, perceptions of unnaturalness, concerns about food safety, and uncertainty regarding taste, nutritional value, and health effects [6].

Previous studies indicate that 3D food printing can enhance perceptions of innovation and product quality, but these positive impressions do not necessarily result in higher sensory acceptance. Compared with conventionally produced foods, 3D-printed products are often evaluated more favourably in terms of appearance and selected sensory attributes [5, 6]. However, perceived technological sophistication does not necessarily translate into greater overall acceptance, particularly when taste and texture remain the dominant criteria in food evaluation [8].

Visual appearance and design complexity have a particularly important role in shaping initial consumer impressions. Because 3D printing enables complex shapes, precise structures, and personalized geometries that are difficult to achieve using conventional methods, consumers may perceive such products as more attractive and engaging [5]. Greater visual complexity can improve evaluations of appearance, although it may not exert the same effect on overall acceptability, taste, or texture [8]. Thus, visual appeal can stimulate interest and positive expectations, but final acceptance depends on the complete sensory experience.

Consumer awareness is another important factor. Clear information about the operation of 3D food printers, ingredient composition, process safety, and potential benefits may contribute to more favourable attitudes [6]. Nevertheless, information alone does not always produce a significant increase in sensory acceptance or perceived quality. More positive attitudes are likely when consumers can directly experience the product, for example through tasting. Studies have shown that some participants expressed greater willingness to consume 3D-printed food again after direct exposure, underlining the importance of experiential familiarization [6, 8].

Despite its potential advantages, 3D-printed food faces several barriers to consumer acceptance. The most frequently reported concerns relate to edibility, healthfulness, nutritional value, and safety [6, 7]. Some consumers perceive printed food as artificial, unnatural, or excessively processed, which can reduce willingness to consume it [6]. Even the term 'printer' may evoke associations with plastics, inks, and industrial materials rather than food. The perceived naturalness of the ingredients is therefore important: products are more likely to be evaluated positively when they are clearly described as being made from familiar, natural, and nutritionally valuable ingredients. Conversely, unclear information about composition, processing, or raw-material origin may increase perceived risk and reduce acceptance [5, 6].

The intention to purchase and consume 3D-printed food is influenced by psychological, social, and sensory factors. Research based on the theory of planned behaviour identifies consumer attitudes,

subjective norms, perceived behavioural control, sensory appeal, food neophobia, technology neophobia, perceived health risks, and environmental acceptability as relevant predictors [6, 7]. Consumers who are more open to innovation and who perceive 3D-printed food as useful, safe, and environmentally acceptable generally report greater willingness to purchase and consume it. In contrast, food neophobia, technological apprehension, and health concerns can substantially reduce interest [7].

In the case of personalized 3D-printed desserts, consumer perception is especially complex because the product combines technological innovation, functional nutrition, personalization, and the hedonic characteristics associated with desserts. Consumers may respond positively to the possibility of customizing shape, portion size, texture, and nutritional composition, particularly when the capacity of 3D printing to address individual dietary needs is emphasized [5]. However, because desserts are primarily associated with pleasure and sensory appeal, acceptance will depend on whether consumers perceive the products as not only innovative and functional but also tasty, safe, natural, and visually attractive [6, 8].

Research on consumer perceptions of personalized 3D-printed desserts is therefore important for assessing the market potential of the technology. It enables the identification of factors that encourage or restrict adoption, including awareness, trust in the technology, sensory expectations, attitudes toward functional foods, the importance of natural ingredients, and perceptions of sustainability [6, 7]. The findings may support the development of products that are aligned not only with technological capabilities but also with consumer expectations, needs, and values [5].

Survey research is particularly useful for examining consumer motivations and perceived barriers related to 3D-printed desserts. Responses are expected to vary according to prior technological experience, openness to innovation, and attitudes toward unfamiliar foods.

4.2. RESEARCH INSTRUMENT

A structured questionnaire was developed for the primary study to examine consumer perceptions of personalized desserts produced using 3D-printing technology. The questionnaire comprised five thematic sections: demographic characteristics; attitudes toward the technology and visual aesthetics of 3D-printed food; perceptions of personalization; sensory expectations and trust; and a final open-ended question.

Respondents were recruited through voluntary participation and completed a structured questionnaire during 2025. The questionnaire was administered both online and in person. Participation was anonymous and voluntary, and respondents were informed about the purpose of the study before completing the questionnaire.

The questionnaire was developed specifically for this exploratory study based on themes identified in previous research on consumer perceptions and acceptance of 3D-printed food [5–8]. As the study was exploratory in nature, no pilot study was conducted prior to the main data collection.

4.3. STATISTICAL ANALYSIS

The study was conducted on a sample of 50 respondents, and the collected data were analysed using descriptive statistical methods. For closed-ended questions, absolute frequencies and relative proportions were calculated to describe the distribution of responses. For statements measured on a Likert scale, the arithmetic mean, median, and mode were calculated. The arithmetic mean was

used to indicate the average level of agreement with each statement, the median to identify the central response, and the mode to determine the most frequently selected rating. The results are presented in tables to facilitate interpretation.

Because the sample comprised 50 respondents, the findings should be interpreted as indicative evidence of consumer perceptions of personalized 3D-printed desserts and should not be generalized to the broader population.

4.4. RESULTS

The sample included respondents from several age groups. Participants aged 18-25 years formed the largest group (15 respondents; 30%), followed by those aged 26-40 years (26%), those aged 41-55 years (20%), and respondents older than 55 years (24%). The age distribution was therefore relatively balanced, without a pronounced dominance of any single category. Respondents younger than 40 accounted for 56% of the sample, while those older than 40 accounted for 44%. This distribution provides insight into the attitudes of different age groups toward 3D-printed food and personalized desserts, which is relevant because perceptions of emerging food technologies may vary according to age, previous experience, and openness to innovation. The sample consisted of 28 men (56%) and 22 women (44%); no respondent selected the category 'other'. Although men were slightly more represented, the gender distribution can be considered reasonably balanced and provides an adequate basis for interpreting differences in attitudes across respondents.

Table 1. Awareness and previous experience of respondents

Question	Response	Number of respondents	Share
Had respondents previously heard of 3D food-printing technology?	Yes	39	78 %
	No	11	22 %
Had respondents tried food produced using a 3D printer?	Yes	0	0 %
	No	50	100 %

Most respondents (78%) had previously heard of 3D food-printing technology, indicating a relatively high level of general awareness. However, none had consumed food produced using a 3D printer. Their attitudes therefore appear to be based primarily on expectations and perceptions rather than direct experience.

Table 2. Distribution of responses and summary statistics for Likert-scale statements

Statement	1	2	3	4	5	Mean	Median	Mode
3D printing enables more visually attractive desserts	0	0	2	6	42	4,80	5	5
Food produced by a 3D printer appears artificial and unnatural	9	8	12	10	11	3,12	3	3
I am concerned about the safety of food produced by a 3D printer	0	0	0	0	50	5,00	5	5
3D printing is the future because it enables precise control of ingredients	0	33	10	7	0	2,48	2	2

The strongest positive response concerned the visual appeal of 3D-printed desserts, with a mean rating of 4.80 and 84% of respondents selecting the maximum score of 5. This finding is consistent with previous research indicating that 3D food printing can enhance perceptions of innovation and product appearance [5, 6]. At the same time, respondents expressed considerable uncertainty regarding the nature and safety of printed food. Opinions regarding the artificial or

unnatural character of 3D-printed food were divided, with 42% of respondents agreeing or strongly agreeing with this perception, 34% disagreeing, and 24% remaining neutral. This pattern is in line with previous findings suggesting that limited familiarity with the technology and perceptions of unnaturalness may contribute to consumer caution [6].

Food safety represented the strongest concern in the present study, with all respondents assigning the maximum score of 5. This result further reflects concerns identified in previous research regarding the safety of unfamiliar food-production technologies [6]. This finding should not be interpreted as evidence that consumers objectively consider 3D-printed food unsafe, but rather as an indication of very high perceived safety concern in this particular sample. In contrast, the statement that 3D printing represents the future because it enables precise control of ingredients received the lowest mean score (2.48), suggesting that the perceived technological advantages of 3D printing do not necessarily translate into confidence in the technology or broader consumer acceptance.

Table 3. Purchase motives and willingness to pay a premium

Category	Response	Number of respondents	Share
Purchase motive	Independent design of the dessert shape	24	48 %
	Nutritional customization	6	12 %
	Trying a new technology	11	22 %
	Unique gift	9	18 %
Willingness to pay a premium	The price should remain the same	44	88 %
	Up to 10% higher	6	12 %
	Up to 30% higher	0	0 %
	Twice the price	0	0 %

The most important purchase motive was the possibility of independently designing the shape of the dessert, selected by 48% of respondents. Interest in trying a new technology ranked second (22%), whereas nutritional customization was the least frequently selected motive. These findings suggest that consumers may be particularly attracted to the creative and personalized aspects of 3D food printing rather than to its potential nutritional benefits. This finding highlights the potential importance of consumer familiarity and confidence in the technology, as greater understanding of the printing process, ingredients, safety aspects, and possible benefits may help reduce uncertainty surrounding 3D-printed foods [6]. Providing such information may therefore be particularly important for increasing consumer confidence and translating interest in personalization and new technology into actual purchase intention.

Despite the interest in personalization observed in the present study, 88% of respondents were unwilling to pay a higher price, while only 12% would accept a price increase of up to 10%. This suggests that although personalization may increase the attractiveness of 3D-printed desserts, consumers may not yet perceive it as sufficient added value to justify a higher price.

Table 4. Confidence in taste and preferred tasting location

Category	Response	Number of respondents	Share
Belief that the taste would be equally good	Yes	13	26 %
	No	37	74 %
	Unsure	0	0 %

Category	Response	Number of respondents	Share
Preferred tasting location	Luxury restaurant	28	56 %
	Local pastry shop	0	0 %
	Public event or food festival	7	14 %
	I would not like to try it	15	30 %

Consistent with previous research showing that technological novelty does not necessarily translate into greater food acceptance when sensory qualities remain important [8], the present findings indicate that the novelty of the technology was not sufficient to overcome consumers' expectations regarding sensory quality. Most respondents (74%) did not believe that a 3D-printed dessert could taste as good as one prepared manually by a pastry chef. Since none of the respondents had previously tasted a 3D-printed dessert, these evaluations reflected anticipated rather than experienced taste. This may indicate that concerns about the expected sensory properties of 3D-printed food remain an important barrier to its acceptance. Nevertheless, 56% of respondents expressed a willingness to try a 3D-printed dessert in a luxury restaurant, suggesting that an attractive and trusted consumption setting may encourage consumers to overcome their initial reservations. In contrast, 30% indicated that they would not wish to try such a dessert in any of the proposed settings.

The results show that respondents recognize the aesthetic and personalization potential of 3D food printing, particularly its capacity to create visually attractive and individually designed desserts. At the same time, substantial distrust remains regarding food safety and taste. Although most respondents were aware of the technology, none had direct experience with 3D-printed food; consequently, their attitudes largely reflect expectations about an unfamiliar technology. The greatest market potential appears to lie in personalized design and presentation in a professional, controlled environment. However, limited willingness to pay a premium suggests that market introduction would require competitive pricing, transparent evidence of safety, and opportunities for consumers to taste the products before purchase.

Several limitations should be considered when interpreting the findings. First, the study was conducted on a relatively small sample of 50 respondents. The sample size limits the statistical precision of the findings and prevents reliable generalization to the broader consumer population. Second, the use of a non-probability sampling procedure may have introduced selection bias, as individuals who voluntarily participated may differ from consumers who were not reached or did not choose to participate. Third, none of the respondents had previously consumed food produced using a 3D printer. Consequently, the reported attitudes primarily reflect expectations and perceptions of an unfamiliar technology rather than direct sensory experience. This is particularly relevant for the findings concerning taste, texture, and safety. Fourth, the analysis was limited to descriptive statistics and therefore does not establish statistically significant differences between demographic groups or causal relationships between consumer characteristics and acceptance. Future research should therefore employ larger and more diverse probability-based samples where feasible, include direct tasting of 3D-printed desserts, and apply inferential statistical methods to examine differences in consumer perceptions across demographic and experiential groups.

5. CONCLUSION

3D-printed desserts offer considerable potential for reducing material waste, enabling precise portioning, and expanding creative possibilities in food design. Nevertheless, the present findings indicate that technological potential alone is insufficient to ensure consumer acceptance. Respondents recognized the visual and personalization advantages of 3D food printing, but they also expressed strong concerns regarding safety and taste. As none of the participants had previously consumed 3D-printed food, their evaluations were based on expectations rather than direct sensory experience. The most promising opportunities appear to involve personalized design and product presentation in professional, controlled settings. However, successful commercialization will require competitive pricing, clear communication about ingredients and safety, and opportunities for product tasting. Given the small sample size, the findings should be regarded as exploratory and should be validated in future studies involving larger and more diverse samples and direct sensory evaluation.

REFERENCES

- [1] Lupton, D.; Turner, B.: "Food of the future"? Consumer responses to 3D printed food, *Food Quality and Preference*, (2018), Vol. 64, pp. 130-138,
- [2] Brunner, T. A.; Delley, M.; Denkel, C.: Consumers' attitudes towards 3D printed foods as an emerging technology, *Appetite*, Vol. 127, (2018), pp. 277-284.
- [3] Manistan, S.; et al.: Perception and Acceptance of 3D-Printed Food among Consumers: Applying the Theory of Planned Behavior, *Nutrients*, Vol. 16, (2024), No. 8, p. 1162,
- [4] Ross, M. M.; Hedderley, D.; et al.: Overcoming barriers to consumer acceptance of 3D-printed foods, *Journal of Food Science*, Vol. 87,(2022), No. 4, pp. 1520-1532
- [5] Derossi, A., Spence, C., Corradini, M. G. i dr. (2024). Personalized, digitally designed 3D printed food towards the reshaping of food manufacturing and consumption. *npj Science of Food*.
- [6] Chang, Y.-H., Hsia, S.-M. i Chen, M.-C. (2024). Breaking Conventional Eating Habits: Perception and Acceptance of 3D-Printed Food. *Nutrients*, 16(8), 1162.
- [7] Kanwal, S. i sur. (2025). Modeling the intention to accept 3D-printed foods: the role of religious beliefs, food neophobia and food technology neophobia. *Humanities and Social Sciences Communications*.
- [8] Consumer Assessment of 3D-Printed Food Shape, Taste, and Fidelity Using Chocolate and Marzipan Materials (2023).

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