

Comparative Analysis of Pre-packaged Food Labeling Regulations Between China, the European Union and the United States

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Abstract: Food labeling is essential for informing consumers about the contents and safety of the food they purchase, significantly impacting both public health and international trade. This paper provides a comparative analysis of pre-packaged food labeling regulations in China, the United States, as well as the European Union. As major players in the global food market, these regions or countries have distinct regulatory approaches. Specifically, it examines key aspects of food labeling, such as ingredient listing, nutritional information, and allergen labeling. It refers to regulatory guidelines such as the Codex Alimentarius (FAO & WHO), A Food Labeling Guide (U.S.), Regulation (EU) No 1924/2006, and China's national standards. By analyzing the differences between these countries' regulations, the article identifies areas for improvement in China's food labeling policies, particularly in nutrition and allergen labeling. The findings and recommendations presented in this study are expected to enhance transparency in food safety for domestic consumers and improve the competitiveness of Chinese pre-packaged food products in the global market.

Keywords: Food labeling, Regulation, China, the European Union, the United States.

1. Introduction

In the area of food safety, labeling plays a significant role in communication between manufacturers and consumers. Food labeling is relevant to several areas, such as consumer behavior, food safety, and international trade. In accordance with the Codex Alimentarius adopted by the Food and Agriculture Organization of the United Nations and the World Health Organization in 1985,[1] general mandatory labeling for pre-packaged food includes the food name, ingredient list, net and drained weight, date marking, storage instructions, and usage guidelines. The specific regulations vary from country to country. In addition to the above regulations, many countries have adopted voluntary guidelines, such as the Health Star Ratings in Australia and New Zealand, the traffic light system in the UK, and the Nutriscore system in France. These governments provide residents with more convenient and health-conscious food labeling.

In China, regulations over the food industry have experienced a later start and slower development in terms of industrialization compared to other developed nations. Consequently, due to the lack of well-regulated food safety standards and lax supervision, food safety issues continue to emerge. From the melamine-tainted milk powder scandal in 2008 [2] to the irregular transportation of edible oil that

occurred in 2024,[3] every incident has posed a serious threat to the nation's food safety. Food safety issues exposed by the 3.15 annual gala, produced by China Central Television to mark World Consumer Rights Day, and by social media in China have shown that, in terms of food labeling and regulation, China still has a long way to go. Built upon these established studies, this paper sets out to review food labeling policy in China and analyzes the necessity for improvement through a comparative study with the United States as well as the European Union.

2. Review of Global Food Labeling Practices

Extensive research has been conducted on food labeling across different countries in recent years. Roosen [4] discussed the significance of food labeling in conveying food safety information. Due to asymmetric information, it is difficult to directly label food safety attributes. Consumers' confidence in food safety relies on third-party accreditation or government enforcement. This paper clearly explained the defects of food labeling policy in the European food and retail industry and discussed the potential of marketing safety through labels. Vandevijvere and Vanderlee [5] expanded on this idea by examining how labeling policies positively impact food reformulation, especially with mandatory policies showing more significant effects. Specifically, front-package food labeling has been shown to be effective in encouraging food reformulation. Besides affecting food manufacturers, labeling policies have also had a positive impact on consumers. Kanter et al. [6] elucidated the goals of mandatory front-of-package (FOP) labeling systems worldwide and their exact effects. They introduced various labeling systems, such as health logos, traffic light labels, health star ratings, and warning labels. Additionally, highlighting the impact of prevalent food labeling practices in China is also important. Liu et al. [7] researched the understanding of Chinese consumers regarding food nutrition labels and their usage, along with the determinants. They observed a moderate level of subjective comprehension and a low level of objective comprehension of food nutrition labels among participants. They observed a moderate level of subjective comprehension and a low level of objective comprehension of food nutrition labels among the participants. From a policy perspective, Guo et al. [8] described the government regulations and voluntary certifications regarding food safety in China and compared the regulatory framework with those in the United States, the European Union, and Japan. In China, food labeling not only affects consumer safety but also impacts the competitiveness of Chinese prepackaged foods in global trade. Li et al. [9] reported that the U.S. FDA issued 147 import refusal notices for Chinese food products due to labeling issues, accounting for 24.92% of all notices in 2021. The main reasons for these notices were "label errors" and "failure to declare allergens."

In addition to fundamental food labeling regulations, there is growing research on various branches of food labeling. Lwin [10] found that a higher proportion of food manufactured in Southeast Asia contains nutrition content claims, while there are fewer nutrition function claims. Zhu et al. [11] analyzed the issues in the design and implementation of the labeling system for genetically modified foods in China. They found that the labeling system is ineffective and inconsistent, failing to adequately protect consumers' right to information. Gendel [12] explored the different approaches taken by various countries and organizations in the identification and labeling of 'priority allergens' in food allergen labeling.

Taken together, these papers provide a variety of analyses for specific content in food labeling. Moreover, Tankosić, Puvača, and Ignjatijević et al. [13] conducted a targeted analysis of the food safety provision in the European Union, highlighting that the EU has established a stringent legal and regulatory framework to ensure food safety and the traceability of food and its ingredients.

3. Comparative framework for food labeling policies

Food labeling, which provides key information on ingredients, nutrition, and allergens, serves as a one-way communication channel from producers to consumers. Therefore, ensuring that consumers can easily and clearly access this information is a joint responsibility shared by government food safety authorities and food produce.

Food labeling practices generally fall into two categories: mandatory and voluntary. Mandatory food labeling serves as a basic framework used by countries according to the Codex Alimentarius (CXS 1-1985), adopted by the WHO and FAO, which is an authoritative standard implemented by most countries worldwide. Mandatory food labeling refers to a set of labeling requirements that food producers and distributors must follow. These requirements are often based on Codex Alimentarius and adapted to the specific conditions of each country. Voluntary labels, on the other hand, are developed by government agencies or organizations to help consumers make healthier purchasing decisions. Such labeling systems are more common in developed countries and regions like the United States, the European Union, as well as in Australia. These two types of food labeling systems represent the minimum and maximum levels of information available to consumers when purchasing food. Mandatory labels ensure basic food safety for consumers, while voluntary labels provide additional options for informed choices.

3.1. Comparison of Labeling Regulations and Enforcement in China, the United States, as well as the European Union

To address the abovementioned inquiries, this section provides a review of the labeling regulations in the three regions and countries. In China, the Food Safety Law of the People's Republic of China was issued by the Standing Committee of the National People's Congress, came into effect on April 9, 2021. This law provides a systematic framework for food safety standards and supervision. Chapter IV, Section 3, establishes mandatory requirements for food labeling, instructions, and advertising in food production and operations. As a legal framework, this law necessitates supplementary guidelines for practical implementation to lead to the establishment of national standards of food safety. The General Rules for the Labeling of Prepackaged Foods (GB7718-2011) provides enforceable regulations for food labeling. Additionally, the General Rules for the Nutrition Labeling of Prepackaged Foods (GB28050-2011) specifically regulate nutrition labeling for prepackaged foods. At the national level, food safety is overseen under the regulation of State Administration for Market Regulation (SAMR), that coordinates food safety supervision and management, manages the daily operations of the State Council's Food Safety Committee and oversees food safety regulations. At the level of local, food safety regulation is carried out by supervision and management departments of local governments.

As a federal country, the United States has both federal and state regulations to address food safety issues. At the federal level, The Federal Food, Drug, and Cosmetic Act (FD&C Act), which is codified into Title 21, Chapter 9 of the United States Code, the Fair Packaging and Labeling Act, and the Nutrition Labeling and Education Act govern food labeling. Based on these acts, the Food and Drug Administration's Center for Food Safety and Applied Nutrition updated the Food Labeling Guide in January 2013. When it comes to oversight, over 35 statutes related to food safety are implemented by over a dozen federal agencies. Four agencies play major roles, including but not limited to the Food and Drug Administration (FDA), part of the Department of Health and Human Services (DHHS), and the Food Safety and Inspection Service (FSIS) of the US Department of Agriculture. More than 50 interagency agreements have been established to coordinate the activities of the various agencies.

In the late 1990s, the European Commission formulated a holistic approach to food safety known as "from farm to fork," which was principally outlined in its White Paper on Food Safety. In 2002,

the European Parliament and the Council approved Regulation (EC) No 178/2002, known as the General Food Law Regulation. This regulation forms the foundation of existing EU food and feed legislation, defining its the fundamental principles, standards, and objectives. It also created the European Food Safety Authority (EFSA), a autonomous body responsible for offering expert guidance on food safety matters to decision-makers. Regulation (EU) No 1169/2011, known as the Food Information to Consumers (FIC) Regulation, was issued by the European Parliament and the Council on October 25, 2011. It mandates the rule of information about food to consumers, specifying general principles and mandatory food information that must be disclosed on the packaging of various food products sold within the EU. Additionally, Regulation (EC) No 1924/2006, issued on December 20, 2006, specifies the rules for claims about nutrition and health on food products. In terms of regulation, the EU's structure is unique. Although the European Food Safety Authority (EFSA) oversees food safety trends, publishes scientific reports, and provides advice, the European Committee for Standardization (CEN) develops and publishes technical standards for food labeling to guarantee the precision and consistency of label content. However, the actual f regulatory measures and enforcement for food safety are carried out by national regulatory agencies in each member state.

In summary, due to differences in political structures and national conditions, food labeling regulations and regulatory agencies vary across countries and regions. As a centralized country, China's provincial and municipal governments do not have legislative power and must follow the food labeling regulations set at the national level. In contrast, as a federal system, the United States allows each state to formulate its own food labeling regulations based on local dietary habits and cultural traditions, in addition to following federal laws. These regulations complement each other, providing more detailed guidance for producers and a basis for enforcement by regulatory agencies. The European Union has strict food labeling regulations and an independent body that provides food safety advice for legislation. However, as a regional international organization without national sovereignty, the enforcement of food labeling regulations still relies on the member states themselves.

4. Comparative Analysis of Labeling Regulations

4.1. Infant Formula Labeling Regulations in China, the United States and the European Union

In the preceding section of this article, the author conducted a comparative analysis of food labeling laws, regulations, and the legislative and enforcement bodies across three countries and regions, with a particular emphasis on infant formula labeling. As a primary nutritional resource for babies alongside breast milk, baby formula is subject to stringent regulations across various countries.

In 1981, WHO and FAO issued the Codex Alimentarius CXS 72-1981 as a worldwide standard for infant formula and formulas for special medical purposes intended for infants. Building upon this standard, China, the United States, and the European Union have each developed their unique infant formula labeling standards. These encompass, but are not restricted to the guidelines for infant formula under GB 13431-2013, General Rules for the Labeling of Prepackaged Food for Special Dietary Uses, and GB 10765-2021, General Rules for Infant Formula in China; Regulation (EU) 2016/127, which supplements Regulation (EU) 609/2013 with detailed compositional and labeling standards for infant formula and follow-on formula in the European Union, despite being a non-legislative act; and Title 21 of the Code of Federal Regulations, which contains the codified federal laws and regulations that pertain to food, and "Labeling of Infant Formula: Guidance for Industry" in the U.S.

Overall, the differences in vital nutrients such as minerals, vitamins, and proteins among countries and regions are minimal, as they largely adhere to the Codex Alimentarius guidelines and adjust based on national physiques, living environments, and dietary habits. However, there are variations in how

this information is presented. According to the Codex Alimentarius Standard for infant formula and formulas for special medical purposes intended for infants (CXS 72-1981), labels should indicate the caloric content, protein, carbohydrates, fat, vitamins, and minerals per 100 grams of formula powder, and provide this information per 100 milliliters of ready-to-use liquid formula to help consumers clearly understand whether the nutrients provided meet the required standards. In the United States, the Code of Federal Regulations stipulates that formula labeling must include, in a specified order and tabular format, the number of fluid ounces supplying 100 kilocalories, as well as the amounts of nutrients provided per 100 kilocalories, such as protein, fat, carbohydrates, linoleic acid, vitamins, and minerals. In the European Union, Commission Delegated Regulation (EU) 2016/127 requires that infant formula and follow-on formula should be indicated per 100 milliliters of the product prepared according to the manufacturer's guidelines.

4.2. Compound Ingredients

China, the United States, and the European Union all follow the Codex Alimentarius requirement (CXS 1-1985) of the FAO and WHO to list ingredients in descending order of quantity. While their regulations on the declaration of raw materials and auxiliary ingredients are largely consistent, there are significant differences regarding the infant formula labeling of compound ingredients.

In China, GB 7718-2011 stipulates that if a compound ingredient has an established national, industry, or local standard and constitutes less than 25% of the total food, its separate components do not have to be specified. However, the Codex Alimentarius requires that if a individual ingredient (excluding food additives that perform a technological function in the final product) shall be listed when its compound ingredient consisted more than 5% of the food and its name is established in a Codex standard or national provision. The European Union's standards are even more stringent, stating that when the component of the compound ingredient is defined in current Union legislation, and the compound ingredient consists more than 2% of the final food, the list of ingredients for that compound ingredient is mandatory (Regulation (EU) No 1169/2011). In the United States, the Code of Federal Regulations states that there are two permissible methods for listing compound ingredients on food labels: either by listing the compound ingredient's common name followed by its components in parentheses or by incorporating each component of the compound ingredient directly into the ingredient list in order of their proportion.

4.3. Allergen

Allergen information is a crucial part of food labeling, especially for individuals with food allergies. According to the World Health Organization, approximately 200 to 250 million people worldwide suffer from food allergies[14]. The overall prevalence of food allergies in China is lower than in Western countries due to differences in genetics and dietary habits, resulting in some differences in common allergens. Consequently, China's allergen labeling regulations are relatively less stringent compared to those of the European Union and the United States. China's allergen labeling follows the scope outlined in the Codex Alimentarius but with some modifications.

In China, the primary allergens that must be labeled include gluten-containing cereals and their derivatives, crustaceans and their derivatives, fish and fish derivatives, eggs and egg derivatives, peanuts and their derivatives, soybeans and their derivatives, milk and dairy products, as well as nuts and nut derivatives. If these foods or their products are likely to be introduced during processing, it is advisable to include a warning near the ingredient list (GB28050-2011). However, sulfites present in concentrations below 10 mg/kg do not need to be disclosed. In the United States, allergens are regulated by The Food Allergen Labeling and Consumer Protection Act of 2004 (FALCPA, or Title 2 of Public Law 108-282). The European Union's allergen labeling regulations are more detailed

compared to those in China and the United States. Alongside the nine allergens mandated by the Codex Alimentarius, the EU requires the labeling of five additional allergens: celery, mustard, sesame, lupin, and mollusks and their products (Regulation (EU) No 1169/2011).

4.4. Food Additives

Food additives are substances mainly incorporated into processed or mass-produced foods for technical reasons, such as enhancing safety, extending shelf life, or modifying sensory properties.

According to the Codex Alimentarius, food additives that fall within specific classes and appear on the list of permitted food additives must be labeled with their functional class along with their exact name or an approved numerical identifier. This includes the names of the functional classes and the International Numbering System for Food Additives (CXG 36-1989), as required by national legislation. In the United States, the Code of Federal Regulations mandates that the common or usual name of food preservative and its function must be listed in a compliant format for food chemical preservative. For instance, terms such as “preservative,” “to retard spoilage,” “a mold inhibitor,” or “to help protect flavor” should be used in the ingredient list. Additionally, the European Union requires that food additives and food enzymes be identified by their category, followed by their precise name or, when applicable, their E number (Regulation (EU) No 1169/2011). China's regulations for the labeling of food additives allow for greater flexibility in labeling requirements. According to the General Rules for the Nutrition Labeling of Prepackaged Foods, the generic name of a food additive can be labeled as the specific name of the additive, or as the functional category name along with either the precise name or the International Numbering System (INS) code.

5. Conclusion

In conclusion, there are differences in both legislation and enforcement regarding prepackaged food labeling regulations between the United States, China, and the European Union. In the United States, federal and state laws work together to guide the actions of local food manufacturers and consumers, while also providing a regulatory framework for the Food and Drug Administration at the federal level and the Food Safety and Inspection Service at the state level. Compared to the other two countries, the European Union's food labeling regulations are more stringent, with independent institutions providing scientific food safety advice for legislative reference. However, due to the lack of national sovereignty, the regulatory work is carried out by specialized organizations established by individual member states. Regarding specific food labeling rules, significant differences exist among China, the United States, and the European Union, particularly when taking infant formula as an example. These differences include the "ready for use" nutrition claim on the label, the disclosure standards for compound ingredients, the types of allergens, and the way food additives are presented. Additionally, the management of infant formula labels in China is not governed by a separate general rule but is grouped with sports nutrition products under the General Rules for the Labeling of Prepackaged Food for Special Dietary Uses (GB 13431-2013), which regulates the standard for special dietary foods, resulting in more lenient overall supervision. These differences arise not only from the governing nature of each country or region but are also linked to the levels of economic development and industrialization.

China's level of industrialization is lower compared to the United States and the European Union, with SMEs (small and medium enterprises) and individual businesses accounting for more than 90%, constituting the majority of the economy. If the regulations for prepackaged food are set too strictly, many of these businesses may be eliminated due to their inability to meet the standards, which would negatively impact China's economy. However, this presents a negative situation for the domestic market and consumers. Low-quality but compliant food products drive out higher-quality ones,

squeezing their market space, hindering innovation, and affecting the overall impending the growth of the prepackaged food sector. Consequently, domestic consumers are left with only low-quality prepackaged food. Thus, China's policies on prepackaged food labeling need to gradually become stricter in order to promote the industrialization of the domestic food sector and provide consumers with a safer food environment.

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