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Enhancing personal sustainability by redefining preferences regarding the appearance of fresh foods

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1. Introduction

Although appearances play a pivotal role in decision-making, studies highlight a societal bias toward visually appealing produce, which can, potentially hindering sustainable consumption practices (Helmert et al., 2017; de Hooge et al., 2018). Beneath this surface-level obsession lies a complex reality: the relentless pursuit of cosmetic perfection in agriculture has led to industrial practices that often overlook nature's inherent diversity and the subtleties of ecological balance (Wadhwa and Capaldi-Phillips, 2014). Employing advanced breeding technologies and heavily relying on toxic chemicals, the industrial agricultural complex has sculpted our food to meet superficial standards, often at the expense of sustainability, health, and the environment.

However, a growing awareness and budding revolution are challenging these norms. Through a shift toward embracing suboptimal appearances, valuing nutrition and flavor over superficial charm, and recognizing the beauty in natural diversity, a paradigm shift toward personal sustainability and more harmonious coexistence with nature is beginning. This article explores the intricate interplay between industrial agriculture and the emerging trend of choosing suboptimal fresh foods grown using organic and natural farming, a transformation that's reshaping our relationship with the planet.

2. Modern plant breeding vs. nature's diversity: health risks

The standardized approach of modern plant breeding contrasts with nature's diversity, which emphasizes ecological balance over visual allure (Estabrook, 2012). Techniques like Marker Assisted Breeding and Quantitative Trait Loci Mapping enable the selection of superior plants even at the seedling stage. Unlike conventional breeding, modern breeding can select recessive alleles, making the program more efficient and focused on traits like optimal appearance (Gao et al., 2022; Caradus, 2023). This standardized approach contrasts with nature's diversity, which defies conformity and emphasizes ecological balance over visual allure.

Toxic chemical residues in fresh foods, stemming from sources like pesticides, herbicides, and fertilizers, pose potential risks to human health. Pesticides are widely used to safeguard crops from pests, but they can linger on produce, leading to health concerns. Research has associated long-term exposure to these residues with ailments such as neurological disorders and cancers (Smith-Spangler et al., 2012).

Heavy metals like lead and arsenic may accumulate in soil and contaminate fresh foods, causing health problems including organ damage, especially in children (Satarug et al., 2010). Endocrine disruptors in food can also interfere with the body's hormonal system, resulting in reproductive and developmental issues (Gore et al., 2015).

3. The beauty of organic diversity

Organic and natural farming emphasizes sustainable practices, often resulting in produce that varies in appearance. While these differences might not align with conventional beauty standards, they symbolize intrinsic qualities (Györény et al., 2006).

Grown without heavy reliance on industrial agriculture practices, organic and naturally grown foods may appear smaller or irregular in shape, without synthetic growth enhancers. This natural growth often results in unique flavors and nutritional profiles. The crops might also have thicker peels, reflecting a natural resilience to pests without heavy chemical treatments.

Conventional farming may aim for uniformity to satisfy market demands, but the diversity in organic produce tells a unique story of local adaptation. It's a celebration of a thriving ecosystem where insects, pollinators, and microorganisms collaborate, fostering a balanced agricultural system (Aschemann-Witzel et al., 2018).

4. The cascade effect on the supply chain

Retail customers often reject fresh foods that appear suboptimal, a bias that extends through the supply chain, resulting in the culling of such produce at farms and warehouses. Suboptimal food refers to physically imperfect food products that deviate from normal visual standards without intrinsic quality or safety concerns. This includes fruits and vegetables that may be misshapen or discolored but are still fresh and nutritious (Cao and Miao, 2021). Research shows that consumers often reject suboptimal food products, leading to increased avoidable food waste. However, some individuals are willing to accept these products, mainly due to environmental concerns and cooking abilities. Studies also highlight the importance of understanding consumer perceptions toward suboptimal food to reduce food waste (Premaratna et al., 2022). This preference for visually flawless products initiates a cycle that limits the availability of suboptimal-looking fresh foods in supermarkets. The rejection of suboptimal food (SF), or food that doesn't meet certain aesthetic standards, has been a consistent finding in various studies, with consumers often choosing not to purchase these items (Rohm et al., 2017). This trend persists even among those who are aware of the broader issue of food waste, revealing a significant gap between attitudes and behavior (Aschemann-Witzel and Zielke, 2017; de Hooge et al., 2018; Symmank et al., 2018).

The retail sector plays a crucial role in this dynamic, acting as a powerful gatekeeper between production and consumption. Wholesalers and retailers have the ability to either hinder or encourage the commercialization and consumption of SF, greatly

influencing consumer behavior (Hezarkhani et al., 2023). The consequences of this situation are far-reaching. SF products are often left in the fields or discarded by retailers, contributing to significant waste (Tristram, 2009; Cicatiello et al., 2017; Porter et al., 2018). At the farm level, demanding internal trading standards set by retailers can result in up to 40% of fruits and vegetables becoming food waste (de Hooge et al., 2018). Furthermore, SF is likely to account for almost all food wasted in retail stores, highlighting the urgent need for changes in both consumer behavior and retail practices (Hartmann et al., 2021). Research indicates that farm production that is wasted for cosmetic reasons, is responsible for about 5% of greenhouse gas emissions (Zabala, 2018).

Individual preferences for visually appealing produce are influenced by upbringing, social norms, and culture. Many overlook nutritionally sound but suboptimal-looking fruits and vegetables in favor of more attractive options (Puteri et al., 2022). Industry experts stress that education and proper information are vital to change these habits and foster sustainable food selection.

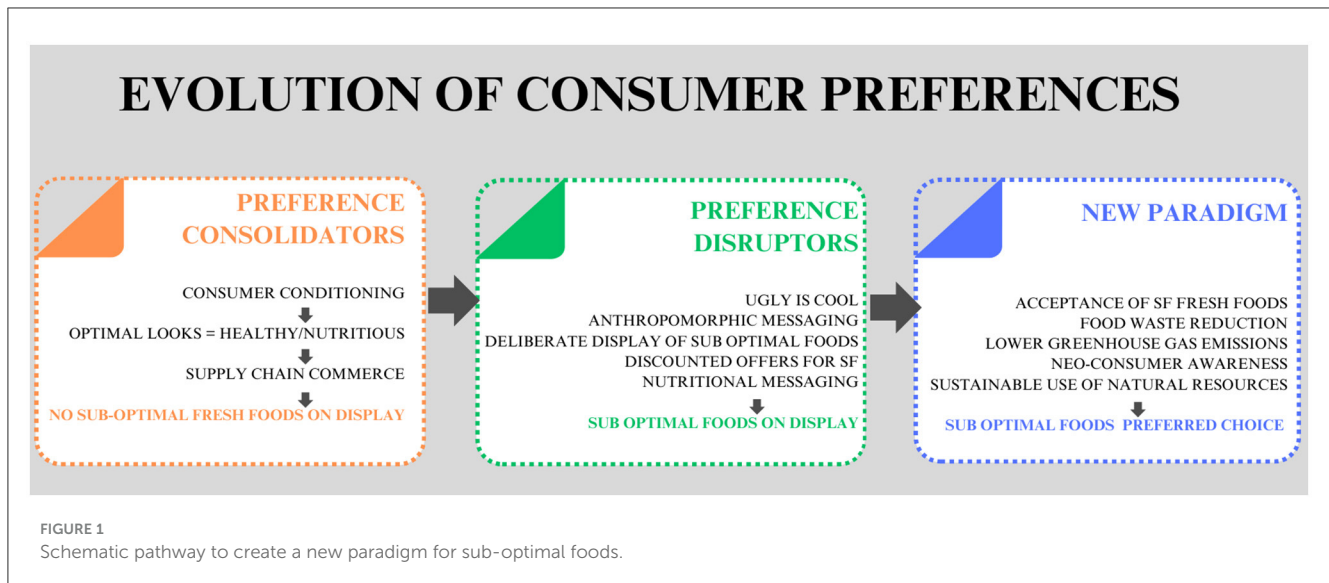
Empirical studies show that consumers are less inclined toward organically grown fresh foods with imperfect appearances. Factors like color, size, shape, and condition weigh heavily in purchasing decisions, leading households to reject otherwise healthy items solely based on aesthetics (Stolz et al., 2010). The challenge ahead involves shifting ingrained perceptions to embrace the value beyond mere appearance, recognizing that imperfection does not diminish nutritional quality. The promotion of suboptimal or "ugly" fresh produce presents both challenges and opportunities. While there is resistance from consumers who seek perfection in food products, there is also a growing awareness of the environmental and social impacts of food waste (Pfeiffer et al., 2021). This awareness creates opportunities for marketing strategies that emphasize sustainability and responsible consumption.

5. The paradigm shift toward personal sustainability

Embracing the irony of nutritionally rich yet aesthetically imperfect fresh foods fosters personal sustainability. Challenging conventional beauty standards in food, people can actively support farming practices that reduce chemical dependence. This requires a paradigm shift to dissociate appearance from nutritional value and prioritize sustainability.

Choosing suboptimal fresh foods is a conscious decision that values nutrition, flavor, and environmental responsibility over visual perfection. What may have begun as a minor trend is gaining traction as a responsible lifestyle choice. This acceptance of imperfect produce signifies a shift in values that emphasizes sustainability, health, and taste, inviting us to rethink our relationship with food.

Several instances provide hope for the future of sustainability. A change in consumer behavior cannot happen without governmental support. Countries like France, Italy, United Kingdom, United States, Canada and Australia have amended/introduced laws that bring back sub-optimal fresh foods back into the supply chain instead of dispatching them



to landfills (Buzby et al., 2014; Gooch and Felfel, 2014; Muth et al., 2019; Mustoe, 2021). Companies like Imperfect Foods have thrived by sourcing and delivering “ugly” produce. Farmers markets, chefs like Dan Barber, and social media campaigns such as #UglyFoodIsBeautiful educate and celebrate the worth of imperfect ingredients. Major supermarkets like France’s Intermarché have begun marketing these items creatively at discounted prices.

The trend toward valuing suboptimal fresh foods reflects broader changes in attitudes toward sustainability, authenticity, and economic practicality. Research such as that by Zámková et al. (2021) in the Czech Republic sheds light on the growing popularity of organic food and this emerging challenge to traditional ideas of perfection in food. Together, these efforts foster a more conscious and sustainable way of living, one imperfect apple or misshapen carrot at a time.

Hungry Harvest, a Maryland-based company, has been at the forefront of promoting suboptimal fresh foods (Swinburne and Sandson, 2019). Their efforts have led to the rescue of almost 200,000 pounds of food, transforming consumer preferences in the process. One of their key strategies is making suboptimal fresh foods accessible and affordable. By offering customizable produce boxes at reasonable prices, Hungry Harvest has opened doors for a wider audience to experiment with different types of produce, including those considered imperfect. This approach encourages people to appreciate and value produce they might otherwise overlook.

In addition to accessibility, Hungry Harvest’s mission to create a waste-free future resonates with social and environmental goals. By positioning suboptimal fresh foods as part of a larger mission, they have made these products more appealing to consumers who are conscious of sustainability and community impact.

Education and awareness also play a vital role in Hungry Harvest’s success. Through engaging blogs and practical guides like “9 Ways to Use Your Leftover Produce,” “Leave No Part Behind-Cooking From Root To Stem,” and “Don’t Waste It-Freeze It,” they have educated consumers on how to fully utilize all parts of the produce. This not only changes perceptions but also fosters more sustainable consumption habits.

Hungry Harvest’s multifaceted approach has been instrumental in changing consumer behaviors and perceptions related to suboptimal fresh foods. By skilfully combining accessibility, alignment with broader values, and targeted education, they have succeeded in making these products more appealing and acceptable to a diverse range of consumers.

Efforts to promote the choice and perception of suboptimal food are found to be more effective when it comes to fresh produce. Sales of suboptimal food in stores should be accompanied by communication, focusing on fresh food in particular. This approach can help tackle food waste and encourage consumers to choose suboptimal products (Aschemann-Witzel and Peschel, 2019). The challenge ahead involves shifting ingrained perceptions to embrace the value beyond mere appearance, recognizing that imperfection doesn’t diminish nutritional quality. The promotion of suboptimal or “ugly” fresh produce presents both challenges and opportunities. While there is resistance from consumers who seek perfection in food products, there is also a growing awareness of the environmental and social impacts of food waste. This awareness creates opportunities for marketing strategies that emphasize sustainability and responsible consumption (Pfeiffer et al., 2021).

Figure 1 outlines a transformative journey in consumer behavior and preferences regarding fresh foods. It starts with strong leanings toward aesthetically pleasing foods, then disrupts these preferences by promoting the acceptance of less-than-perfect looking foods, and finally establishes a new paradigm that values sustainability and conscious consumption over mere appearance.

6. Conclusion

This study unveils a transformative paradigm shift in consumer preferences toward fresh foods, transcending mere aesthetics and embodying a deeper understanding of responsible consumption. A harmonious symphony of change is currently being orchestrated, with powerful contributions from governmental bodies and private initiatives. Notable campaigns such as Imperfect Foods,

#UglyFoodIsBeautiful, and Hungry Harvest spearhead this revolution, fervently advocating for the valorisation of sub-optimal, yet wholly edible foods in our consumption narratives. These innovative movements herald a renaissance in consumer attitudes, cultivating an ethic that marries sustainability with authenticity. They champion the embrace of the “imperfect,” fostering a culture where nutrition intertwines with ethics, and personal choices resonate with broader environmental impacts. This enlightened perspective nurtures a pathway toward individual sustainability, rekindling our connection with the earth and the multifaceted beauty it offers. It propels us toward a society where authenticity triumphs over superficial allure, and substantive value overshadows mere appearance. In embracing this vital transition, we are poised to redefine societal norms and navigate toward a future where the “imperfect” is celebrated as a symbol of thoughtful and conscientious living. Thus, we are collectively empowered to mitigate unnecessary waste, safeguarding our planet’s precious resources and ensuring that no edible food is condemned to the wastefulness of landfills. This revised conclusion integrates the cited findings, emphasizing the role of various campaigns and movements in fostering a transformative shift toward sustainable and responsible consumption practices.

Author contributions

PB: Conceptualization, Formal analysis, Investigation, Methodology, Visualization, Writing—original draft, Writing—review & editing.

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