A Multi-Factor Model of Global Consumer Acceptance of Cultured Meat and Its Policy Implications

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Abstract. With the continuous growth of the global population, traditional animal husbandry is facing challenges related to the environment and resources. Cultured meat, as an innovative alternative protein source, holds the potential to reduce environmental burdens, enhance animal welfare, and improve food safety. This paper aims to construct a multi-factor model of global consumer acceptance to explore how cultural background, ethical motivation, health awareness, technological acceptance, and economic factors influence consumer attitudes. By adopting literature review and case analysis methods, this paper analyzes differences in consumer attitudes and the impact of policies across countries. The analysis shows that cultural, health, and ethical perceptions, as well as technological and economic factors, play key roles in the global acceptance of cultured meat. At the same time, countries are promoting the development of the cultured meat industry through policy measures such as advancing regulatory frameworks, market education, and reducing production costs. This research provides theoretical support for the global cultured meat market and effective marketing strategies for policymakers.

Keywords: Cultured meat, consumer acceptance, multi-factor model, policy impact, alternative protein.

1. Introduction

With the continuous growth of the global population, traditional meat production is facing increasingly severe challenges related to the environment and resource use. According to the Food and Agriculture Organization (FAO) of the United Nations, global animal husbandry accounts for 14.5% of greenhouse gas emissions, consumes vast amounts of land and water, and contributes to biodiversity loss [1]. According to data from the Good Food Institute (GFI), global meat production requires approximately 700 billion liters of water. Furthermore, animal farming increasingly negatively impacts animal welfare and public health, particularly due to the use of antibiotics and the risk of bacterial contamination [2,3]. It is estimated that around 75% of global antibiotic use occurs in livestock farming, posing potential threats to human health. Therefore, finding sustainable meat alternatives has become a crucial topic in the global food industry.

Cultured meat, as an innovative alternative protein, offers significant advantages in reducing environmental pressure, enhancing animal welfare, and improving food safety, gradually attracting global attention. For instance, GFI predicts that by 2030, the global cultured meat market will reach a value of $40 billion. Additionally, research shows that replacing traditional meat with cultured meat can reduce greenhouse gas emissions by about 90%, while requiring 96% less land and 99% less water than traditional meat production [4]. However, despite continuous advancements in cultured meat technology, its market promotion still faces numerous challenges, particularly regarding consumer acceptance. Surveys indicate that only around 30–40% of consumers in European and American markets are willing to try cultured meat. This level of acceptance is still influenced by multiple factors, including cultural background, ethical perceptions, and technological understanding [5, 6].

This paper aims to construct a multi-factor model of global consumer acceptance to explore the key factors influencing consumer attitudes, including cultural background, ethical motivation, health awareness, technological acceptance, and economic factors. Meanwhile, the paper also explores the impact of policy on promoting the development of the cultured meat industry, particularly how

governments facilitate its adoption through regulatory frameworks and market education. For example, the Singaporean government has advanced the commercialization of cultured meat through legislation, while the European Union has adopted a more cautious regulatory approach. In China, the government has promoted the development of plant-based meat by formulating group standards, which may positively influence consumer behavior. These standards help raise consumer awareness of alternative proteins and improve their acceptance of cultured and plant-based meat.

2. Trends and Challenges in Global Meat Consumption

With the growth of the global population and improvements in living standards, the demand for meat continues to rise. However, traditional animal husbandry has become a global challenge due to its impact on the environment, water resources, and biodiversity. Global meat consumption now faces environmental, ethical, and health-related challenges. Alternative protein technologies—particularly cultured meat and plant-based meat—offer innovative solutions to these issues and are expected to gain a significant share in the global meat market in the coming years.

Cultured meat produced through animal cell cultivation offers advantages in environmental protection, animal welfare, and food safety, but still faces challenges such as high production costs and technological gaps. Although production technologies are advancing, cultured meat remains more expensive than conventional meat. Furthermore, the replication of taste and flavor has yet to be fully resolved. In contrast, plant-based meat made from ingredients such as soy and wheat protein have a more mature production process, lower costs, and a larger market share. The taste and nutritional profiles of such products are also continuously improving.

3. A Multi-Factor Model of Global Consumer Acceptance

Global consumer acceptance of cultured meat is influenced by multiple factors, including cultural background, ethical motivation, health awareness, technological acceptance, and economic considerations. By constructing a multi-factor model, it is possible to comprehensively analyze how these factors interact and ultimately influence consumers' purchasing decisions and attitudes.

3.1. Cultural Background and Social Perceptions

Cultural background profoundly shapes consumers' perception and acceptance of cultured meat. In Western countries such as the United States, the United Kingdom, the Netherlands, France, and Germany, consumers tend to place a higher emphasis on environmental protection and animal welfare and thus demonstrate a relatively high acceptance of cultured meat—though it remains around 40%. Especially in the United States and Europe, where technological innovation and environmental consciousness are widely embraced, consumers are more inclined to try novel technologies such as cell-cultured meat and plant-based alternatives.

In contrast, consumers in Asian countries like China, India, and Japan are more rooted in traditional dietary culture and favor "natural" foods, leading to lower acceptance of cultured meat. In these regions, skepticism toward "lab-grown meat" is common; for example, surveys indicate that over 50% of Chinese consumers believe such products may be unnatural or unsafe. Research suggests that designing cultured meat products to better match the use scenarios and sensory expectations of traditional meat can reduce concerns about their "unnaturalness," enhance familiarity, and thereby improve acceptance [7, 8].

In Latin America—particularly Brazil and Argentina—meat consumption is deeply ingrained in cultural tradition. However, rising concern over environmental and health issues is gradually prompting some consumers to embrace plant-based and cultured alternatives [9]. Therefore, cross-cultural marketing strategies must be adapted to the specific cultural contexts of different regions.

3.2. Ethical Motivation and Health Awareness

Ethical motivation and health awareness are global forces advancing the acceptance of cultured meat. With increasing public attention to animal welfare and environmental sustainability, consumers in many countries—especially in Europe and North America—view cultured meat as a dietary solution that minimizes animal slaughter and aligns with ecological ethics [10].

In addition, health considerations play a key role in influencing consumer choices. For example, consumers in European and American markets are growing more concerned about food safety, especially regarding the use of antibiotics and hormones. This has led to a perception of cultured meat as a healthier and safer alternative.

In Asian markets—particularly in China and India—rising awareness of food safety has also driven recognition of cultured meat's advantages in mitigating the risks associated with traditional meat production, such as bacterial contamination and antibiotic residues [11].

3.3. Technological Acceptance and Economic Factors

Technological acceptance and economic factors are crucial drivers of consumer attitudes. Although cell-cultured meat technology continues to advance, many consumers remain skeptical of "lab-grown meat," especially due to a lack of understanding and trust in new technologies. Studies show that consumer acceptance of emerging food technologies largely depends on their level of awareness and comprehension [12].

If consumers lack accurate knowledge of cultured meat's production process and health benefits, it can result in cognitive bias and rejection. Enhancing public understanding and reducing information asymmetry could significantly increase willingness to purchase and overall support.

In Western countries, where technological innovation is generally encouraged, consumers are more receptive to new technologies [13]. In contrast, in Asia and many developing nations, technological acceptance remains relatively low, and widespread misconceptions about "artificial meat" persist.

Economic factors also play a decisive role in consumers' purchasing decisions worldwide. While interest in cultured meat is strong in Western markets, high production costs remain a major obstacle to large-scale commercialization. In countries such as India and Brazil, where consumer income is lower, price becomes the most important factor affecting purchasing decisions. Therefore, reducing costs and increasing price competitiveness are necessary steps for global expansion of cultured meat [14,15].

3.4. Case Studies: Impossible Foods and Beyond Meat

3.4.1. Impossible Foods

Impossible Foods is one of the leading producers of plant-based meat. Its core technology involves genetic engineering of soy protein to simulate the flavor and texture of traditional meat. Its product line includes plant-based burger patties, sausages, and other meat alternatives aimed at providing delicious and environmentally sustainable options. To meet the rising demand for sustainable consumption, Impossible Foods emphasizes "eco-friendliness" and "health" as its core brand values. Its flagship product, the Impossible Burger, has gained global popularity and formed partnerships with restaurant chains such as Burger King to meet the dietary preferences of younger consumers.

3.4.2. Beyond Meat

Beyond Meat focuses on plant-based and cell-cultured meat products, with a particular emphasis on high protein content and low carbon footprint. In different countries, Beyond Meat adjusts its product formulations and market positioning based on local dietary preferences. For example, in the Chinese market, Beyond Meat has tailored certain product flavors to better suit local tastes and partnered with restaurants to launch culturally relevant plant-based offerings [16]. In addition, Beyond Meat has collaborated with international brands such as McDonald's and Starbucks to

introduce its products into fast food and convenience store chains, providing consumers with easy access to alternative protein options.

4. Policy Impacts on the Cultured Meat Industry

Government policies play a crucial role in driving the development of the cultured meat industry. Different countries have implemented diverse policy approaches—ranging from regulatory frameworks and financial support to public education—to foster the sector's expansion. The following section categorizes and analyzes countries based on the nature of their policy impacts.

4.1. Proactive Regulatory Frameworks and Commercialization Support: Singapore and Israel

Singapore and Israel are among the most proactive countries globally in promoting the commercialization of cell-cultured meat. As early as 2020, Singapore approved the world's first cultured chicken product for market sale, making it a regulatory pioneer in the field. This success is largely attributed to its centralized and forward-looking food regulatory system [17]. The Singaporean government established clear approval processes and provided comprehensive support in regulatory science, risk assessment, and consumer education to encourage innovation. For example, Eat Just's cultured chicken was the first product to be commercialized in Singapore.

At the same time, Israel has demonstrated remarkable vitality in technology incubation, government funding, and industry coordination. The government has promoted the development of cultured meat companies by offering grants and establishing food tech incubators. Companies such as Aleph Farms and Future Meat have already achieved mass production capabilities. Furthermore, both countries place strong emphasis on improving consumer acceptance by promoting transparency, clear labeling, and communication of sustainability benefits. These policies have not only accelerated product launch but also provided globally replicable models for policy development.

4.2. Market Promotion and Price Support Policies: China, Brazil, India, and Other Developing Countries

In developing countries such as China, Brazil, and Argentina, governments are advancing the cultured meat industry by establishing standards, lowering production costs, and offering market support. China has introduced group standards for plant-based meat, providing regulatory structure and quality benchmarks that enhance consumer awareness [18].

In Brazil and Argentina, governments support the popularization of cultured meat through tax exemptions and subsidy policies aimed at reducing production costs. In low-income countries such as India, price remains a major barrier to consumer adoption. The Indian government has facilitated market penetration through tax reductions, production subsidies, and pricing policies. Additionally, government-backed technological innovation initiatives are accelerating the spread of alternative proteins in India. By lowering costs and offering financial support, these countries have helped the industry overcome pricing bottlenecks and tap into the consumption potential of lower-income markets.

4.3. Cautious Regulation and Transparency Policies: European Union (Germany, France, Netherlands, UK)

The European Union has adopted a cautious but structured approach to regulating cultured meat. The European Food Safety Authority (EFSA) imposes strict requirements for novel food approvals. All cultured meat products must undergo comprehensive risk assessments, safety validation, and labeling management before entering the market [19]. Although this process prolongs the time to market, it helps build public trust.

In Germany and France, regulators emphasize the ethical debate between "naturalness" and "tradition," requiring companies to provide clear sourcing and nutritional information. The Netherlands, an early hub for cultured meat research, maintains stringent oversight but actively

collaborates with research institutions and promotes transparent review and public participation. Since 2019, the Dutch government has allowed public tastings of experimental cultured meat.

After Brexit, the United Kingdom has moved toward developing independent food innovation legislation, aiming to ensure safety while shortening approval timelines. Overall, EU countries emphasize risk control, scientific evidence, and transparent labeling, aiming to strike a balance between public skepticism and industrial innovation. This approach helps maintain consumer confidence and promote rational acceptance of alternative protein products.

4.4. Global Policy Coordination and Standardization

Against the backdrop of global food safety and sustainability goals, international organizations have begun enhancing policy coordination and technical standards for the cultured meat industry. The FAO and the World Health Organization (WHO) have jointly conducted food safety evaluations of cultured meat and, in 2023, issued the "Draft Guidelines on Food Safety and Regulation for Cultivated Foods" to assist national regulatory agencies [20].

This initiative helps bridge regulatory capacity gaps between developed and developing nations and promotes consistency in international approval standards. Meanwhile, the International Organization for Standardization (ISO) is working on process standards and testing methods for alternative proteins, laying a foundation for global product certification. Given the wide variation in national policies regarding labeling, ingredient definitions, and risk assessments, cross-border trade barriers are common. Enhanced global coordination may help multinational companies overcome regulatory challenges, increase consumer trust, and improve product transparency.

In addition, global policy harmonization could assist smaller economies in leveraging large-scale regulatory systems to enter the international market and promote fair competition for cultured and plant-based meat products. In the coming years, the unification of international regulatory standards is expected to become a key driver of global industry expansion.

4.5. Responses of Traditional Meat Companies to Cultured Meat Market Challenges

Traditional meat companies are adopting various strategies to respond to the market impact of cultured meat. Firms such as Tyson Foods and JBS S.A. have strengthened their market competitiveness by investing in alternative protein ventures and acquiring cultured meat companies. For example, Tyson Foods has invested in Beyond Meat and launched its own brand of plant-based meat products to attract consumers interested in health and sustainability.

JBS has focused heavily on promoting plant-based meat in the South American market, addressing regional demand for sustainable food. By launching innovative plant-based products and forming partnerships with major foodservice chains, JBS has not only entered new markets but also enhanced its brand visibility.

To respond to the growing cultured meat market, traditional meat companies have also adjusted their marketing strategies. Tyson Foods, for instance, has emphasized the sustainability of its conventional meat offerings, highlighting labels such as "natural" and "hormone-free" to address consumer concerns about food health. This approach aims to attract consumers who are attentive to animal welfare and environmental impact.

Meanwhile, traditional meat companies are investing in technological innovation to improve product quality and production efficiency. Increased investments in smart farming and sustainable agricultural technologies are helping these companies maintain competitiveness in both the alternative protein and conventional meat markets.

5. Conclusion

This paper constructs a multi-factor model to explore the key factors influencing global consumer acceptance of cultured meat, including cultural background, ethical motivation, health awareness, technological acceptance, and economic considerations. Through literature review and case analysis,

the study finds that the combined effects of cultural perception, ethical values, and food safety concerns shape consumer preferences for cultured meat.

Meanwhile, different countries have adopted varying regulatory and industrial strategies. Proactive countries such as Singapore and Israel have accelerated commercialization through flexible regulatory frameworks and funding policies. The European Union, on the other hand, has maintained a relatively conservative stance, focusing on strict safety and labeling reviews. China, Brazil, and India are promoting market expansion by introducing national standards and policy incentives. These policies reflect how governments influence consumer attitudes and shape the direction of the cultured meat industry.

In summary, consumer acceptance of cultured meat is determined by a combination of psychological, cultural, and policy factors. Promoting information transparency, reducing production costs, and enhancing product familiarity will be key to driving consumer acceptance. Future efforts should also focus on strengthening international regulatory coordination to support the sustainable development of the global cultured meat industry.

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