Basket, Barrel and Box: The Secret Role of Crafted Wooden Containers in the History of Marketing

Diana Twede, Michigan State University, School of Packaging, USA

This paper explores the use of fabricated wooden shipping containers and shows examples of how they have facilitated trade and logistical activities throughout history. The construction and use of baskets, barrels and boxes is described. The study finds some universal principles of shipping container design:

- Geometry maximizes cube utilization and facilitates blocking and bracing in transit (and the shapes reflect the different shapes of the relevant transit modes).
- Trade associations cooperate to set standards for quality control.
- Trade associations cooperate with government to regulate standards for net contents (sales unit quantities upon which markets are based).
- Printing and graphics are used to identify product and "brand."
- Shape and weight facilitate material handling productivity.
- Construction protects from handling and transit forces.
- Shelf life of food products can be extended.
- Materials and technology are readily available and low cost.
- Containers are widely reused or recycled.

Keywords: basket, barrel, box, container, wood, marketing history, packaging history

It is easy to overlook the role of packaging in human history. Even in today's advertising-saturated culture, packages do not play a central role, but exist only in the service of more strategic marketing concerns. This is particularly true for shipping containers, which humbly serve cloaked in brown anonymity.

The purpose of this paper is to illuminate a more romantic view of the history of shipping containers in Western Civilization, focusing on packages made from wood, one of the earth's most plentiful renewable resources. Furthermore, this historical survey from a present-day packaging perspective seeks to discover universal principles of shipping container design.

There is no secret about boxes, barrels and baskets themselves. Their constructions are no mystery, and some of the basic techniques will be reviewed. The paper begins by showing that baskets are one of the earliest forms of packaging. The second section about barrels describes their construction, trade guilds and significance to 2000 years of trade. The last section explores wooden boxes, from tea chests to World War II.

The real secret is that, as has been revealed in previous CHARM meetings, marketing activities have existed throughout human civilization...and so have packages. Packages are among the artifacts that bear witness to marketing activities.

**BASKETS**

Wood and fibers are among the oldest packaging materials. When humans began to use reeds, leaves and clay as packaging materials, they also began to use hollowed out pieces of wood and gourds. Soon the use of wood and fibers extended to the weaving of baskets.

Baskets are older than the weaving of cloth and more ancient than the early ceramics. The interlacing of twigs into baskets first occurred during the neolithic period, contemporary with the first arrowheads (Bobart 1936). Early men and women used baskets for gathering food, carrying goods, and for ceremonial and decorative purposes.

Evidence of early basket use can be found in all parts of the world. However, very little ancient basketry remains because of its tendency to biodegrade. Baskets as artifacts have been found primarily in arid places. Since baskets were used to mold clay vessels before the invention of the wheel, some pottery artifacts show their imprint.

The earliest remains have been found in Egypt (10,000-8,000 BC) and the North American Southwest (about 9,000 BC). These artifacts show that basketry was already a well-developed technology at that time and...
suggest that it may have been a technology brought by the very first human migrants to the new world (Adovasio 1996).

There is plenty of evidence of early baskets from secondary sources. The first Sumerian priest-king of Babylon in 3,000 BC was depicted carrying a basket on his head. The Greeks employed sacred baskets in religious ceremonies, one of which was a shovel-shaped harvest basket. “Corn mother” harvest festivals from Egypt to Rome to Peru to Borneo employed the basket symbol. Baskets in the Bible include a basket made of twigs for carrying bread to the priests, baskets used for gathering grapes and other fruits, containers for carrying clay to brick-kilns, Moses’ papyrus reed cradle, and the basket in which St. Paul escaped from Damascus (Bobart 1936).

The Middle English word basket is said to come from the Latin bascauda which meant an “English basket.” Bascauda were valued highly by the Romans: “In no other manufacture did our British ancestors excel so as to obtain for their productions a similar distinction.” (Anthon 1850, 140).

During the middle ages in London, basket-making was one of the predominant crafts, and the basket-makers’ craft guild was one of the 111 guilds listed in 1422 under the reign of Henry V. London established laws (under Mayor Dick Whittington) that required that bread be sold from baskets and that fish baskets must be sound and each hold only one kind of fish. The Basketmakers’ Company (many gilds went by the name of “company”) was officially established by an Order of the Court of Mayor and Aldermen of the City in 1569, the authority under which it still exists. Its coat of arms includes a wicker cradle. Basketmaking was so significant that, in early eighteenth century London there were two Basket Alleys, five Cradle Alleys, five Cradle Courts and an Osier Lane, and Pannier Alley was a place where the bakers sold their bread in panniers (Bobart 1936).

**Basketry Packages**

Basketry has much in common with their fellow packages throughout history. They were made from the least costly materials available. Whatever suitable fibrous material was at hand could be used, ranging from parts of a tree—twigs, split wood strips, leaves, palms, bark, roots and willows (the Roman osier)—to grasses, reeds, straw and bamboo. Furthermore, the techniques of twining, coiling and plaiting were a well-developed craft; basket-work was used for other household and functional items as complex as shields and other military equipment used by the Greeks, daub-and-wattle (mud applied to a woven structure) buildings of the Celts, wicker-work carts used by the Gauls and wicker-and-hide boats used by the Britons.

Like other packages, form followed function. Basketry’s flexible construction methods invite variations in shapes and styles. Creative basketmakers developed many designs that were cleverly adapted to each use.

Most of the packaging functions served by early baskets were related to food. Hunters and gatherers used baskets for collecting the food that they found and for carrying leftovers to the next nomadic location. The transition to crop cultivation was accompanied by the development of special baskets for seeds, harvesting, winnowing, sifting and storage, with different shapes for each activity. For example, harvest baskets must be large; winnowing baskets are shallow; and storage baskets are tightly woven with lids (Sentance 2001).

Baskets played an important role in distribution from the very earliest trading and markets. Traders carried goods to market in baskets designed to be lightweight and ergonomic. Some baskets were designed be balanced atop a person’s head, shallow with a low center of gravity. Others were designed to be carried on a person’s back; in the interest of stability they were longer than wide, and they had straps that were supported by shoulders, chest or forehead. Pannier baskets carried by a beast of burden usually came in a pair, one slung over each side. The first “crates” used for shipping were wicker hampers (the word, like “cradle,” derived from the Roman cratis). Glass and ceramic vessels were sometimes reinforced by basketry. (Sentance 2001)

Baskets used for display in markets were (and still are) shallow to allow a clear view of the produce. Baskets used by shoppers to carry home the goods had/have handles that can be carried with a hand or an arm.

Baskets are still used in some supply chains that are short and local, where the baskets are re-used. In less developed parts of the world, baskets are still used for fresh food ranging from melons to live chickens. The familiar bushel basket made from splints of wood, is still widely used to harvest and bring fresh produce to US farmers’ markets. The basket names bushel and peck (1/4 bushel) have long been used in England and the US as a standard unit of measure for marketing purposes.

In our mass-produced injection-molded society, craft-made baskets are no longer the low cost package. One might be grateful that human labor has gained more value than to be used for menial basketweaving. On the other hand, there is also a sense of something lost. Basketmaking conveys a surprisingly primitive, and maybe even a little terrifying (Highsmith 1972), feeling of connection to ancient crafts that have been carried on for so long by and for the human race. One scholar expresses regret for a simpler craft-made age:

In a sense, we have always been a throw-away society. The difference is what we throw away now. As little as fifty years ago, if it was not in a can, everything was packaged in paper or basketry. Many things, from yeast to field-gun cartridges, were packed in a basket. The baskets were made from extensive renewable sources, the atmosphere was not polluted by their production and, when the basket
was thrown away, it rotted down and helped enrich the soil. It is time we confronted our indulgent devastation of our world. Perhaps if more of us were to learn an honest craft like basketmaking, our eyes would be opened and we would become more sensitive to the precarious balance of our environment (Sentance 2001, 15).

The romance of basket weaving and basket uses are easy to understand. There is a sort of feminine harvest goddess aura about baskets. Barrels, on the other hand, have a decidedly masculine, almost brutish character. But they are no less romantic in their own way.

**BARRELS**

The first wooden barrel was probably made from a hollow log, with tightly-drawn animal skins covering both ends, like the musical drum instrument. The first recorded use was by Armenians shipping wine down the Euphrates River to Babylon, “wine, stored in casks made of the wood of the palm tree,” documented by Herodotus in 500 BC.

Wooden barrels made from staves as we know them, were invented during the time of the Romans and have been in common use for over 2000 years. Barrel-making may have developed concurrently with ship building technology. Materials, modes of construction and tools are similar: thin slabs of wood, bent to curved shapes and bound together (Elkington 1933).

For the Romans, barrels began to serve as substitutes for an older type of shipping container, clay transport amphoras (T’wede 2002). They were used to ship wine and olive oil from the northern parts of the Empire where wood was a more abundant natural resource than clay. They had the advantage of being convenient, light, easy to transport, and not subject to breakage like pottery. Pliny reports of a beer-like drink made from barley, kept by the Gauls (in the Alps) in wooden vessels bound with hoops.

Strabo, the Roman geographer, also mentioned wooden barrels used by the Gauls. Roman remains from the province of Germania, have revealed wooden barrels, casks and pails used for beer. (Hankerson 1947).

By the time of the crusades, the barrel was a standard package. Barrels carried many of the supplies of the Knights. In the Middle Ages and the early Renaissance, the most common cargo, especially in the Mediterranean where most sea trade was conducted, was wine in wooden casks, called tun, which became a standardized unit of volume measure for the purpose of marketing and import tax collection. (The derivative "ton" measure has, over time and various circumstances, indicated either weight or volume.) In the mid-13th century, princes along the Rhine had contests for who could make the biggest most ornately carved barrel. The largest and most famous is the Heidelberg Tun, filled for the first time in 1752 with 50,000 gallons of wine. (Hankerson, 1947)

**Barrel Technology**

For the 2000 years that preceded modern material handling and retailing, barrels offered many unique advantages. They employ one of the strongest building principles in engineering: the principle of the double arch. When a barrel is viewed from the head, each stave acts as a keystone in the arch construction, supported by the other staves as a base. When a barrel is viewed from the side, the stave is the keystone, supported by the two heads as a base. Because of its shape, the barrel is “one of the strongest containers known to man.” (Hankerson 1947, 32)

Its round bulging shape also endows it with unique handling characteristics: the ability to roll, making it a container with a built-in wheel. Although a single person can typically carry less than 100 lbs, he or she can roll a much heavier barrel, up to several hundred pounds. Because of the bilge construction, only a small surface comes in contact with the floor, reducing friction to a minimum so that it will roll and pivot easily, especially down an incline. It is easy to upend because the chime is a natural handle by which it can be grasped and rocked back and forth on its bilge until it rocks into an upright position (Hankerson 1947). They can be transported on a simple wagon chassis, and they are easy to load into a ship using simple fixtures for rolling or lifting.

They also fit nicely into ships’ holds, on side with the bung hole up and the heads pointing fore and aft. A second layer is laid in a “bilge and cantline” pattern, with the bilge of the barrel above resting in the space between the four barrels below it so as to minimize the use of space (Taylor 1920).

There are two basic types of barrels: tight and slack. Tight barrels are designed to hold liquids, heavy products, and explosives. Slack barrels are for dry goods.

Making a barrel tight is a skill requiring great precision. Woods like white oak and Douglas fir are most often used, because they resist soaking, are hard enough to resist abuse and yet soft enough to form into the barrel shape. A tight barrel’s staves are quarter sawed, making them parallel to the log’s medullary rays, a hard fibrous membrane radiating out from the center of the tree and therefore impervious to seepage. The edges are cut so that the staves are slightly wider in the center and so that one face is slightly narrower than the other. One of the staves is drilled with the bung hole through which the barrel will be filled (it will be closed with a cork or wooden plug). The staves are set in a form that is tight on one end and then steamed to soften them. They are drawn together into the conventional barrel shape (with a slightly bulging bilge) and held in place with heavy iron hoops (originally the hoops were made from wood). At this point, some barrels for wine or bourbon are slightly charred to give a distinctive taste to the contents. The formed barrel is then fired to dry and shrink the wood and set the staves in shape. After cooling, the hoops are hammered towards the bilge in order to press the staves.
CHARM 2003

more tightly together. Next are cut the chime, a bevel on the end of the staves, and the croze, a groove into which the heads will fit. The circular heads are cut with a beveled edge and inserted into the crozes. The last step is driving on the head hoops which complete the tight head package. (Hankerson 1947) The quality control test was to partly fill the barrel with boiling water and roll it around, creating a powerful steam that finds its way through flaws in workmanship or the wood (Howard 1996).

Two of barrels' most important roles in marketing history were standardization of net contents and differentiation of products. There were several standard sizes, some specific to their contents. And although this paper uses the word barrel to refer to them all, there are special (often colorful) names for each. In tight cooperage, sizes up to 25 gallons are called kegs, and those between 25-60 gallons are called barrels. Those above 60 gallons are known as casks, butts and hogsheds. “The whole hog” originally referred to the hogshed’s quantity “sufficient for a gentleman’s drinking for three months” (Coyne, 1940). Other once-standard styles were called pipe, puncheon, piggin, firkin and tierce, each with a specific use and market.

Slack barrels for dry products are much less precise. They can be made from a number of different woods such as gum, elm, cottonwood, basswood and pine. Slack barrels are formed in the same way as tight barrels, except that the staves are thinner and do not need to be cross sawed. Some have tongue-and-groove joints, designed to be sniffproof for holding powdered products. The heads are usually made from more than one piece. They can be bound with hoops made from metal, wire or wood; the choice depends on the contents’ weight and consistency, as well as the rigors of distribution. Slack barrels are opened by removing one head (one carefully drives the top hoop halfway off and taps the multi-piece head into the barrel) which is carefully replaced after filling. There were a number of standard styles and sizes for specific commodities like dry powders, meat and poultry, glass and pottery, potatoes, apples, fish, biscuits, vegetables, nails and spikes, heavy weights and explosives. (Hankerson 1947)

The head of the barrel usually held the identification for the contents. They were printed or branded with wood burning equipment. The brand often contained the manufacturer’s name and a stylized logo. This may be the source for our marketing use of the words brand packaging.

Making a barrel takes not only skill to precisely cut and fit the staves, but it also requires brute force to hammer the hoops into position. Barrel makers are called coopers, and they have the reputation for working hard and drinking hard, especially those affiliated with the use of barrels for alcoholic beverages (Gilding 1971).

The Coopers of London

Barrel supply in Medieval England was cooperative in a packaging supply market that was highly organized. It was a regulated market, the result of a partnership between the government and the barrel makers. This was an important factor for institutionalizing net contents standards. There was some vertical integration, but that was regulated too. There has long been a close relationship among such packaging suppliers and between them and the government, especially for purposes of standardization.

In the middle ages Coopers’ gilds (also spelled guilds) formed all over Europe. The first trade unions (and the first trade associations), such medieval gilds oversaw the training and apprenticeship of young tradesmen ranging from masons to weavers. By means of their Royal Charter, they used the government’s authority to set standards. The gilds had monopoly power to seize and condemn imported merchandise. As suppliers of factors of production, cooperers were not one of the most powerful gilds in the city compared to those like vintners and grocers which were closer to the market. Their members’ operations were also further from the city and its power. Like the Brewers, they were spatially distributed outside the city limits. (Hotchkiss 1938, Unwin 1908 and Ward 1977).

The history of the Worshipful Coopers Company of the City of London (Elkington 1933 & Foster 1944) is typical of the minor gilds. The first record of the London Coopers was a 1296 notation of the levying on them of a collective fine or tax. In the next two hundred years there were stock seizures, fines for fighting, and the institution of an inspection and certification regime to combat fraud and imports. A 1420 city ordinance required every cooper to brand his barrels with a distinctive mark registered at the Gildhall. In 1501 a Royal Charter granted by Henry VII incorporated the Coopers as a fraternity-in-Gild for ever. The gild was most active in the 1500s and 1600s, when it lobbied to raise the government’s fixed price, fought vertical integration whereby brewers tried to employ more than two of their own cooperers (the legal limit), and supported the rebellion against the King by the Lord Mayor of London and Parliament.

The Worshipful Coopers Company of the City of London (which still exists) standardized the hogshad at 52.5 gallons and wine barrel at 31.5 gallons under the authority of Richard III, and under Henry VIII they set standards for beer barrels. They also set standards for slack barrels, for products like gunpowder and soap, based on weight.

Their hall has had four incarnations. The first, adjacent to the main London Gildhall, was destroyed by the Great Fire in 1666 and rebuilt on the same location. In the 1700s, gilds like the Coopers lost the power to actively supervise their craft and concentrated on more
ceremonial and collegial activities, and by the 1800s they were reduced to internal political squabbles and leasing out their hall to raise funds. The second hall was torn down and modernized in 1865, and its successor was destroyed by incendiary bombs in World War II. The current Coopers' Hall location is in Devonshire Square, where the members engage in charitable work. Only a handful are still affiliated with making barrels (including steel and plastic drums).

Some gild traditions, like commemorating the completion of an apprenticeship, continued into the 20th century. The education and apprenticeship of these packagers was as comprehensive in its way as our modern packaging education, but the graduation ceremony, called the "Trusso" was a little more bizarre. As a final exam, the apprentice is required to make a cask by hand (even in the days of mechanization), the process graded by a Master Cooper, a member of the coopers' union and a gild member. While the barrel was still smoking he was placed inside of it, doused with water, shavings and ashes poured on his head, and then the barrel was rolled down the street with the cooper still inside. The procession ends at a party where he "dispenses hospitality" and receives his certificate of service (Elkington 1993, Hankerson 1947 & Gilding 1971).

The history of the London coopers illustrates the widespread nature of the trade. There were specialty coopers dispersed throughout the city and suburbs, usually making barrels for a single product like beer, flour or fish. There were legions of coopers working throughout supply chains, repairing (recopering) barrels whenever they leaked. Ship’s coopers kept the cargo in sound condition; dock coopers supervised the quality of the cargo as it was unloaded and bond coopers inspected cargo stored in customs warehouses and vaults. “Sound condition” was an apt description, because a cooper could tell, just by the sound of a mallet tap, whether a barrel was full (Gilding 1971).

The largest number of coopers in London were concentrated in the East End. They were affiliated with the docks and the wine vaults adjacent to Tower Hill where there is still a street called “Coopers Row.” Here, imported wine and spirits were stored in barrels, and then bottled on demand. An account in the mid 1900s describes some of the colorful "unofficial practices" in the vaults, where the coopers were the resident royalty, holding court as they served wine or rum to their longshoremen friends. The libations were either drawn from full barrels with hoses ("sucking the monkey," a phrase that goes back at least to Chaucer's time) or were made by pouring boiling water into a "fresh empty" barrel and thus extracting the "bull" (Gilding 1971).

Gilds like the coopers' paved the way for trade unions and trade associations. Just as the gild began its decline to more of a social organization in the 1800s, the craftsmen embraced the trade union movement after the repeal of the Combination Acts in 1824 (Pattison 1969).

While the unions took care of the workers, the work of standardization and organizing the industry moved to a higher level. Thus, trade gilds were also the forerunners of our modern trade associations, institutes and standards organizations.

Barrels in America

Across the Atlantic, cooper's were likewise hard at work, although they were less organized. The American colonies were supplied with goods packed almost entirely in barrels. The Nina, Pinta and Mayflower were stocked with casks of water, biscuits, meal, meat, vegetables and gin. The Mayflower hired America's first cooper (John Alden) to come with them and bring cooperage tools so that the pilgrims could make the essential packages themselves.

Colonization stimulated the demand for barrels. The colonists needed fish, meat, sugar, tobacco, shoes and hardware. More colonists came, and they made new products like soap, butter, candles, cider and syrups (Howard 1996). Each new product created a new demand for barrels and cooper’s. The relatively high rate of pay in the Colonies brought many adventurous immigrant craftsmen from England, Holland and Sweden. In 1639, it only cost 5 £ to book passage to the Colonies where pipe staves sold for the extraordinary price of 18 £/thousand (Coyne 1940).

Barrels were especially necessary for export. The first ships returning to England carried back barrels of salted codfish, which quickly became a high demand delicacy in the Catholic part of Europe because of no-meat days declared by the Church. American tight barrels carried two-thirds of the high volume "triangle trade," bringing molasses from the Caribean islands to Boston and Newport where it was distilled into rum which, in turn, was carried in barrels to Africa and other destinations. Exports of rice and Virginia tobacco stimulated the earliest demand for slack barrels. The colonies even exported staves to be fabricated into barrels in England, Ireland, Spain and Portugal. (Coyne 1940).

Whale oil, used for candles and lamps, was another important early American commodity. The whales were "processed" and barrels were filled on board ship. Most whalers employed their own ships' cooper to assemble, maintain and repair the casks on board (Howard 1996). Melville (1851) concludes his description of on-board whale oil processing, by:

...singing, if I may—the romantic proceeding of decanting off his oil into the casks and striking them down into the hold, where once again leviathan returns to his native profundities, sliding along beneath the surface as before: but, alas! Never more to rise and blow.

While still warm, the oil, like hot punch is received into the six-barrel casks; and while, perhaps, the ship is pitching and rolling this way and that in the midnight sea,
the enormous casks are slewed round and headed over, end for end, and sometimes perilously scoot across the slippery deck, like so many land slides, till at last manhandled and stayed in their course; and all around the hoops, rap, rap, go as many hammers as can play on them, for now ex officio, every sailor is a cooper (437).

Barrels supplied the American military, from George Washington’s band of rebels through the War of 1812, the Civil War, and the two World Wars. They appeared in pirate booty and Niagra Falls stunts. They filled the westward wagon trains with water, nails, china, food, oil, gunpowder and beer. They filled the general stores of America with the supplies for frontier life.

The early American cooper was a journeyman in more than skill; he literally journeyed from village to village to work. Staves were made by a laborious hand process of hollowing out the inside and curving the outside with a draw knife and adze. A good workman could produce 2 in a day (Hankerson 1947).

Increased demand for trade in sugar, salt, beer, rum and molasses in large quantities stimulated the development of cooper shops or cooperages. At first they were no more than a shed at the back of a cooper’s house where he and his helpers turned out a few barrels/day. Because they were such an important enabling factor for production, wherever a cooper set up shop, a town was likely to grow (Coyne 1940).

American coopers united in 1833 to organize trade unions, starting with New York, Boston and Philadelphia. Although the panic of 1837 destroyed most unions, the New York union survived and later organized, in 1870, the Coopers International Union. The Union organized strikes to protect workers from the threats of two substitutes: migrant workers and mechanization. In 1871 there were 8,371 members, the second largest union in America (Doyle 1947).

The End of the Barrel Era

Coopering remained a hand operation until 1837 when machinery was first developed for cutting and dressing staves, eliminating the most laborious hand operations. Economies of scale improved even more when the machinery for assembling them was developed over the next 30 years. The “old hand cooper” resented the new technology and the fact that the innovations were funded by the intensely disliked John D. Rockefeller interests.

The first machines were operated by a supplier to the Rockefeller & Andrews Refinery and later the new Standard Oil Company. The discovery of oil in Pennsylvania, New York (later Ohio, West Virginia, California and finally Texas) created a huge demand, and an overnight shortage. Large cooper shops sprang up in the oil regions to get the black gold to refineries and then to market. New and rapidly growing industries like meat packing, brewing, distilling, flour milling and corn products stimulated more growth. The new cooper factories drew a rough sort of man, more skilled in machinery than craft (Coyne 1940).

Mechanization, however, produced barrels of inferior quality. Leakproofness was somewhat improved with glue and other lining materials like silicate of soda (for oil-based products) and paraffin (for water-based products). About 1870, the first tank cars (wooden tanks on flat cars) for oil were developed to replace leaky barrels.

Substitutes for barrels in other industries followed, but not right away. Coyne, in 1940, still salutes them as the “king of packages,” and remembers the turn to the twentieth century as the “hey-day” of bulk shipment with the list of commodities in the hundreds. As late as the 1940s articles on the topic of linings and how to join the staves to better prevent leakage were still common in the trade press (eg. in Barrel & Box & Packages, 1943-7).

For example, flour was still packed in 196-lb barrels in Midwestern mills up until the early 1900s, when wood and woodworkers were plentiful, and there was a lack of textiles made for bags. Every flour mill had a cooperers’ shop, and it often had more cooperers than millers. The switch to bags was stimulated by the invention of the sewing machine which reduced the bag-making cost (Steen 1963), the increased availability of cotton and burlap, and the increased demand for export flour which occurred largely because of improvements in ocean carrier liability and loss prevention care. The container cost, whether bag or barrel, was more than the cost of the labor required to make the flour, but the freight saving for bags was substantial. In addition, the reuse value in London of a bag at that time was greater than that of an empty barrel (Storck & Teague 1952).

But by the early 1900s, bulk packages were losing market share to consumer packages. The cracker barrel was portrayed being as old fashioned and the bottom of the barrel as unsanitary, symbolizing a bygone era. The famous waterproof Uneeda biscuit carton symbolized the birth of the consumer packaging industry, and most retail merchandise quickly moved into consumer packages. Besides the convenient size, consumer packaging offered the great marketing advantage of advertising the brand into the consumer’s home (Twede 1997).

As for bulk packages, oak barrels are still used for aging wine and whisky, and as such are valued for the nuances of flavor that they impart. But most liquid products have long ago moved to alternative semi-bulk shipping container forms, such as steel and plastic drums and tanks, as technology became available. Most dry granular products moved to bags. And for shipping manufactured goods, the better alternative was boxes.
The Romance of Marketing

1973). At 100 lbs net weight, plus the case of lightweight thin walled (albeit lead-lined) wood, tea chests could easily be handled at the port and loaded into ships by the barefooted Chinese stevedores.

Clipper ships were designed for the tightest, soldest stowage possible. This maximized the payload and minimized the amount of shifting in transit as the ship swooped and shuddered under pressure of the sea and sail. The clippers were permanently ballasted with about 100 tons of iron arranged on each side of the keelson. On top of this was laid a layer of clean dry stones, thicker in the center and smoothly leveled outwards to leave an exactly equal height space everywhere below the cambered deck. A pair of workers loaded the chests tightly, chock-a-block, from the outer hatch wings inwards, hammering in the final center chest in each layer as if it were a keystone of the arch, with a wooden mallet (Scott 1965, Forrest 1973 & Stevens 1869). In some cases, heavier boxes of blue-and-white chinaware were used to form the flooring under the tea chests, serving to protect the tea from water damage in the bottom of the ship (Twinings 1956).

Tea chest designs changed little over the 300 years that they were used. The design was similar from China to Japan, India, Sri Lanka and Java, with minor changes that reflected changes in technology. Lead foil with soldered seams took the place of molten lead, which ultimately gave way to aluminum foil liners. Plywood was pioneered by the tea industry, in the search for a thinner lighter weight material. Reinforcements changed; battens and metal strips reinforced the edges, and there were alternatives to the woven cover, including hoop iron bands (Ukers 1935 and Forrest 1973).

Tea chests may have been the earliest packages in history to employ elaborate surface graphics. Decoration on the chests varied, from simple chop marks to "glorious labeling...in flowery motives". Second rate tea chests were plain, but boxes for the better grades were decorated to reflect the quality. (It has been difficult to learn more about the graphics and what they symbolized, and this is an matter for further research.)

Rattan bands, used to protect the labeling, were ultimately found to be a nuisance in stowing cargo and were eliminated. While the chests were originally made in the tea factory, "patent chests" were later developed and made by special carpenters' shops. Although tea is mostly now shipped in bags, standard specifications for tea chests are still used; now they are sized to fit pallets and 40-ft ocean containers (Calcutta Tea Traders Association 1975).

At 100 pounds, the chest was a practical unit for wholesale and retail purposes. Chests were purchased by the grocer who skillfully blended the consumer's order and packed it in a paper wrap. Some "old fashioned" retailers would mix the tea in front of the customers, tasting and adjusting the blend to the customer's liking (Twinings 1956). Sales of 1/4, ½ and 1 lb predominated.

BOXES

There have probably been wooden boxes for as long as there have been carpenters. The shape is simple and easy to form with common tools.

The traditional chest shape, with a hinged curved top (named for its resemblance to the ribs and breastbone), was the oldest kind of furniture. Giovannetti (1999) shows examples from as early as 14th century BC, Egyptian chests with rounded tops. Chests held valuables, and in the middle ages the nobility carried them from castle to castle. As castles became more amply furnished, furniture became stationary, and chests came to take the shape of the familiar oblong box with feet (domestic dovery chests became popular in the 1600s) and the chest of drawers (Encyclopaedia Britannica 1960).

But the use of wooden boxes as routine shipping containers is relatively recent, and their history is notably less romantic than that of the rounded shaped baskets and barrels that they replaced. There is an exception: the tea chest.

Tea Chests

The first widespread use of wooden boxes was for tea, shipped from China by the East India trading companies. In 1685, the Chinese Emperor opened up the Chinese ports to trade, and the western exportation of tea began to grow. At some point (the story so far has evaded this researcher), the tea chest, a clever multilayer shipping container, was developed.

In China, the export tea was blended and packed in Cantonese warehouses called go-downs. This required a great deal of labor. Carpenters made the chests from planked boards of a wood that was relatively odorless. Apprentice plumbers made the thin lead lining for the chests by "pouring molten lead over a tablet wrapped in heavy paper and dropping its mate on top." The lead lining was to keep the tea free from damp and foreign odors. Paperers made and fitted paper linings between the lead and the tea. For the better teas, painters "adorned the exterior with grotesque flowers and fanciful devices." The chests were filled and coolies stamped down the tea with their feet to compress it and maximize the cube utilization. "Finally the chests were sewn up in rough matting and secured with rattan." Every chest had two paper labels, one inside the burlap and the other outside which named the ship it was to travel on (Goodwin 1991, 35).

Weights varied, but there were standards for each country of origin. In the "old China days," sizes varied, and until the end of the 18th century black tea was shipped in chests up to 350 lbs, whereas green tea came in 40 to 60 lb packages. By the mid 1800s, the standard was reduced to 100 lbs, a weight that made handling more merciful and stowage on ships more flexible (Forrest
A high quality blend was a competitive advantage for a grocer (Forrest 1971).

But there were also low quality blends. Similar to the problems of selling from the cracker barrel, there were allegations of contamination, adulteration and short weight. And similar to the Uneeda promotion, the allegations were heavily promoted by the first branded packets for tea, introduced by John Horniman in 1826 (the packing was mechanized in 1852). The sealed paper packets were later lined with lead foil. At first the packets had to be distributed through confectioners and chemists since the grocers refused to carry them, but the advertising created a demand that forced the grocers to abandon their boycott (Twinnings 1956 and Forrest 1973).

“The ubiquitous tea chests” were a symbol of wealth and expanding trade influence for the whole enterprise in the East. The teas [and their chests] were carried all over the world from the Company’s London warehouses. “Wherever the British traded, settled or colonized, tea would follow.” (Lawson 1993, 96)

Millions of the original “Useful Box” were sent to tea-crazy England over 200 years, where they have a reputation for being reused for moving households and for storage. “The attics of England creak beneath their collective weight.” (Goodwin 1991, 35) The lead was sold to printers for the making of type (MacGregor 1972).

The chests were also sent to the colonists in America, who found their symbolism to be more useful than their function. For the Boston Tea Party crowd in 1773, the chests symbolized taxation without representation, and the collective act of destroying them with tomahawks and dumping them overboard was the catalyst for the American Revolution.

**First Modern Shipping Container**

For other uses, widespread use of wooden boxes became more common after the Industrial Revolution, coinciding with the development of railroads and an increase in trade (Marquis 1943). It is a classic case of the relationship between transport and packaging technology. Plaskett (1930) calls wooden boxes “the first modern shipping container.”

Earlier, wooden boxes had not been widely used as shipping containers because of the high cost to transport and handle them. They are heavy (especially when loaded with something more dense than tea) and awkward. Transloading from one transport conveyance to another is difficult, especially compared to cylindrical barrels which could be rolled.

The advent of railroad transportation created concentrated hubs of material handling and therefore the opportunity to mechanize it with the use of hoists and wheeled conveyances. Economical wooden boxes soon began to displace barrels for many dry commodities and manufactured goods shipped by rail.

At the same time, boxcars were developed to ship the boxes, creating the squared-off world of distribution that now predominates all transport modes. Barrels did not fit the boxcars and even suffered physically from railroad shipment. Shipped in an upright position in railcars, they were difficult to restrain from the forces encountered in rail transport and train switching operations. The Association American Railroads found it necessary to develop rules for blocking and bracing them in boxcars (Coyne 1940 & Hankerson 1947).

Box making in the US was at first a completely local industry, utilizing readily available local timber and producing made-up boxes for local use. The close relationship between the box and railroad industries was mutually beneficial, since the railroads had been granted much timber land which could be made into the boxes that they came to require. Lumberyards owned by the railroads, first established for making railroad ties, later specialized in making boxes or planing wood for other box factories.

Boxes are much more economical than barrels to make, and the process can be more successfully mechanized. The introduction of the band resaw made it possible to produce knocked-down boxes, known as shooks, to be assembled in the user’s box room. The band resaw efficiently slices thinner boards from the squared-off cant produced by trimming a circular log in a circular head saw. It was the most important single improvement in box manufacture equipment (Marquis 1943). The first domestic shipment of shooks is said to have been made in Saginaw, MI in the late 1860s. Other equipment that improved quality and reduced costs were power planers, matching machines, squeezing machines for tongue and groove work, nailing machines and stapling machines. The size and number of box factories without sawmills increased steadily between 1860 and 1910. Demand rapidly increased for rail shipments, coincident with the use of new power-driven woodworking machinery, creating a tremendous stimulus to the box industry during the closing years of the 19th century. (Marquis 1943).

In the United States, the box and railroad industries (National Association of Wooden Box Manufacturers and Association of American Railroads) worked together with the USDA’s Forest Products Laboratory (which was developed by the industry in 1910) to establish standards for wooden boxes. They included standard box styles, types of wood, and nail size, number and pattern. They also developed standard tests for impact strength, puncture resistance and compression strength. The aim of the standards was to minimize the use of material and to improve performance by showing how to reinforce the joints (edges and corners), which are the weakest part of a box (Plaskett 1930).

In the early 1900s, all fresh produce as well as canned and bottled goods were shipped in wooden cases. So were most dry goods and manufactured items ranging from hardware to housewares.
A Short Life Cycle

In the history of shipping containers—compared to amphoras, baskets and barrels—the American wooden box form had a relatively short life cycle. They were most widely used as shipping containers from the mid 1800s to the 1920s when they began to be displaced by the newly invented corrugated fiberboard shipping containers. "Cardboard boxes" use less material, are lighter weight and more economical to ship in a knocked-down fashion to the packer-filler.

The railroads unsuccessfully resisted this innovation at first, because of concerns about strength (carriers are supposed to be liable for damage), and because it undermined the demand for their timber and box factories. But the decision of the Interstate Commerce Commission to permit the use of corrugated fiberboard shipping containers, coupled with the growth of motor carrier transport, soon signaled the end of the hardy wooden box (Howell 1940).

Wirebound boxes made from thin veneer plywood were an intermediate solution for some products such as plumbing fixtures and produce. They offered the same advantages as corrugated fiberboard boxes since they can be mass produced and shipped knocked down, but they are more sturdy. The industry developed other hybrid packages made from plywood with cleats and hinged corners.

World War II was a major turning point for the wood packaging industry. It created a huge spike in demand for wooden boxes, which created a lot of excitement in the industry after the initial downturn due to competition from corrugated fiberboard. An article in the 1943 trade press claims that "a larger proportion of our total lumber cut is today going into boxes and crating than at any time previous." One third of lumber in 1943 went into packaging: a little more than half for "crating and shipping" and the rest for box shok. Most was used for war supplies, delivering everything from food to parts and weapons to The Front. A large share was from West Coast mills, with a lot more Douglas fir than previous. "It is a tremendous responsibility and one which the West Coast mills are meeting with characteristic vigor and determination." (Titus 1943, 8)

But the war also created a shortage of wooden boxes for commercial uses and these after the war quickly turned to less expensive and more efficient corrugated fiberboard boxes. There was far greater demand for wood to be used in building suburbs. The wooden box and barrel industries in America slowly faded for all but military and other extreme uses. The industrialization that had so successfully mechanized and increased the production of wooden boxes, in the end, also created their competition, the totally mechanized production of corrugated fiberboard shipping containers.

Some of the uses that persisted the longest were for regional distribution of soft drinks, beer and farm commodities such as eggs and bottles of milk. Such boxes were returned and reused. Produce was still shipped in wooden boxes into the 1950s, and produce boxes had regional standards: for example standardized eastern apple boxes were 1 1/5 bushel for soft varieties in New England and 1 1/8 bushel in other parts of the east (Barrel and Box and Packages 1943). Grapes and strawberries (because they are fragile) and broccoli and celery (because they are packed wet or with ice) were some of the last produce to move out of wooden boxes.

Packaging for export has been another persistent application. Wooden boxes predominated in ocean shipments until the 1970s when the use of containerization (eg. 40-ft ocean containers), also introduced in World War II, became commonplace. For non-containerized shipments, wooden boxes are often still required in order to withstand the rigors of break-bulk ship loading and stowage. It is interesting to note that this is another case of packaging changing with transport modes, and thereby changing the nature of trade. The use of container ships have significantly changed the kinds of packages that are now exported and the economics have contributed to a growth in global trade.

Wooden boxes, especially cleated plywood and wooden crates, are still used in "extreme" applications such as military shipments of equipment and supplies. Plywood styles which can be easily folded or disassembled and reassembled are used by the automobile industry and others for shipping parts to assembly factories. Crates (which differ from boxes because they are only frames with open sides) were still used until the 1950s for appliances, and are still used for some large equipment.

But even as World War II signaled the demise of the wooden box and barrel industries, wooden packaging was simultaneously reborn in the wooden pallet industry, which had proven to be key for logistics efforts during the war. In the decades after WWII, forklifts mechanized material handling throughout the commercial world, creating a new demand for wood. Although there have been many substitutes for the wooden pallet, it has been hard to beat for low cost and versatility. Wooden pallets represent the highest use of wood for packaging today.

CONCLUSION

Baskets, barrels and boxes deserve acknowledgment for the important parts that they have played in history. They served the early inhabitants of America, Egypt, Rome, Europe and the Bible. They accompanied Hunters
and Gatherers, Crusaders, Explorers, Pilgrims, Pirates, Revolutionaries and Pioneers.

They appear in the most colorful historical scenes of the Western world. But theirs is a supporting role, humbly serving commerce, trade and markets. And then just as quietly they exit the stage. It is a secret of their nature to be temporary; they serve—maybe for a series of uses—and then decompose. Their resources are recycled and renewed—and not only the wood. The most vital resource for fabricated wooden packaging has been people passing the craft from generation to generation, legions of packaging suppliers making things from wood with their hands and simple tools.

Crafted wooden containers have facilitated logistics, trading and transactions between individuals, organizations and nations. They have preserved and protected food and beverages, housewares and war wares. They were transported on freighters, clipper ships and whaling ships...camel trains, wagon trains, and railroad trains. Their geometry fits the conveyances and handling methods—and vice versa.

While it is certainly no secret, it is surprising to learn that transport modes and shipping containers, throughout history, have evolved together, and that the following principles of shipping container design that we use today have been employed for thousands of years:

-Materials are low cost and use plentiful natural resources.
-The fabrication technology is well developed for other uses.
-The geometry of packages fits the transit mode to maximize cube utilization.
-The geometry facilitates blocking and bracing of cargo in transit.
-Printing and graphics are used to identify product and “brand.”
-The shape and weight facilitate handling and use efficiency.
-They are easy to fill and to empty.
-The construction aims to protect the contents from handling and transit forces.
-The shelf life of food may be extended through the use of barrier materials.
-After emptying, shipping containers are widely reused and recycled.
-Trade associations cooperate to set standards for quality control.
-The trade cooperates with government to regulate standards for net contents.

It is also surprising to find that the collegiality of packaging professionals is not new and, in fact, may be necessary to facilitate marketing functions. We packagers have a tendency to share our skills through education and to work together with our trade associations to establish standards for weights, measures, tests and package construction. Such standards make an important contribution to efficient markets.

But the secret surprise is to find that there is something very special, maybe even romantic, about crafted wooden packages. A glimpse of history from their perspective strangely connects us to marketing history and to the earth.

REFERENCES


Barrel and Box and Packages. Trade magazine published in the early 1900s. MSU has 1943-6, vols 48-51.


Doyle, J. J. 1947. "The Coopers Union History as Recalled by Official" Barrel and Box and Packages, November, 14-16)


The Romance of Marketing


Camden, New Jersey: Samuel M. Langston.
Marquis, R. W. 1943. "The Wood Box Industry at War," Barrel and Box and Packages, April, 8-10.
Pattison, G. 1969 'The Coopers' Strike at the West India