Aligning Chinese Pallet Standards with International Standards

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Abstract

This paper examines the current state of Chinese pallet standards and their alignment with international standards. It discusses the diverse standards in the Chinese market, the development of national standards, and the specific issues faced by the transportation industry in pallet applications. Finally, it presents conclusions on the future development of Chinese pallet standards.

Keywords: Chinese Pallet Standards, International Standards, Market Diversity, National Standards Development, Transportation Industry Issues

1. Introduction

Pallets are fundamental to the efficiency of modern logistics systems, serving as the critical link between different stages of the supply chain. Their role extends beyond simply supporting goods; they integrate packaging, transportation equipment, and handling systems into a cohesive, streamlined logistics process. The pallet's role as a unit load device facilitates mechanized and automated operations, reducing manual labor and optimizing handling efficiency across warehouses, transportation hubs, and retail environments.
Packaging, whether for transportation or product protection, forms the basic unit of logistics. For optimal efficiency, pallets and packaging must be compatible. Once goods are packaged, they are stacked on pallets, forming a transportation unit that is moved through the supply chain using various handling equipment, including forklifts, cranes, conveyors, and automated systems. This coordination ensures that operations such as loading, unloading, warehousing, transportation, and distribution are mechanized, enhancing overall logistics performance.
The standardization of pallets plays a crucial role in improving logistics efficiency. Standard pallet dimensions and specifications enable seamless integration with various equipment and transportation vehicles, minimizing inefficiencies. The development of pallet standards in China began in the 1980s, coinciding with the nation's rapid economic growth and increasing demand for advanced logistics solutions. The first national standard for pallets, GB/T 2934-1982 "Dimensions and Tolerances of Combined Transport Flat Pallets," marked the beginning of China's commitment to pallet standardization, laying the groundwork for broader improvements in logistics efficiency.

2. Diverse Standards in the Chinese Market

Despite attempts in pallet standardization (Pallet Standards listed in table 1), China's logistics market faces significant challenges. While national standards set basic guidelines for pallet dimensions and tolerances, the actual pallet landscape remains fragmented. In practice, a wide variety of pallet sizes are used, and quality control across manufacturers is inconsistent. This lack of uniformity creates inefficiencies in pallet circulation, complicating logistics operations and increasing operational costs.

Table 1 - Chinese pallet-related standards

	Standard number	Standard name
1	GB/T 3716-2000	Pallet terminology
2	GB/T 16470-2008	Pallet unit cargo

3	GB/T 2934-2007	Main dimensions and tolerances of flat pallets for intermodal transport
4	GB/T 4995-2014	Performance requirements and test selection of common flat pallets for intermodal transport
5	GB/T 4996-2014	Test method for common flat pallets for intermodal transport
6	GB/T 31005-2014	Pallet number and bar code indicated
7	GB/T 33459-2016	Commercial pallet RFID tag application specification
8	YC/T 272-2008	Specification for Application of electronic labels on flat pallets for cigarette intermodal transport
9	GB/T 20077-2006	Disposable pallet
10	GB/T 19450-2004	Paper base flat pallet
11	GB/T 15234-1994	Plastic flat pallet
12	GB/T 18832-2002	Box and post pallet
13	GB/T 10486-1989	Steel rail freight flat pallet
14	GB/T 27915-2011	Built-up plastic pallet
15	GB/T 31148-2014	Intermodal general purpose flat pallet Wooden flat pallet
16	GB/T 30672-2014	Molding flat pallet plant fiber type
17	GB/T 31081-2014	Plastic box-type pallet
18	GB/T 23898-2009	Wood-based panels for wooden flat pallets
19	YC/T 215-2007	Intermodal general flat pallet for tobacco industry
20	SB/T 11152-2016	Service Specification for pallet Rental enterprises
21	SB/T 11153-2016	Specification for Operational Management of pallet sharing systems
22	SB/T 11154-2016	Specification for Quality Acceptance of shared system pallets

One of the most basic national standards in China's pallet industry, GB/T 2934-2007 modified using ISO 6780:2003 “Flat pallets for intercontinental materials handling - Principal dimensions and tolerances”, from its six types of pallet dimensions selected 1200 mm× 1000mm and 1100mm×1100 mm as Chinese dimensions standard.

Table 2 - ISO pallet-related standards

	Standard number	Standard name
1	ISO 445:2013	Pallets for materials handling — Vocabulary
2	ISO 6780:2003	Flat pallets for intercontinental materials handling-Principal dimensions and tolerances

3	ISO 8611-1:2011	Pallets for materials handling-Flat pallets -Part 1: Test methods
4	ISO 8611-2:2011	Pallets for materials handling-Flat pallets -Part 2: Performance requirements and selection of tests
5	ISO 8611-3:2011	Pallets for materials handling-Flat pallets -Part 3: Maximum working loads
6	ISO/TS 8611-4:2013	Pallets for materials handling-Flat pallets -Part 4: Procedure for predicting creep responses in stiffness tests for plastic pallets using regression analyses
7	ISO 12776:2008	Pallets-Slip sheets
8	ISO 12777-1:1994	Methods of test for pallet joints-Part 1: Determination of bending resistance of pallet nails, other dowel type fasteners and staples
9	ISO 12777-2:2000	Methods of test for pallet joints-Part 2: Determination of withdrawal and head pull through resistance of pallet nails and staples
10	ISO 12777-3:2002	Methods of test for pallet joints- Part 3: Determination of strength of pallet joints
11	ISO 13194:2011	Box pallets-Principal requirements and test methods
12	ISO 15629:2002	Pallets for materials handling-Quality of fasteners for assembly of new and repair of used flat, wooden pallets
13	ISO 18333:2014	Pallets for materials handling-Quality of new wooden components for flat pallets
14	ISO 18334:2010	Pallets for materials handling-Quality of assembly of new wooden pallets
15	ISO 18613:2014	Pallets for materials handling-Repair of flat wooden pallets
16	ISO TR 10232:1989	General purpose flat pallets for through transit of goods design rating and maximum working load
17	ISO TR 10233:1989	General purpose flat pallets for through transit of goods performance requirements
18	ISO TR 11444:1995	Quality of sawn wood used for the construction of pallets
19	ISO 16412:2005	Air cargo equipment-Air cargo Pallets-Utilization Guidelines
20	ISO 13194:2011	Box pallets-Principal requirements and test methods
21	ISO 15629:2000	Pallets for material handling-Quality of fasteners for assembly of new and repair of wooden

Among the most widely used ISO standards listed in Table 2, the ISO 6780:2003 Flat pallets for intercontinental materials handling-Principal dimensions and tolerances clause 4.1 specifies six pallet sizes, reflecting the varying pallet preferences across different regions. The various pallet sizes stipulated are the result of compromise balance in major industrial countries, and logistics developed countries have their own mainstream pallet sizes as shown in Table 3.

Table 3 - pallet standards used in different region

ISO Standard Dimensions	Europe	North America	Asia Pacific
1200×800mm	✔		
1200×1000mm	✔		✔
1140×1140mm			✔
1219×1016mm		✔	
1067×1067mm		✔	
1100×1100mm			✔

3. Transportation Industry Issues with Pallet Applications

China’s pallet usage remains highly localized and inefficient. The scope of pallet use is often confined to internal movements within manufacturing or retail operations, limiting their utility across broader logistics networks. A significant challenge is the inefficiency of pallet return systems: after goods are unloaded, pallets are often left on trucks, requiring additional trips and manual labor for return transport. This results in wasted resources and underutilized pallet capacity, particularly during peak shipping periods when pallet shortages occur, while in off-peak seasons, pallets remain idle.

Because the implementation of the national standard of pallets is not enough, and even some enterprises blindly and randomly adopt the phenomenon of foreign pallet standards earlier, there are more than 30 kinds of pallets in circulation on the market. These pallets are produced in accordance with the national standard, there are enterprises self-made according to demand, and there are import enterprises left over when importing goods from abroad, the sources are varied, the specifications are very different, it is difficult for circulation.

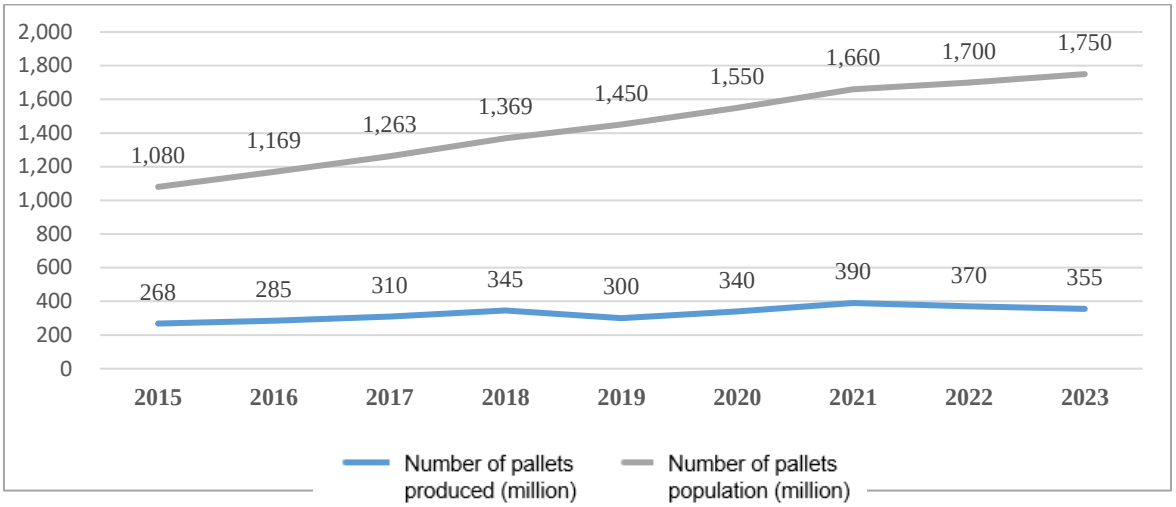

Figure 1 – Output of China's pallet industry from 2015 to 2023

Figure 1, showing the growth of China's pallet industry between 2015 and 2023, highlights a gap in China's pallet usage relative to its logistics needs. This disparity is partly due to the diversity of pallet types in circulation, which makes the efficient management and sharing of pallets difficult.

Internationally, the utilization of standardized pallets serves as a key indicator of a country's logistics development. For instance, in Europe, over 90% of pallets used are standardized, whereas in the United States, approximately 60% of pallets meet industry standards.

In contrast, China's per capita pallet ownership remains low, with the country possessing only 1.2 pallets per capita as of 2023, far below the figures for developed countries like Japan, South Korea, the United States, and many European nations.

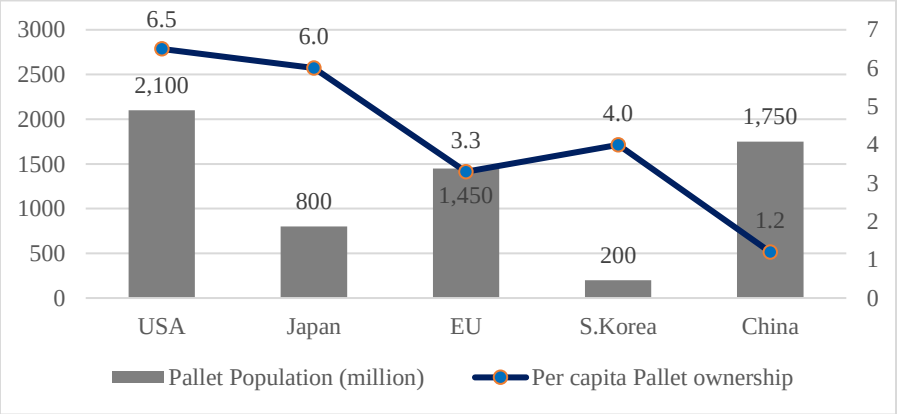

Figure 2 – Per Capita Pallet Ownership Comparison

If we look at the recycling process of pallets, the development of the Chinese market is also limited, and the material and price of pallets directly affect their durability and recycling applications. Wooden pallets have cost advantages. Most enterprises buy their own wooden pallets, the price of wooden pallets is about 150 yuan, but the price of plastic pallets is more than 250 yuan. The circulating pallets are mainly plastic, durable and easier to recycle, but the high rental recovery price, especially the non-unification of pallet standards, hinders the wide range of pallets.

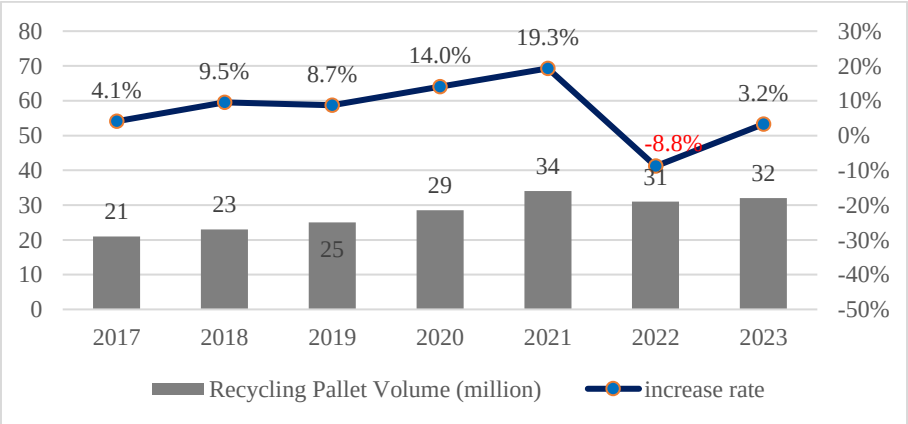

Figure 3 – Recycling Pallet Marekt Size

There is another dimension that affects the expansion of pallet application scope, which is the width dimension inside the truck. Europe and the United States and Japan truck inner width are different, the United States truck is 2510mm, the European truck is 2438mm width, Japan's largest truck inner width is 2350mm, which is why the three regions with three different pallet systems, different countries are based on their own truck compartment design of the pallet system. The pallet is to adapt to the truck. The common application of multi-standards from all over the world into China has also led to the failure to maximize the loading efficiency of truck pallets, further limiting the application and promotion of pallets. The 2016 version of GB1589 has increased the width of Chinese trucks to 2500 mm to accommodate parallel loading of 1200mm width pallets; But at the same time, it will also cause a waste of space for loading 1100mm width pallets. It is urgent to unify the tray size standards.

4. Development of National Standards

Efforts to refine China’s pallet standards have been ongoing for decades, with the most recent revisions aiming to streamline pallet sizes for greater compatibility with packaging modules and transport equipment. GB/T 2934 new draft outlines the adoption of two primary pallet sizes: 1200mm × 1000mm and 1200mm × 800mm. These sizes align with international standards and support efficient loading on trucks, particularly in the context of China's growing infrastructure.

4.1 Advantages of 1200×800mm and 1200×1000mm Pallets

- Alignment with National Packaging Modules: According to CFLP survey data, the market share of 1200mm×800mm pallet is 19%, which has the highest market share of all dimensions. And the market share of 600mm×400mm packaging module is about 32%. The 1200×800mm pallet size is especially compatible with the increasingly popular 600×400mm packaging module (Illustrated in Figure 4). This alignment makes it easier to load goods manually or automatically, improving operational efficiency across various industries.

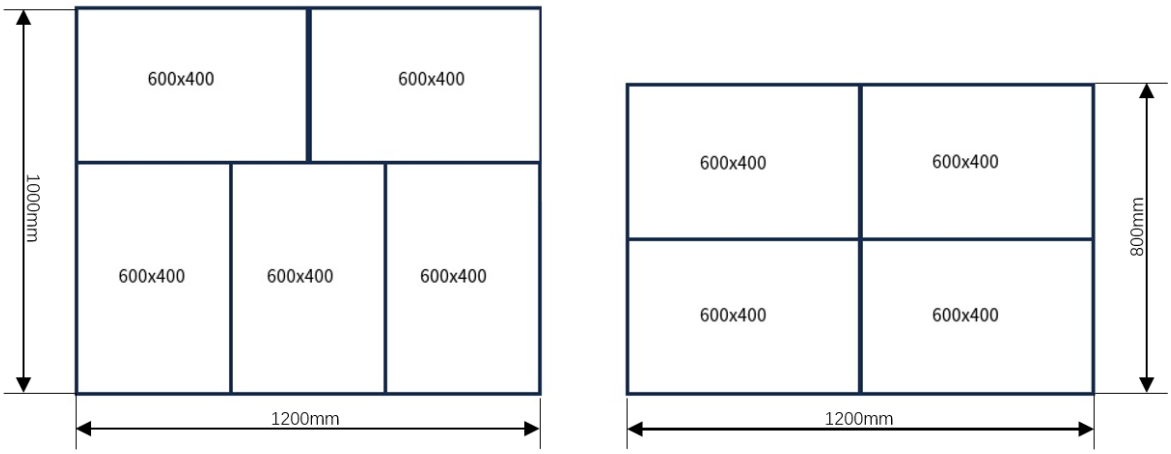

Figure 4 – Pallets of 1200mm × 1000mm and 1200mm × 800mm can hold 5 and 4 600mm × 400mm Standard Package boxes, respectively

- **Global Compatibility**: The 1200×800mm pallet is widely used in Europe (occupies 80% of the European market share), and its adoption in China will help integrate domestic operations with international logistics networks. This standard is well-suited to China's infrastructure, with roads and vehicles designed to accommodate such pallets.
- **Better Space Utilization**: The adoption of the 1200×800mm pallet ensures optimal use of truck space. China's vehicles, roads and other infrastructure equipment is highly like the situation in Europe, the maximum width of the road single lane is 3.75m. According to China's GB1589-2016 standards, which govern vehicle dimensions, this size pallet is perfectly suited to the maximum width of standard freight vehicles, ensuring high load density and reducing wasted space.

4.2 Reasons for Phasing Out the 1100 mm ×1100mm Pallet

The 1100×1100mm pallet, once considered for standardization, faces several challenges:

- It does not align with China's primary packaging modules, leading to inefficiencies in transportation.
- It is less compatible with China's standard truck sizes, further reducing loading efficiency.

1100mm×1100mm pallet has not been promoted by the industry for nearly 10 years, and the practical application is only suitable for the import and export of the Asia-Pacific region and the corresponding domestic factory business, accounting for a very small proportion.

By focusing on these dimensions, China can further align its pallet system with international standards, particularly those prevalent in Europe, which uses the 1200×800 mm pallet in approximately 80% of the market. Furthermore, the 1200 mm pallet size matches China's truck specifications, allowing for better space utilization and enhanced transportation efficiency.

In addition to the standard selection of mainstream specifications, the Ministry of Commerce, the Ministry of Finance, the National Standards Committee around the Beijing-Tianjin-Hebei, Yangtze River Delta, Pearl River Delta region and the Yangtze River Economic belt extension, select 32 cities to carry out logistics standardization pilot, the pallet and upstream and downstream facilities and equipment standardization transformation to give financial support.

In addition, after the Ministry of Commerce and the National Standards Commission issued the "14th Five-Year Plan" for the standardization of Domestic Trade circulation, the Ministry of Commerce and other five departments issued the "14th Five-Year Plan" for the development of commercial logistics. The plans are expected to streamline pallet circulation and improve the overall efficiency of China's logistics network.

5. Conclusion

It is expected that GB/T 2934 will be updated and implemented by 2025, leading the industry to adopt the 1200mm × 1000mm and 1200mm × 800mm sizes as the mainstream. This will significantly promote the circulation and sharing of logistics vehicles, gradually establishing a national pallet-sharing system. This system will be coordinated regionally and will support the development of uniform logistics practices. Furthermore, to avoid that packaging design is based on outdated pallet standards, such a national unified standard is of paramount importance.

The adaptation of these pallet standards will have significant implications for the composition of China's truck fleet. The promotion and widespread use of recycling, especially with European standard pallets, will help standardize logistics vehicles. This will reduce the proportion of non-standard trucks, increase the use of standardized vans, side-curtain vehicles,

and trailers, and improve the overall efficiency of the logistics industry. The result will be substantial energy savings and carbon reductions.

By 2030, it is projected that 200 million pallets will be recycled through sharing systems, with the recycling rate increasing from 10% to 25%. This growth, coupled with the adoption of international pallet standards, will help China bridge the gap with the more advanced pallet-sharing economies of Europe and North America.

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