

---

# SMITHERS PIRA

## Paper-based packaging trends to 2019

# 1 INTRODUCTION

Whilst consumption of printing and writing papers for newspapers and books continues to fall as an ever-widening array of digital technologies replaces traditional hardcopy, the use of paper and board in the packaging sector remains robust with demand continuing to expand at the global level in spite of rapidly changing market conditions and rising competition from plastics and other material substrates.

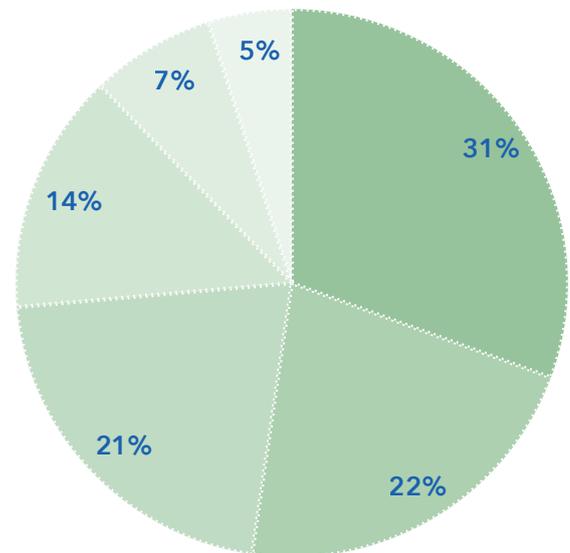
This paper explores the current market trends and future opportunities for paper-based packaging, focussing on its three core product sectors - cartonboard packaging, containerboard packaging and flexible paper packaging. It includes a review of the current position of paper and board within the global packaging market, an assessment of the 'mega-trends' currently affecting paper and board companies, an evaluation of the recent developments in luxury product packaging, and finally a synopsis of the outlook and prospects for the industry over the next five years.

# 2 PAPER AND BOARD PACKAGING OVERVIEW

Paper and board continues to be key packaging material substrate. It currently accounts for 35% of worldwide packaging sales at around \$280 billion (2013).

At the global level, the share of paper and board packaging has remained broadly unchanged in recent years in spite of rising competition (from plastics in particular) and a rapidly changing marketplace. Board - including carton board and containerboard for corrugated cases - currently makes up 31% of demand, with the remaining four per cent share attributable to flexible packaging papers.

Approximately 90% of board packaging sales are accounted for by corrugated



**FIGURE 2.1 Global packaging consumption by category, 2013 (% share by value)**

Source: Smithers Pira

- Board packaging
- Rigid plastic packaging
- Flexible packaging
- Metal packaging
- Glass packaging
- Other packaging

packaging (based on containerboard) and cartons – both folding cartons and liquid cartons, based on cartonboard raw materials. The remainder is accounted for items like tubes and cores, food packaging and disposables manufactured from food & cup stock (FCS) grades and other products.

### **3 . CARTONBOARD**

Cartonboard is used in a wide variety of packaging-related applications. Types include coated unbleached kraft paper, folding boxboard, white line chipboard, solid bleached board and liquid packaging board. End uses vary considerably ranging from commodity applications through to high-end speciality products. It is expected going forward that the fastest growing sectors will include spirits, healthcare, confectionery, tobacco, hardware and chilled food. Continual innovative developments by paper manufacturers and converters are enhancing cartonboard performance and application in a number of end uses.

Each application may require a wide range of different print processes to be utilized. These include sheetfed offset, rotogravure and flexography, but often a given board will be printed by all of the above methods depending on its application. Digital printing technology is also being developed by companies like Landa, and this could have a significant impact in the medium term, especially in short-medium runs.

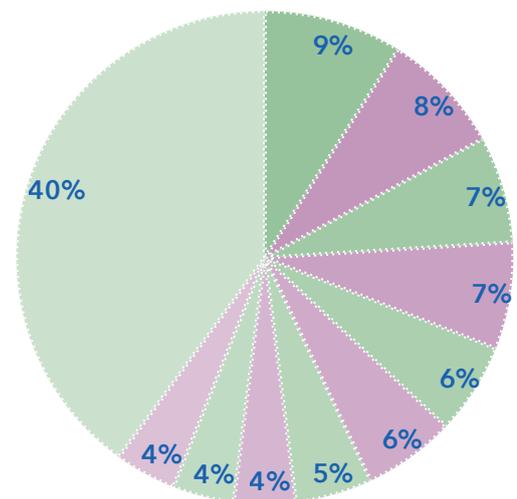
#### ***Folding cartons***

The majority of cartonboard is used in folding cartons, although some folding cartons are made from microflute, i.e. thinner corrugated containerboard grades. The global market for folding cartons overall was worth around \$140 billion in 2012, forecast to grow to \$184 billion by 2018. Growth will be fed mainly by the continued and growing demand for healthcare products, cigarettes, dry foods and frozen/chilled foods – especially in the emerging economies, while demand in the developed regions is likely to be somewhat muted in comparison.

In volume terms, consumption is likely to increase at an average annual rate of over five per cent per annum between 2013 and 2018, from 47 million tonnes to 63 million tonnes at the end of the period. There will be a marked shift in geographical demand, with the Asia-Pacific sector increasing its share of global volume demand from over 56% in 2013 to more than 63% in 2018. This will be mainly at the expense of EMEA markets, the share of which will fall from 25% to 21% over the same period, while that of the Americas will fall from 19% to 16%.

The four largest end-user sectors for folding cartons are healthcare, tobacco products, household care, and hardware and electrical, which includes the burgeoning consumer electronics industry with its rapidly growing market for personal electronic devices such as tablets, mobile phones and the like.

In terms of absolute incremental volume growth (tonnes), the largest areas of volume growth between 2013 and 2018 for folding cartons in Asia will be healthcare, household care, tobacco and dry foods. Relative to global demand trends, the areas where Asia will outperform the world as a whole in terms of percentage growth over the same period will be confectionery (74% Asian growth vs 33% growth globally), preserved foods (55% vs 26%), baby food (55% vs 28%), soft drinks (42% vs 7%) and pet food (34% vs 10%).



**FIGURE 3.1 Global folding carton demand by end-user sector, 2013 (% share by volume, tonnage)**

Source: Smithers Pira

- Healthcare
- Tobacco
- Household care
- Hardware, etc.
- Frozen foods
- Dry foods
- Dairy products
- Chilled food
- Personal care
- Confectionery
- Other

**TABLE 3.1 Folding carton demand trends in key sectors in Asia, 2013-18 ('000 tonnes)**

'000 tonnes	2013	2018	Incremental volume, 2013-18	CAGR % 2013-18	% change, 2013-18
Healthcare	2,604	4,059	1,455	9.3	55.9
Household care	2,555	3,756	1,201	8.0	47.0
Tobacco	3,122	4,182	1,060	6.0	33.9
Dry foods	1,540	2,584	1,044	10.9	67.8

Source: *Smithers Pira*

### **Liquid cartons**

Liquid paperboard is generally considered separately from cartonboard. It is used in the production of liquid cartons, employed primarily in the packaging of liquid milk and juice/nectar products. There are two main types of carton used for liquid food products:

- Short shelf life cartons are made from a lamination of carton board with PE and are used for short shelf life products delivered through chill chain distribution (most notably pasteurized milk and fresh juice & nectars)
- Long shelf life 'aseptic' cartons are intended for ambient storage and distribution. These contain an additional aluminium foil layer in their construction to provide a better barrier and extend shelf life

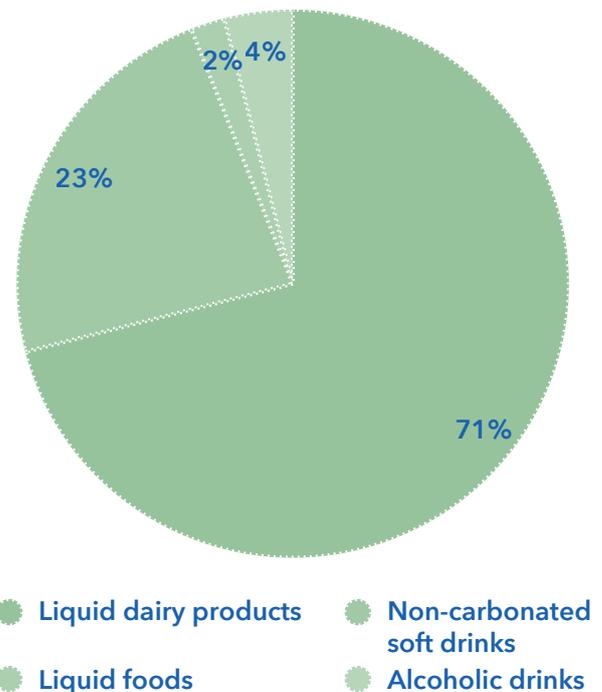
Global liquid packaging board output amounted to just under four million tonnes in 2013, with a converted value of over \$13 billion. Good underlying growth is anticipated over the medium term, with demand estimated to have increased by over five per cent during 2014, followed by forecast average annual growth of 4.7% in the five years to 2019, leading to an additional one million tonnes of material required to meet the demands of the market.

The relatively mature liquid packaging board markets of North America and Europe made up over 61% of 2013 demand for liquid packaging board, with a further quarter of demand emanating from Asia/Australasia, and it is this latter region that will show the highest medium-term growth in demand for this material, accounting for 60% of the incremental tonnage expected to materialise by 2019. Growth in the Middle East & Africa and South and Central American regions is also expected to be strong over the next five years.

Globally, liquid dairy products account for 71% of volume demand for total liquid packaging board and, together with non-carbonated soft drinks, make up 94% of the market. Nevertheless, it is the smaller sectors of liquid foods and alcoholic beverages (mainly still wine) that will enjoy the highest growth rates over the medium term, albeit from low bases.

Ambient (aseptic) packaging has been slowly gaining market share over chilled, increasing its share from 66% in 2007 to almost 68% in 2013. However, this does not paint the full picture of the market, as the ambient carton has lost market share to chilled cartons in Europe over the same period, from over 78% in 2007 to 76% in 2013. This can be attributed to the higher level of development in the European retail market, with its sophisticated chilled merchandising cabinets, compared to the relatively undeveloped infrastructure prevalent in the emerging regions, where aseptic packs enjoy a much greater popularity. Demand for ambient cartons North America remains relatively low and remains stubbornly static, though its share grew slightly from 47% in 2007 to 48% in 2013.

In terms of packs, the liquid carton market reached 241 billion units in 2013, and is still largely dominated by three players. Tetra Pak commands by far the largest share, controlling almost 74% of



**FIGURE 3.2 Demand for liquid packaging board by end-use sector, 2013 (% share by volume, tonnage)**

Source: Smithers Pira

the market. Historically, SIG and Elopak have been the other two major converters but recent years have seen the emergence of Greatview of China. Greatview and a few other 'non-systems' suppliers produce board for use on its competitors' filling lines. Their success to date has been largely at the expense of Tetra Pak, whose global share has fallen (mainly from Asia) from around 76% in 2003. SIG Combibloc's global market share has grown slightly over the last ten years as the majority of the growth worldwide has been in long life (ambient) cartons. Elopak, which still operates primarily in the short shelf life carton market, has seen a slight market share decline in this period; although (as for all the major converters) its volume sales have grown in absolute terms due to strong positive growth in the underlying market.

### **Cartonboard packaging drivers and trends**

#### **Down-sizing & resource reduction**

Constant striving amongst brand owners to reduce packaging costs and volumes is resulting in initiatives such as the Kraft Foods 'Better World' programme, resulting in: ten per cent less packaging on its Easter eggs; the Kleenex redesign of its tissue box achieving 30% less packaging; and other similar examples. This is likely to erode some volume growth potential in the cartonboard market in the medium term.

Major global producers of cartonboard and other paper packaging increasingly offer lighter packaging materials, in line with the trend towards lightweighting and downsizing. Stora Enso, for example, offers lower-weight board for the production of pharmaceutical cartons in high-speed pharmaceutical packaging lines. According to the company, its 215 gsm Tambrite board can easily be used in packaging instead of the 250 gsm boards that are typically used, with no compromise in packaging performance. Such a reduction in package weight generates savings and environmental benefits throughout the supply chain and the product's life cycle, which means less raw material used, less weight in storage and transportation, less packaging waste and fees to pay, and a lower carbon footprint.

International Paper, meanwhile, invested more than \$60 million in a new state-of-the-art line of coated paperboard products that are lighter in weight but offer the same quality and strength as heavier grades. For customers, this option can help reduce their shipping costs and environmental footprint.

In both cases these companies have a significant Asian presence and the new lighter-weight lines are sold in the region. China in particular has become a major importer of recycled paper and with the rise in demand here and in other emerging markets for cheap board, this has led converters to look at ways of making their investment in recycled fibre go further, as well as in some cases seek to improve environmental performance.

Inks is another area where companies are looking for cost savings. In Asia, Kimberly-Clark, achieved reduction in number of inks used in its packaging (equal to \$315,000 annual cost savings), as well as 55% annual usage reduction of 150 metric tons of corrugated board for its Kleenex & Scott brand.

### Single serve packs

The current trend toward smaller packs is offset to an extent by an increase in demand for single serve portion packs in many product groups such as sauces, bakery products, pre-packed rice dishes and others. This trend is driven in part by an increasing number of single person households coupled with a growing demand for convenience as many families now eat at different times. The upside of this for folding cartons is that smaller packs tend to use more packaging material than the larger packs they replace, for the same volume of packed product.

A good example of single serve cartonboard packaging is the Single pizza slice box. This is used by major pizza chains such as Sbarro and Pizza Hut, and is available globally including in markets in Asia where demand for such packaging is understood to be growing quickly in major cities like Shanghai.

## Printing techniques

Over the next ten years the most dynamic area of change will be in the fields of package printing, where cartons and corrugated are sectors that will take up digital production methods. Future growth forecasts for printed packaging are all positive with increases in both volume and value.

Currently in terms of printing process, 75% of carton packaging by value is being printed using litho machinery, followed by gravure at 16%. By way of contrast flexo printing is the primary choice for corrugated packaging users with a market share of over 76% in 2013, followed by offset (litho-laminated) and gravure. Digital is set to make significant gains in the coming years in both sectors, although its share of output will remain low.

## Healthcare safety

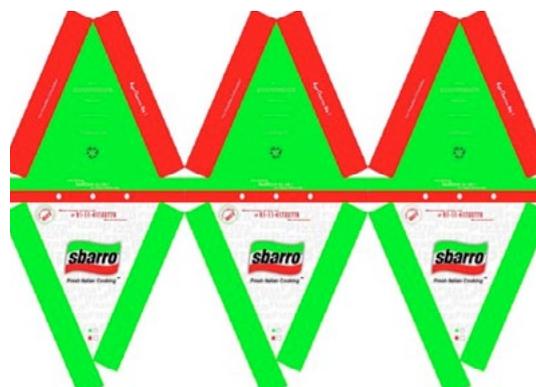
In healthcare in particular, there is a call for the development of smart carton packs able to provide a system for monitoring patient medication. The UK's National Patient Safety Authority estimates that some 900,000 'adverse events' occur in the NHS each year, with about a third of these attributable to errors in medication and dispensing, and smart packs would go some way towards alleviating these problems. The technological developments in printed electronics are bringing the development of smart carton packaging closer to fruition as costs are dragged down.

## Anti-counterfeit packs

The value of anti-counterfeiting technology used in folding carton applications is expected to almost double between 2013 and 2018, as a further \$500 million is added to market value, with high growth expected, especially in the health care sector. Costs still constrain this market to an extent, but these will gradually be reduced as the technology develops. Anti-counterfeit technology includes a wide range of systems such as holograms, watermarks, barcoding, radio-frequency identification (RFID) and similar technologies.

### ..... Single pizza slice box

Source: Pizza Hut



## Smart packaging

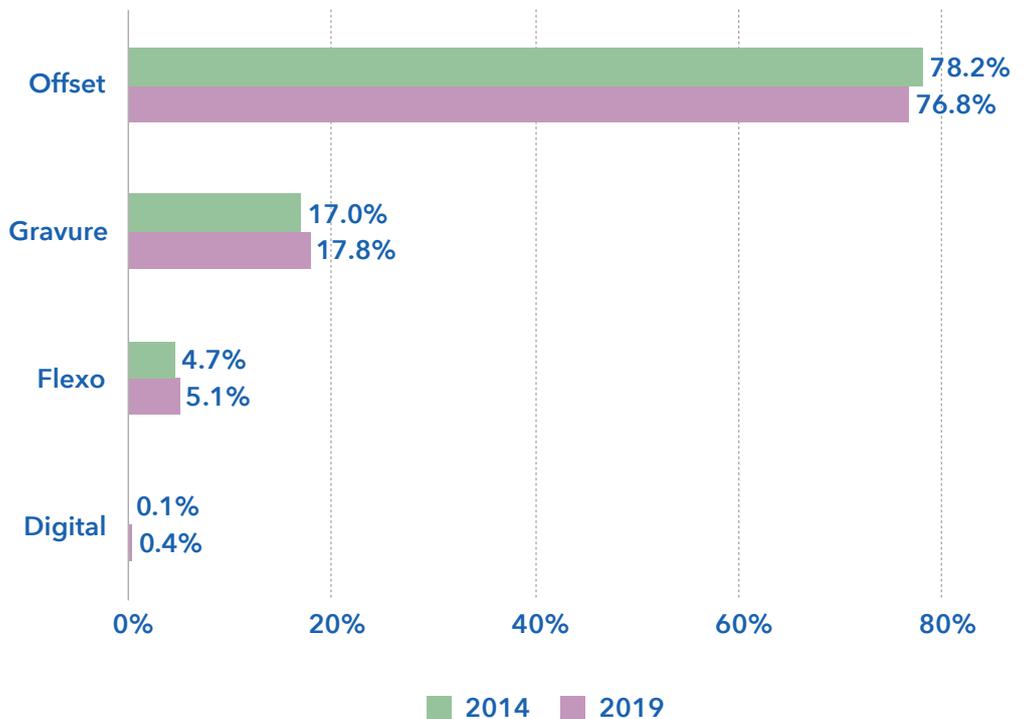
The need for continual brand differentiation in the crowded marketplace facing brand owners is seeing a growing demand for innovation in printing methods, with an increase in such technologies as QR codes, holographic images, Fresnel lenses and other 3D devices. Further developments include the refining of offline coding equipment to improve the marking of products with sell-by dates and unique serialisation codes designed for anti-counterfeiting. Converters are constantly striving to stay ahead of the game, by upgrading outdated printing equipment.

## New barrier coatings

Barrier coatings are typically polymer-based and are formed either to prevent penetration, such as moisture into detergent, or to perform a specific function such as a silicone coating preventing dough sticking to a carton during cooking. New developments in water-based coatings are achieving high levels of adoption, whilst other technologies under development include nano-materials, bio-polymers and antimicrobial compounds, among others.

## Recycled versus virgin material

A focus on migration of contaminants through cartonboard began in 2010, with the identification of mineral oils from recycled newsprint as a potential threat to consumer health. This has seen the development of a number of products aimed at preventing or at least minimising this risk, including Mayr-Melnhof's FoodBoard and a new coating from Imerys patented in 2013. Prior to this, in 2012 the UK's Food Standards Agency announced the development of a scanner able to detect the unintentional transfer of



.....  
**FIGURE 3.4 Asian carton printing output by process, 2014-19 (% share by volume)**

Source: *Smithers Pira*

chemicals from the outer to the inner surfaces of packaging materials. Whilst this issue remains unresolved, virgin materials are seeing an uptick in demand in food packaging markets

### **Added value trends**

Meanwhile in Europe increased competition and strong drive for brand and product differentiation at the luxury end of the market is resulting in shift from standard to higher added value folding boxboard grades such as GC1 and SBB.

### **Shift from informal to formal markets**

The shift from 'informal 'unpacked' to 'formal 'industrially packaged' consumption will drive long term growth in liquid cartonboard and folding carton demand across food and beverage areas. Currently the majority of (for example) the milk market in India (the world's largest milk market) is mainly unpackaged (consumers use reusable containers in a market that is 80-90% informal), so with such a large overall consumption base, any small shift to packaged consumption will have a major positive impact on liquid cartonboard material demand.

### **Diversification of consumption patterns**

More and more western and international products are being consumed by Chinese and other Asian consumers as they travel more and become more closely involved with western food and other products. More choice and diversity is likely to foster cartonboard consumption growth.

## 4 CONTAINERBOARD

• Containerboard is principally used for transport and distribution packaging in the form of corrugated cases (boxes). These cases require product functionality that enables them to be transported and stored under a range of temperatures and humidities to protect the product. However, increasingly, corrugated packaging also has to reconcile the needs of purchasing, logistics, quality and production, without forgetting the needs of marketing. Design is also playing an increasingly important role in the development of corrugated products since it can considerably enhance the value of the contents. Greater use of microflute corrugated material is enabling improvements in printability and increasing the opportunity for containerboard to move into higher value sectors.

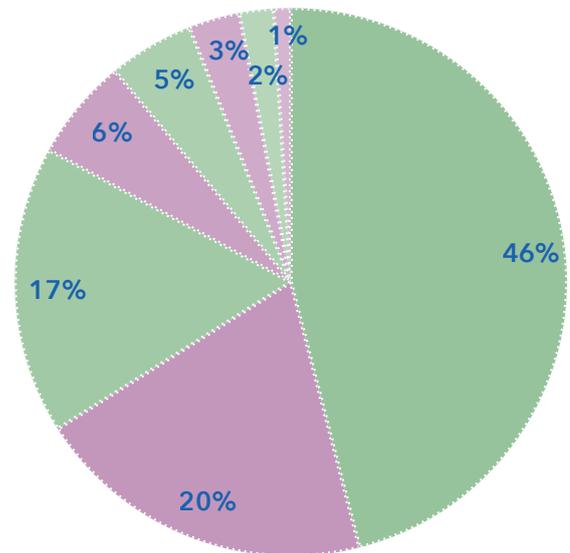
The term 'containerboard' refers to the two unconverted materials that are used to manufacture corrugated boxes: i.e. linerboard and corrugating medium.

- Linerboard is thick, rigid paper that is used to form the external faces of corrugated products and provide resistance to vertical loads. It can be made from virgin fibre or recycled fibre. The linerboard qualities may vary depending on the desired end use. These papers are also available in a range of thicknesses categorized by basis weights. The type of linerboard is chosen in accordance with the desired surface smoothness or final degree of rigidity required.
- Corrugated medium/fluting makes up the inner layer of the corrugated board, which gives it the strength to resist vertical loads. This can be made from recycled fibre or from semi chemical virgin pulp. The fluting can be made in a range of flute size depending on end use requirements.

The global corrugated packaging market was worth over \$140 billion in 2013 and

**FIGURE 4.1 Global corrugated packaging demand by region, 2013 (% share by volume, tonnage terms)**

Source: *Smithers Pira*



- Asia
- North America
- Western Europe
- Eastern Europe
- South & Central America
- Middle East
- Africa
- Australasia

amounted to almost 90 million tonnes of finished product. This was made from a total of almost 110 million tonnes of containerboard material, worth \$58 billion, produced in over 750 paper mills around the world. The largest producing country is China, which accounted for more than 27% of total containerboard production in 2013; China also leads the world in corrugated conversion, making up over 28% of the global converted output in 2013.

Demand for corrugated packaging material is expected to increase by an average of more than four per cent annually over the next five years and will amount to almost 115 million tonnes of converted material value at \$176 billion by 2019. Almost 30% of this volume will be used in the packaging of processed foods, with fresh produce adding a further ten per cent to the total. The packaging of electrical goods, which includes mobile devices, is expected to show the most attractive growth prospects, with demand rising by 5.6% annually to 2019 to account for almost seven per cent of overall consumption by the end of the period.

By 2019, food and beverage packaging will consume almost 47% of the total volume of containerboard, with processed foods alone accounting for 30% of the total. Electrical goods will be the single largest non-food packaging application, followed by paper products and personal and household care items.

These forecasts suggest that, compared to the total market, corrugated use for processed food will substantially exceed overall corrugated growth in most regions and countries with particular strong growth in demand in Western Europe, Eastern Europe, the Americas and Asia. This is in part due to the rise in Internet and online food sales in these markets, which is driving corrugated use in formerly untapped markets.

Whilst still positive, by way of contrast for fresh food and produce the anticipated growth of corrugated containerboard is forecast to be below the global 'all products'

figure in nearly all countries and regions. One reason for this is competition from returnable plastic crate systems in the more developed markets of Europe and North America.

Nevertheless due to the relatively large size of the processed food sector in terms of corrugated container used (it is typically 4-5 times that of fresh foods/produce), this means that the growth in food packaging will outstrip growth in the containerboard market as a whole and trends in microflute will reflect that.

**TABLE 4.1 Food & beverages - corrugated demand by end use, 2013-19**

'000 tonnes	2013	2014	2019
Processed food	25,446.6	26,464.6	33,955.1
Fresh food & produce	9,727.6	9,909.5	11,381.2
Beverages	6,681.7	6,854.8	8,217.8
Sub-total food & beverages	41,855.9	43,228.9	53,554.0
% overall corrugated demand	46.5	46.5	46.6

Source: *Smithers Pira*

## **Corrugated packaging drivers and trends**

### **Sustainability**

A number of issues are driving and influencing rising demand for corrugated packaging materials. Significant investments are being undertaken by producers in environmental protection and energy optimisation programmes, as well as other activities aimed at reducing water consumption and improving logistics and transportation. These initiatives and programmes are having the desired effect, as the corrugated industry reduced its carbon footprint by a further 4.8% between 2009 and 2011, following a reduction of nearly 12% between 2006 and 2008.

## Lightweighting

Average substance weights continue to show reductions as producers look to improve yields as far as possible whilst retaining performance. Much of the new capacity being brought into the market is focused on lightweight containerboards of 50-110gsm, especially in new machines being installed in China. At the same time, heavyweight boards are being introduced to target the wooden packaging market, as well as to replace double-walled board with an overall lighter weight single wall substitute.

## Online retail

The growth in the use of the internet for shopping, stimulated by the growing broadband internet penetration, use of smartphones and an increasing proportion of tech-savvy consumers, has had a very positive impact on corrugated demand in recent years. In traditional in-store retailing, one corrugated case would be used to transport several items to the retailer for sale, whereas now, each individual item has its own corrugated secondary pack for distribution direct to the consumer.

Online grocery sales in China reached around \$7 billion in 2014, rising by 80% on the previous year, stimulated by the growing middle class and urbanising population.

Yihaodian (majority owned by Walmart), China's first online supermarket, launched 1,000 augmented reality stores across the country in 2012. These are in open public spaces where shoppers use their smartphones to view a virtual supermarket with over 1,000 items in stock. Between 2012 and 2013, registered users of Yihaodian rose from 29 million to 57 million.

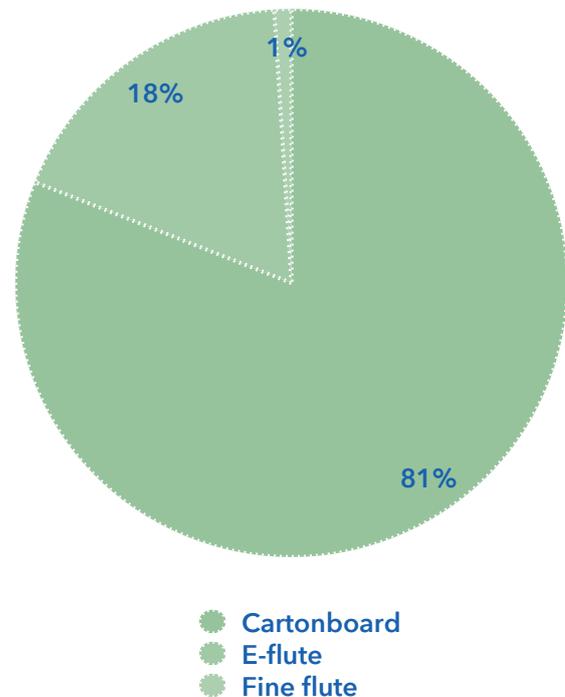
Online shopping has yet to make very significant inroads in India, however, but there is significant potential for growth. The number of online food and grocery outlets increased from 14 in 2013 to 44 in 2014. According to retail consultancy Technopak, the online grocery retail market is growing at 25-30% in the metros and other large

cities in the country, with major players including Local Banya, Big Basket, Jiffstore and also Amazon. Increased investment from online retailers and rising internet penetration will help drive growth in the market, with the number of internet users rising from 120 in 2013 to 213 million in 2014, driven by the growth of cheaper smart phones.

### Retail ready packaging

Retail-ready packaging (RRP) is increasing, driven by the influence of modern retail over the retail landscape, and supported by their growing share of the retail market, as they attempt to improve in-store and distribution efficiencies.

Retail ready packaging usually comes in the form of corrugated/microflute systems or rigid board products though there is also competition from rigid plastics. They are designed to alleviate the process of in-store stock replenishment, and include systems referred to as shelf-ready, display-ready or shopper-ready. The growth in demand for microflute RRP is expected to bring in an additional \$1.7 billion of business to the industry over the period 2013-2018.



**FIGURE 4.2 Asian folding carton output by flute type, 2013**

Source: *Smithers Pira*

**TABLE 4.2 Asian retail ready corrugated packaging demand by end-use sector, 2012-17f**

000 tonnes	2012	2017	CAGR (%) 2012-17
Food	3,866.5	5,248.2	6.3
Beverages	796.6	1,073.9	6.2
Non-food	533.0	747.2	7.0
<b>Total</b>	<b>5,196.1</b>	<b>7,069.3</b>	<b>6.4</b>

Source: *Smithers Pira*

### Smart packaging

Converters are under pressure to provide the shelf appeal and brand exposure so cherished by brand owners, and this has led to the development of specialised grades of highly printable liner boards to enable production of packaging with a strong visual impact. This is being stimulated further by the development by brand owners of new marketing techniques incorporating smartphone apps and QR (quick response) codes which require sophisticated printing.

### Rivalry with cartonboard

Corrugated flute sizes are shrinking since the development of E-flute, with new materials known collectively as fine-flute with less than 1mm in flute height, such as F (0.75mm), G (0.55mm), N (0.5mm) and O (0.3mm). The development of these fine flute products has stimulated overall corrugated consumption as they are taking market share from cartonboard materials in folding carton applications.

Currently, E-flute accounts for around 18% of all carton output although some consider the packages made from this material to be corrugated boxes, although they do have their main application in consumer goods markets rather than transit/bulk applications. Fine flute accounts for around one per cent of output at around 200,000 tonnes.

## 5 FLEXIBLE PACKAGING PAPERS

Flexible packaging papers remain important because of their relatively low cost, their use in laminations (often as a light barrier), tactile feel and environmental performance. Not only does paper offer environmental benefits such as the low energy levels required to create paper products, but also stiffness, breathability and cleanliness. They are also one of the easiest materials to recycle with over 60% of paper packaging being recycled in Europe. They are widely used to package a wide range of foodstuffs. Extrusion-coated papers are used to package dried food, prepared meals and savoury snacks. Paper wraps and pouches are widely used in fast-food restaurants and coffee shops and for savoury snacks and baked products. Specialty grades of medical packaging papers also offer the potential for growth and there is substantial use of paper in the form of sacks for industrial and commercial applications (e.g. cement and other building materials).

Paper-based flexible packaging is largely made up of two products - kraft papers that are used primarily for sacks and paper bags and wrapping papers used on their own or in laminations with other materials for a wide variety of applications - but especially food packaging.

### ***Kraft paper***

Sack and bag kraft is used to manufacture multi and single-wall sacks and a range of bags, either in form-fill-seal applications or other automated packaging processes, or also in loose bags used to pack products at the point of sale, such as bakeries, street vendors, etc. Kraft papers are also used in a wide range of multi-substrate applications as well as in plain wrapping functions.

Global demand for kraft papers in food contact applications amounted to more than 7.2 million tonnes of material worth around \$25 billion in 2013. Almost a fifth of this total was consumed in India, while the EMEA region made up almost a third of the total volume.

Expectations for future demand will see average annual growth of almost six per cent over the medium term, with the overall global market reaching ten million tonnes by 2017. China is again leading the growth stakes with demand currently increasing by 11% annually, versus 9.5% for India. This will be offset by sluggish development in demand from the rest of the world, particularly in Western Europe where annual growth is expected to be under two per cent.

### **Wrapping papers**

Although it falls under the general heading of 'wrapping papers', this product category includes parchment, greaseproof and glassine papers, and incorporates papers used in applications such as baking, where the paper is used in the production process in direct food contact but is then discarded and does not accompany the finished product on its retail journey.

Over two million tonnes of parchment, greaseproof and glassine papers were used in food contact applications alone worldwide in 2013, with a market value of some \$7 billion. As with other product sectors, demand is concentrated in the Asia-Pacific region, where India made up 29% of the total.

Short-term and medium-term growth prospects indicate average annual increases in demand of 5-6%, with China again leading the field. It is expected that global demand will reach around three million tonnes by 2017.

## 6 MEGA-TRENDS AFFECTING PAPER & BOARD COMPANIES

### • *Economic and demographic trends*

In terms of geographical trends, emerging markets are seeing more people joining labour markets than ever. The economies of these countries are predicted to benefit in case youth is provided with adequate education and opportunities to develop their skills. They are the future consumer with higher disposable incomes and improved demand for fast moving consumer goods. In addition the return migration of highly skilled workers to their home countries is predicted to improve local living standards and boost the consumption of staples.

Packaging designed to save time is becoming more popular throughout various industries. Since women's increasing participation in labour market is not accompanied by men's involvement in domestic work, there will be less time available for meal preparation, caring for children and home cleaning.

Another demographic trend having a positive impact on demand for packaging is growing urbanisation in some countries. It has a significant effect on the volume and format of fast moving consumer goods and services. Since urban citizens spend most of their time at work and everyday commute, they prefer to save any extra spare time available. Demand for convenient packaging for on-the-go consumption will continue to grow in the foods and drinks industries.

In terms of economic development emerging market and developing economies continue to contribute more than two-thirds of global growth. The stable growth of the Chinese economy in the region of 7% per year and the positive development of the Indian economy at the level of 6% will allow the global packaging market to grow in both volume and value terms over the next decade.

## **The rise of the middle classes in Asia**

Continued strong per capita growth in domestic consumption is set to lead to growth in the middle classes in key emerging markets, with disposable incomes rising significantly among a key population segment. This will drive internal food and non-food products, and hence cartonboard/folding carton demand. Strong production and export demand will continue, but there is likely to be a shift in balance more toward domestic consumption as these markets mature.

Definitions of what constitutes the 'middle class' can vary significantly. In the case of India, the National Council for Applied Economic Research defines this figure as households with a worth of \$10,000-\$100,000, and put the number of middle class households at 31.4 million (160 million individuals) in 2014, expected to rise to 53.3 million by 2016 (267 million individuals). McKinsey, meanwhile, says that India will have 250 million middle class households this year (2015) with earnings of \$3,605-\$18,031 per annum, a figure that will rise to 583 million by 2025. In the case of China, McKinsey figures point to 68% of the Chinese population being middle class (household earnings of \$9,000-\$34,000), a figure that is estimated to rise to 75% by 2022.

## **Drive for greater productivity, efficiency & competitiveness**

Productivity in manufacturing is about performing within or improving upon the budgetary boundaries that have been established for an operation. Productivity will depend upon the efficient use of labour, energy, and material.

Brand owners are continually seeking to optimise packaging operations as every little improvement can affect the bottom line. As they face increasing global competition, an ever increasing range of products and shorter product runs, the increased use of robotic solutions will assist in productivity improvements and overall efficiency.

In addition to enhancing efficiency and boosting productivity, robotic technology can help minimise material and energy waste for better sustainability scores and greater returns on existing assets. Advancements in software and information management capabilities can extend the benefits even further.

As brand owners in industries such as food packaging, e-commerce and parcel logistics demand increasingly complex boxes with multiple compartments, the demand for new and unique packaging sizes, shapes and configurations continues to grow. Packaging lines have to become more flexible. Robotic automation enables the quick and easy changeover needed to switch between product configurations.

Automating a packaging process with robotics offers greater speed, accuracy and capacity than the comparable manual processes it tends to replace –and many robotics providers claim that the return-on-investment over time justifies the switch. Adding a robotics component can help minimise labour costs, increase throughput and enable round-the-clock operations, making more productive use of packaging line assets that might otherwise sit idle.

With the vast array of technical innovations and enhanced features rapidly coming on the market, production managers require the tools to control, monitor and manage these systems and track the data they produce. Such requirements include:

- Managing product flow speeds,
- Using modelling and simulation software to specify optimal line configuration,
- Tracking production data to identify inefficiencies.

Robotics providers are coupling their machines with smart software to better enable packagers to achieve their production targets.

Greater automation of packaging operations has also led improvements in the

downstream supply chain, notably in distribution and warehousing. Typically products of only one type and size were loaded by the manufacturer on a given pallet. The warehouse had to break down the contents of those pallets and the pallets of several other products so that pallets could be loaded with mixed products.

Sustainability considerations are increasingly important to the processing and packaging sector. Robotics manufacturers are keenly aware of this and attacking the associated challenges in ways that are environmentally sound and make good business sense, such as minimising the energy usage of a piece of equipment or reducing packaging waste through the production of consistent, fault-free packaging with precision handling capabilities.

### ***The capability and flexibility of the value chain***

Paper and board are intermediate products with a long distribution chain to the ultimate consumer. The chain from forest to end-user involves many production, converting and distribution steps, each of which adds both value and costs and many of these are independent, profit unit organisations.

The value chain is often only partially integrated. Pulp, paper and board production can be part of the same organisation or the same production mill, but there are very few cases of further vertical integration. The most common further vertical integration exists within the containerboard sector. Companies like Smurfit Kappa and David S Smith are involved in the manufacture of the containerboard (liner/fluting grades) and also in the manufacture of the corrugated cases. Even in these cases the integration levels are usually not above 50%, i.e. only 50% of the containerboard production is converted in own box plants.

For cartonboard and flexible packaging there is very little integration of the value chain. Converters in these sectors source fibre substrates, chemicals, polymers and converting machinery from a number of suppliers. Increasingly such converters

expect suppliers of both materials and equipment to offer an enhanced package in addition to the product itself. Such enhancements may include dedicated technical sales personnel, strong customer commitment; and joint development programmes. Increasingly supplier differentiation is related to the total package offered to the converter.

### **Fibre quality**

Many of the paper packaging grades are manufactured using recycled fibre, for example containerboard and white lined chipboard. Such fibre is sourced through mill owned or independent based recovered paper operations. Concerns have been raised that with continually increasing recycling rates the quality of the resulting fibre from recovered paper sources is being reduced through a more 'closed' recycling loop (i.e. less 'new' fibre is entering the loop) and heightened contamination arising from factors such as poor sorting or contamination from co-mingled collection.

A reduction in fibre quality will manifest itself in a number of ways in terms of the end use performance characteristics of products manufactured from recycled fibre based grades. Some deficiencies can be compensated through the addition of other additives, e.g. starch which will improve strength properties. However, such solutions will be less effective if fibre quality continues to deteriorate.

The issue has been compounded for many mills in the developed economies by the increasing demand for recovered paper imports by countries such as China who do not have sufficient 'home derived' sources of recovered paper to service the needs of the increasing number of Chinese paper packaging mills. This results in the highest quality recovered paper grades going for export.

With the drive to further increase recycling rates, there is likely to be a greater move to build in recyclability into a product at its inception. This may include using only chemicals/polymers for product functionality that are easily separated or removed

when the product returns to the recycling loop, or ensuring that any subsequent converting or processing stages have little or no detrimental effect on fibre properties.

### **Reductions in packaging use & sustainability**

Packaging always has and will continue to be developed on the basis of a series of trade-offs between many functions. The two functions that seem to be most in the spotlight today are consumer convenience and environmental friendliness. The struggle toward sustainability packaging is progressing but becoming more difficult every day because of the practicalities of a consuming society. Manufacturers of packaging must look for a balance between:

- Protecting the packaged goods
- Protecting public health
- Protecting the environment
- Complying with legal demands and regulations
- Providing brand differentiation and value to the consumer
- Providing necessary information about the packaged goods
- Making a profit in a highly competitive business arena.

New packaging designs using environmentally friendly materials and processes are important to the concept of sustainability, but protecting the product from damage or spoilage may have a far greater environmental impact than the packaging itself. It is essential that the packaging minimises product wastage in the supply chain and in the home. The factors that must be considered under the umbrella of sustainability are:

- Materials
- Overall energy use and transport
- Packaging waste minimization

- Reuse and source reduction
- Recycling
- Biodegradability and composting
- Waste-to-energy conversion
- Retail and consumer value.

A more sustainable future can be achieved by producing sustainable packaging. Materials and packaging design will always be very important areas in developing sustainable packaging but they are not the only tools available. Adjustments to the consumer and the supply chain will become more and more important. New and more sustainable production methods will also come into existence.

The increasing global population has resulted in an increase in resource consumption and placed a greater pressure on finite suppliers of materials such as fossil fuels. It is likely that this will result in materials such as petroleum-based packaging becoming more expensive. This will likely lead to an increased use of recycled material, a decrease in the amount of virgin materials consumed, and an increase in the use of materials from renewable sources, which should favour paper and board based packaging.

### **Regulations, environment & sustainability**

Environmental legislative requirements will have a considerable effect on how environmental considerations are managed in the future. The ability to anticipate and respond to future environmental legislation is seen as a key competitive issue. This is likely to be given a greater emphasis when more ambitious, far-reaching, and complicated legislation is introduced to protect the environment.

### **Packaging recycling and waste legislation**

Governments around the world are embracing the concept of reduce, reuse and recycle (the 3Rs), as are consumers. The principal outcome of the concerns about

the negative impact of packaging on the environment has been the introduction of legislation specific to packaging and packaging waste. The regulations focus on a range of packaging attributes such as its design, the use of certain materials, recycled-content requirements, the elimination of toxic materials and its disposability at the end of its life.

The EU has the most advanced packaging regulation, with many other countries following its lead. It has the strictest legislation on waste management. The 28 countries of the EU must comply with the Directive on Packaging and Packaging Waste that specifies minimum design standards for recyclability and requires countries to recover and recycle specified volumes of packaging waste. Formulated in 1994, the Waste Directive is the cornerstone of EU waste policy. The directive aims 'to harmonize national measures in order to prevent or reduce the impact of packaging and packaging waste on the environment' and sets out recycling and recovery targets. This was followed by the EU Landfill Directive in 1999 that aimed to prevent or reduce negative effects on the environment from the landfilling of waste. The Directive sets out targets to reduce the amounts of biodegradable waste reaching landfills. European, a packaging industry trade group, calls the directive 'clearly one of the most successful pieces of EU environmental legislation,' responsible for a 'remarkable' reduction in waste sent to disposal and for 'lower costs for the public purse'.

The Packaging Waste Directive was revised in 2005 to introduce a modernised approach to waste management based on Thematic Strategy on Waste Prevention and Recycling. The revised Directive focused on waste prevention and puts in place new targets for the EU Member States for recovery and recycling of packaging waste. The Directive introduced a five-step waste hierarchy where prevention is the best option, followed by reuse, recycling and other forms of recovery, with disposal such as landfill as the last resort. Both of these Directives have driven businesses to improve manufacturing efficiency and to consider the end of life of packaging, and

they have been very effective in increasing recycling rates of all types of packaging materials including paper, glass, metal and plastics. The amount of packaging going to final disposal in 15 EU countries fell by 43% between 2003 and 2013 largely due to higher recycling levels.

Despite the fact that over the past two decades much has been achieved, challenges remain and new opportunities can be seized according to the European Commission. On 2 July 2014, it adopted a legislative proposal and annex to review recycling and other waste-related targets in the EU Waste Framework Directive 2008/98/EC, the Landfill Directive 1999//31/EC and the Packaging and Packaging Waste Directive 94/62/EC.

The aim of the proposal is to boost recycling, secure access to raw materials and create jobs. It sets new targets and adds key provisions on the instruments to achieve and to monitor them. The main elements of the proposal include:

- Recycling and preparing for re-use of municipal waste to be increased to 70 % by 2030
- Recycling and preparing for re-use of packaging waste to be increased to 80 % by 2030, with material-specific targets set to gradually increase between 2020 and 2030 (to reach 90 % for paper by 2025 and 60% for plastics, 80% for wood, 90% of ferrous metal, aluminium and glass by the end of 2030)
- Phasing out landfilling by 2025 for recyclable (including plastics, paper, metals, glass and bio-waste) waste in non-hazardous waste landfills - corresponding to a maximum landfilling rate of 25%
- Measures aimed at reducing food waste generation by 30% by 2025;

This review - mainly focused on the end of life management of (packaging) waste - is set to contribute to the EU's overarching objectives in transitioning towards a resource efficient, low-carbon and competitive economy.

In the US, food, cosmetics and pharmaceuticals regulations also contain requirements for packaging and there has been an increasingly strong focus on packaging sustainability throughout the US packaging industry during 2014.

There is no standardised regulation in Asia and Africa. However, individual countries like China are increasing regulations on packaging and packaging waste at a national level.

Other important legislation related to packaging is the EPR (extended producer responsibility). Governments in Europe and Canada have been at the forefront in introducing EPR legislation, and it is now law in 47 countries including the EU, Canada, Brazil, Taiwan and Japan. EPR legislation mandates that any company that puts packaging on the market in any substantial amount must be responsible for managing its end-of-life by paying fees that partially or fully cover the cost to collect and recycle the materials used as packaging in their products. Industry funding organisations (IFOs) have been set up in several countries to pay for the recycling programme. EPR is also being introduced in the US by state governments. Although there is stiff opposition from several corporations regarding expanding EPR nationwide in the US, there is an equally strong movement to push it through.

Environmental packaging regulations are heavily influencing packaging development. New directives are setting recycling and recovery targets. While these regulations affect all countries, they have not been translated into law in a consistent manner. International commerce can be hindered if companies are forced to comply with inconsistent regional regulation and standards. There is no doubt that future environmental legislation will be stricter and more widely enforced. Campaigns by NGOs and environmental groups are also encouraging consumers to avoid over-packaged products and even to remove the packaging from a product and ship it back to the retailer.

## Labelling legislation

In addition to legislation aimed primarily at packaging waste, a number of changes to the product labelling are currently impacting paper and board packaging markets.

- Food packaging - incoming European regulations are changing in pursuit to give shoppers more information. The general labelling parts of the European Food Information to Consumers Regulation apply from 13 December 2014 are designed to drive greater consistency in labels and make food labelling easier for people to use. It is expected that so for a while both the old and the new labels will be in the shops, because it will take time to change all of the labels on food and drink packaging.
- Nutrition labelling - currently, food products claiming to have added vitamins and minerals must have nutrition information on its package. From 13 December 2014 providing nutrition information (energy, fat, saturates, carbohydrate, sugars, protein, salt) on most packaged foods will become a legal requirement. In addition, a longer list of other nutrients, including fibre and vitamins and mineral, can be provided on a voluntary basis. In addition to the nutrition table found on the back of packs manufacturers may also choose to voluntarily use the "hybrid" front-of-pack nutrition labelling scheme which allows for "traffic light" colours (red, amber and green) to be added to the RIs information. Traffic light colours are quick and simple to interpret, if consumers need information at-a-glance.
- Allergen information - new rules on allergen labelling were built on the current legislation. The 14 major food allergens will still be identified in the ingredients list. Where the allergen is not obvious from the name of the ingredient, there will be a clear reference to the name of the allergen next to the ingredient e.g. "casein (milk)" "or tofu (soya)". It is important to note that there will no longer be reference to gluten in ingredients lists. Consumers will instead need to look for the specific cereal containing gluten, such as wheat, rye or barley. Under the new rules the allergenic ingredients must also be emphasised, for example in bold, to make them stand out from the other ingredients.

- Health warnings for alcoholic drinks – these will possibly follow the example of tobacco packaging. The question is how these warnings can evolve in time and if alcohol packaging will end up with graphic health warning labels or ‘plain packaging’. Currently health warning labels either mandated by government or provided voluntarily by alcohol producers. Usually they take the form of reminders about general health risk associated with alcohol consumption, health risk of drinking during pregnancy and dangers of driving while drinking. From a business perspective, the introduction of mandatory health warnings would force producers to change their branding and potentially cause problems complying with export requirements and international trade agreements. In addition, the alcoholic drinks industry’s representatives state that the simplistic nature of package warnings (particularly the graphic, tobacco-style visuals) means they cannot give consumers all the facts or highlight the often complex relationship between alcohol consumption and health. Warning labels with simple slogans do nothing to provide the information consumers need to make informed decisions.
- Tobacco plain packaging – this refers to packaging that has no branding elements, images and colours which has already been introduced in some countries such as Australia and is being proposed in many other countries worldwide, though it is currently vehemently opposed by the major global tobacco companies. Brand name must be printed in a mandatory font, size and place of the pack in addition to other mandatory elements, such as excise tax stamps, toxic consistence and health warnings. This development clearly has major implications for the tobacco packaging industry and discussed in more detail later in this paper.

### **Digital printing**

The benefits of digital production methods – both inkjet and electrophotography (incl. toner, laser printing) – are well established and understood in commercial print but not all are applicable to packaging and labels, hence the low levels of take-up to date. Making short runs economic; consistently proven high quality; using print-on-demand ordering; providing personalisation capability; and connecting print engines

to dedicated finishing equipment to provide easy to use systems are all enablers that will boost adoption in the face of increasing demands from packaging specifiers and buyers.

Many larger packaging converters are reluctant to adopt digital methods of production. The reasons for this reluctance include: the cost of equipment and consumables; format and productivity of digital presses compared to conventional processes; the finishing requirements; and specific functional properties of packs act to make converters reluctant to change.

Brand owners and retailers are continually trying to improve supply chains by reducing cost and speeding up the response times. All brands are exploring new ways to engage with consumers. There is considerable legislation to provide more information to consumers, while track and trace and the provision of braille capability is on the horizon in Europe and the United States. Packaging supply chain optimisation – getting an item in front of a consumer to make a purchase decision at the lowest cost – is a continuing series of developments. Digital production methods can provide the means of increasing flexibility, for example through the adoption of late stage customisation to apply branding and market specific information to a generic pack or label is growing in pharmaceutical packaging and will be more widely adopted. This opens the way for more manufacturers to print packaging at point of use, avoiding the costs and inflexibility of having to carry stocks.

Instead of completing and stocking batches of product for subsequent orders, many pharmaceutical suppliers are instead producing larger quantities of generic products, then customising the packs for a particular application or product. In Europe this is becoming quite common with blister packs, cartons or vials being digitally printed in the destination language on bespoke lines. The benefit is reduction in stock through the supply chain, with potential for redundancy and waste as well as reducing the working capital tied up in stock. The last couple of years has been characterised by

many sectors reducing their stock holdings. Inkjet technology is increasingly being added onto existing packaging lines, replacing slow and limited thermal transfer systems to provide better quality and flexibility.

Digital printing can be useful in brand protection, with clear and UV fluorescent toners and inks providing covert and overt security features. Variable data capability can provide unique text and code identifiers providing total pack traceability across the whole supply chain to point of use.

There are intangible benefits of digital packaging production as companies try to get closer to customers. Personalised and customised packs, enabled by digital print are growing in use with many brands including Kleenex, Heinz, Wrigleys, Thorntons, Heineken, Lego, Milka and Coca Cola providing such products. The method links a web portal with digital print on demand, then finish and dispatch and it is growing rapidly for promotion and creating a new dialogue with customers.

There are continuing technology developments in digital printing, together with new finishing methods and associated workflow and data management tools to handle large numbers of small value jobs. There will be significant improvements in performance and economics of electrophotography and inkjet in the next five years to 2019. These will make digital a preferred option for more converters and other players going forward.

It is not just printing that is going digital, finishing is changing as the largely analogue processes are transformed with new technology. Low speed mechanical cutting systems are well proven for very short runs and flat plotting tables provide cutting, perforating and creasing with automatic loading and unloading making systems competitive on one-off designs and runs up to 1,000.

Digital print for paper and board packaging is likely to extend existing trends toward shorter run lengths and fragmentation, requiring greater flexibility, faster turnaround times and more late stage pack customization. It should also aid the further development of security and brand protection, consumer engagement and provide environmental benefits.

Some of major pioneers of digital printing for packaging are listed below, although many others (including some large players such as Xerox, Heidelberg/FujiFilm, Bobst/Kodak) are thought to be working on similar technology:

- Barberan
- CyanTec
- FujiFilm
- Gallus
- Hinterkopf
- HP/HP Indigo
- INX Digital Evolve
- KHS
- Konica Minolta/Komori
- Krones
- Hymmen
- KHS
- Landa
- Machines Dubuit
- Mark Andy
- Miyakoshi
- Océ InfiniStream (Canon)
- Sacmi
- Sun Automation
- Till Engineering

- ToneJet
- Xanté
- Xeikon Cheetah

Packaging presents a very large opportunity for inkjet. There is already a lot of corrugated printed using wide-format and flatbed presses with several vendors now offering new sheetfed and web corrugated presses. Carton and flexible packaging inkjet print systems are developing, for example the Landa digital nanography (an indirect inkjet process where the image is printed onto a moving belt and transferred to the substrate) is targeting cartons for its first printing press. A very interesting sector is using inkjet to print directly onto bottles and jars with the first machines being installed in brands and on filling lines, early examples of the potential to simplify packaging supply chains and print much closer to filling and selling points, potentially reducing stock levels and time.

Many different types of inkjet presses are available. The largest installed base is for wide-format printers, where a traversing head prints the image in a number of swathes, with the substrate advanced under the heads to build up the image. Flatbed machines have a bed where a rigid substrate is moved under the printheads, at a much faster speed, with high levels of automatic loading and unloading boosting throughput. There are narrow web presses, and very high speed wide web up to 1300mm where the print is a single pass at speed up to 300m per minute in full colour. High quality sheetfed inkjet presses are coming to market, aimed at commercial applications and cartons. The non-impact printing allows pre-diecut boards to be printed, greatly simplifying short run carton production for versioned and personalised print. The final category covers bespoke presses and systems that may be configured and developed for a particular application where integrators combine a front end data system with printheads, ink supply, substrate transport and drying into a system. This may be a one-off for a particular application, or for specialist machines such as varnishers and print enhancement machines. There are

imprinting heads that can be mounted onto presses, with several litho and flexo press manufacturers offering inkjet print as an option for their equipment.

For cartonboard packaging specifically the rapid uptake of digital print over the next few years is expected to lead to increased use of large format presses and more digital finishing, although initially, digital is expected to be used alongside traditional printing processes rather than substitute for them.

### ***End-user demands - brand owners switching products & packs***

Brand strength is the potency of a brand in comparison to the competition. It is the engine behind long-term growth; and relates to a brand's future value rather than its past. Distinctive and relevant packaging is a valuable asset to brand strength. Consequently, the strategic role of packaging in today's global consumer goods industry is escalating. Over the next five years, its growing ability to influence long-term profitability will see packaging investment, specification, design and development become a central part of decision-making for brand owners across the globe.

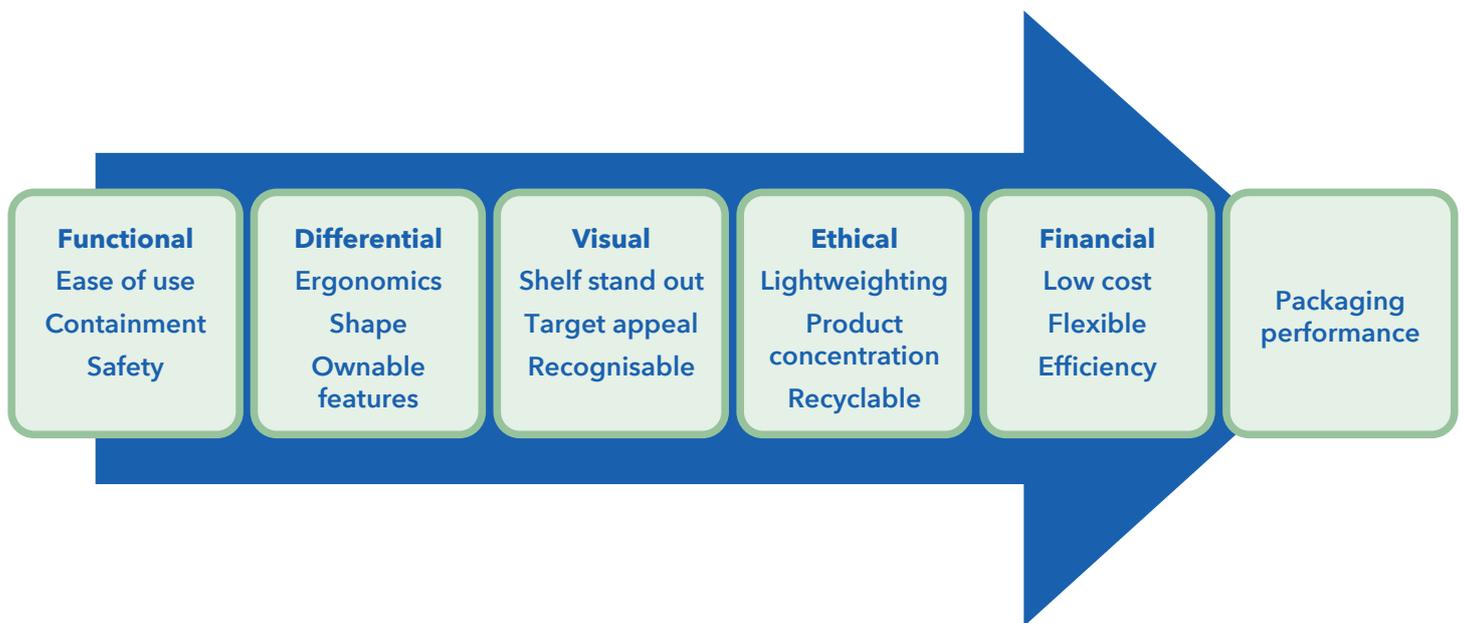
Packaging is so important to brand strength because it is the closest the brand can get to the target consumer. It is consequently a powerful marketing tool because it can create a brand identity, embody brand equity and influence consumer decisions. Good packaging design which is both relevant and differentiated not only has the ability to create a successful brand, but become its flagship and even an icon, as exemplified by Coca Cola.

Packaging is in essence an advertising medium that the brand owns, and if utilised effectively it will build recognition, awareness and trial. Its role in brand strength is heightened by the fact that it is a constant in an environment characterised by prolific media fragmentation. Every brand manager should aim to develop packaging that has a measurable impact on the marketplace and a measurable contribution to brand strength.

Increasingly, it is through investment in strategic packaging development that enables brands to build a sustainable differential advantage.

It is easier to truly innovate in packaging on a new brand or brand extension. True packaging innovation tends to be led by smaller companies, who are prepared to target a tightly defined market with a highly imaginative concept, designed to provoke an extreme emotional response (love or hate). This provocative approach indicates that there is significant merit in knowing the audience and single-mindedly designing the packaging to appeal directly to them. For established products, the brand owner tends to focus on improving the features on its existing packaging for competitive advantage, termed renovation. Increasingly, renovation has to work within the boundaries of environmental targets.

There is growing belief in the potential for packaging to build brand memorability and recognition by appealing to a range of senses - touch, taste, sound, smell and sight, if aligned to brand values. Appealing to multiple senses is emerging as an exciting opportunity to help brands connect more strongly with the consumer to drive preference, and ultimately build market share.



**FIGURE 6.1 Packaging performance elements**

Source: *Smithers Pira*

The table below summarises some of the key themes identified from Smithers Pira research which will shape all packaging development within the global fast-moving consumer goods (FMCG) industry over the next five years.

**TABLE 6.1 Packaging - shaping brand strength in 2015**

Key themes	New opportunities	Comments
Innovation needs a purpose	Brand fit	Supplier innovation should be brand-centric, and should demonstrably add value
	Consumer relevance	
Ownable differentiation	Shape	Unique features to distance brands from private label
	Usability	
	Sensory branding	
Segmentation	Market evolution	Breeding new opportunities for aligned packaging solutions
Convenience	Usage occasion	Portability
	Pack format	Simplifying life
	Portion control	Affordable treats
	Packaging diversity	Healthy living
Sustainability	Brand fit	Recyclable
		Light weight
	Brand trust	Use of recycled material
Ergonomics	Improved handling	Non-slip
	Marrying usage occasion with target consumer	Solutions designed for car travel
Merchandising	Colour/design blocking	Improved shelf impact
	Re-usable mobile units	Improved profitability

Source: Smithers Pira

**TABLE 6.1 (continued) Packaging - shaping brand strength in 2015**

Key themes	New opportunities	Comments
Low-cost based industries	Visual and surface finishes	Where packaging functionality is optimal, innovation should be channelled to enhance brand impact or target ownable structure
	Ownability	
Transparency	Product display	Driven by aesthetics, safety, reassurance, aligned to purity or to denote fill level in product categories such as juices, baby food, chilled dairy, snacks and home care
Small packs	Interactive packaging	Where there is limited space for design and legislative copy
Acoustics	Brand fit	Sound can work at three levels to build brand strength
	Quality	
	Function	

Source: *Smithers Pira*

Discussions with brand owners indicate that packaging performance is not measured in isolation. It forms part of a combination of variables that make up the assessment of brand strength. The apparent lack of specific and direct packaging focus could be a missed opportunity for brand owners. Packaging initiatives are often reactive and in response to regulatory demands or proactive competitive behaviour. It is about getting the fit right in terms of building brand values and remaining relevant to the target market. Brand owners confirmed the categorisation of what the most important packaging attributes for the building of their brands. These packaging performance criteria fall into the following areas based on three main sub divisions of functional, differential and visual areas. Less important but still of consideration are the ethical and financial roles that brand owners are keen to identify and measure. These brand strength elements are all related and connected to each other and cannot to assessed or measured in isolation. The key elements may be summarised as follows:

## 7. KEY GROWTH AREAS

### • Shelf ready packaging

Shelf-ready packaging is among the most interesting areas in packaging for board packaging producers – especially producers of corrugated packaging, the largest single sector within shelf ready. Static or decline food consumption in Western Europe and Japan is taking the edge of the growth in overall demand for corrugated board as a transit packaging product, but there is continued growth in retail shelf ready product and this is presenting some value-added opportunities.

**TABLE 7.1: The outlook for shelf-ready packaging to 2024**

Trend	Forecast to 2024
Population/urbanisation growth	Growing population requires bigger volume of staples thus more shelf-ready packaging is required. Overall population growth is predicted to show a rate of 1% over the next decade. Over the forecast period the highest increase is expected in Africa with 2% annual average growth. The latest available statistics on urbanisation show that just over half of the global population was urbanised in 2010 and the size of the urban population is likely to grow at a rate of almost 2% annually over the medium term
Growth of supermarkets	A key factor in the demand for shelf-ready packaging is the burgeoning growth in supermarkets. The number of major retail chains' supermarkets is over quarter of a million outlets. The largest number of supermarkets operated by major retail groups is to be found in Germany, which is home to more than 54,000 outlets, making up almost 21% of the total, followed by some 50,000 or 20% in the US and a further 29,000 or 11% in the UK. This retail channel is predicted to have the major impact on the development of shelf-ready packaging.
Retailers' influence	Retail requirements are driving new product development. They will remain the main driver of innovation in packaging, especially in the bakery and snack food sector. Retailers are specifying pack sizes and retail packaging to optimise shelf space, especially in high traffic areas of their outlets. The packs will continue increasing product count per case, using space more effectively and improving in-store appearance, as well as reducing overall corrugated consumption by its doubling as a transit pack and a point-of-sale display.

Source: *Smithers Pira*

**TABLE 7.1 (continued) The outlook for shelf-ready packaging to 2024**

Trend	Forecast to 2024
Online retailing	The internet continues its inexorable growth, with online retailing increasing steadily, posing a growing threat to traditional store-based retailing and thus to shelf-ready packaging. The global online population stood at almost 2.4 billion users in 2013 and this expected to continue growing. The trend towards online retailing is well illustrated by the growth of Amazon, which is predicted to outstrip Walmart over next decade.
Lightweighting	The need for reduced costs and improved sustainability is driving the development of lighter-weight materials that provide the same packaging characteristics as their predecessors. This has seen a steady reduction in board weights in the corrugated industry in particular, with average grams per square metre (gsm) falling over the years. This trend is still evident according to the latest European figures available from the European Federation of Corrugated Board Manufacturers (FEFCO).

Source: *Smithers Pira*

### **Luxury packaging**

When defining luxury packaging, it is necessary to look at the product that is being packed, as a definition of luxury cannot be given in isolation of the product itself. It may be the nature of the product itself, or the brand that contributes to the definition.

Materials are considered luxury when they are of the highest quality, and have the strength and weight required to maintain pack integrity. Paperboard is the most widely used material in luxury packaging in value terms. Solid bleach sulphate/board (SBS/SBB) is the highest quality paperboard grade and the one most frequently used in luxury packaging applications; folding boxboard is also used in some applications (generally GC1).

Paperboard is considered luxury when it is stiff, durable and both the inner and outer surface is white. Glass is the largest material in luxury packaging in volume

terms. It is the material of choice for many luxury products as it conveys an up-market image as a result of its various positive attributes. Glass has a heavy weight, is strong and recyclable, and consumers typically have a positive attitude towards products packaged in glass.

Luxury metal is produced from different types of finished steel (tin mill products) and different alloys of aluminium are used in packaging and component manufacture. Metal is sustainable, has the ability to protect products, and is often used as an added-value element of the luxury packaging, for example in the form of a label, cap or closure.

Plastic is the fastest growing material in luxury packaging. Various rigid and flexible plastics are used for luxury packaging, for example PET and polypropylene, and it is mainly used in the form of bottles, jars, trays, film and bags.

The global market for luxury goods packaging across cosmetics/fragrances, tobacco, confectionery, premium alcoholic drinks, gourmet food and watches/jewellery was valued at \$14.2 billion in 2014, growing by around four per cent on 2013 levels. Cosmetics/fragrances accounted for 43% of sales ahead of premium alcoholic drinks (22%), tobacco (17%) and confectionery (nine per cent). Western Europe accounted for over one third of sales, with major contributors including the French cosmetics and UK Scotch whisky industries.

The market is expected to grow by 4.4% per annum on average during the period 2014-2019, reaching \$17.6 billion, with growth rates ranging from around three per cent per annum in Western Europe and North America to six per cent in Asia-Pacific (incl. Japan) and as much as nine per cent in South & Central America. Cosmetics/fragrances will continue to drive growth at around six per cent per annum versus four per cent for premium alcoholic drinks, three per cent for confectionery and less than one per cent for tobacco.

## Finishing & decorative techniques

There are various finishing, printing and decorative techniques that can be applied to materials; it is often a combination of these techniques that will result in a luxury standard for packaging.

The effects that are applied to paperboard to achieve a luxury finish include lamination, hot foil stamping, embossing and tactile varnish. Various inks are also used, including UV, metallic and pearlescent.

Other important factors in luxury packaging design are aesthetic and functional innovation.

Aesthetic innovation involves packaging that is eye-catching, appealing and visually stands out from competitors. It can include packaging that has a unique shape, features extravagant designs and uses a combination of materials.

Innovation through functionality can be in many forms. For example, it can be an efficient dispensing system for cosmetics products, a format that locks in freshness for tobacco products, or an alcoholic drinks closure that prevents counterfeiting. Innovation can also be in various other forms; this can include personalised packaging and packaging that can interact with digital technology.

## Trends and technology developments

There are various market trends and developments in technology that are shaping the future of luxury packaging. Packaging that is sustainable, personalised, has the ability to interact with digital technology, prevents counterfeiting and uses the latest state-of-the-art printing technology, are all features that are predicted to have a greater presence in luxury packaging over the next five years.

In the luxury goods market, consumers want the packaging to reflect the high value of the product. As a result, consumers are more concerned about the appeal of the packaging over sustainability issues, and therefore are more forgiving if the packaging is not easily recyclable. Although environmentally friendly packaging is a nice-to-have feature, it is not essential in luxury packaging.

That said, consumers are also becoming increasingly more environmentally aware, particularly in response to 'over-packaging'. In addition, consumers in mature markets are typically more sensitive to sustainability issues in comparison to those in emerging markets.

These consumers are putting pressure on luxury brand owners to reduce the environmental impact of packaging whilst maintaining its luxury quality.

To address this, manufacturers are opting for more environmentally-friendly materials such as paperboard instead of plastics in some instances, reducing the environmental impact of the manufacturing process and using lightweighting techniques.

Manufacturers often offer a lightweight paperboard solution. For example, MeadWestvaco (MWV) has developed Promina for tobacco packaging; it is a more lightweight paperboard packaging solution, with a reduced weight of up to seven per cent when compared to MWV's PrintKote paperboard.

Veuve Clicquot launched the 'Naturally Clicquot' limited edition campaign in 2013. The packaging solution is a 100% biodegradable bottle cover made from potato starch and recycled paper. As well as being an environmentally friendly packaging solution, it also has isothermal capabilities keeping a bottle of Champagne chilled for approximately two hours.

Although sustainable packaging is not a priority for luxury goods, these examples are among many others that demonstrate that packaging manufacturers and luxury brands owners are working together to develop environmentally friendly luxury packaging solutions.

### Personalised packaging

Personalised luxury packaging is a hot trend in the current packaging market, which allows the product to be unique and personal to the consumer. It is popular as not only do brand owners engage with their consumers, consumers feel that brands are making the effort to build a relationship with them.

The volume of packaging that is personalised is extremely small today, with well under one in a thousand luxury packs featuring any kind of personalisation, but it is growing strongly. The success of the 'Share a Coke with...' campaign drew a lot of attention towards the concept, but it is not clear how uptake of this idea will progress going forward – at this moment in time there is some reluctance to avoid 'copy-cat' launches, but it is likely that the trend will catch on sector by sector.

The premium alcoholic drinks market is engaging with this trend, particularly Absolut, and other luxury markets are also experimenting with the idea of personalised packaging. For example, My Swiss Chocolate allows consumers to personalise their own chocolate as well as the packaging, and Lindt enables consumers to personalise the packaging with a name and a message.

Digital interaction with print is a way for luxury brand owners to reach out and engage with their consumers; the digital technologies that facilitate this interaction are expected to have a big influence in shaping the future of luxury packaging.

Rondo-Pak offers digital watermarking for folding cartons. Using InvisiMarc code, the digital watermarks connect packages and other printed materials to interactive

experiences on consumers' smartphones. It provides consumers with expanded brand messaging and detailed product information at the point of purchase. The digital watermarking can also be integrated into customers' brand authentication and anti-counterfeiting strategies. The major benefit of Rondo-Pak's watermarking is that it watermarking can be incorporated into the carton without the need for graphics or package redesign, detracting from established brand image and remain fully functional.

### Coding

Identification (ID) and Quick Response (QR) codes that are printed onto the packaging are increasingly being used to enable consumers to learn about the story behind a brand, in effect increasing the engagement and enriching the experience. In addition, these codes allow brands to clamp down on counterfeiting and assist in brand protection.

The use of ID codes and QR codes – as well as Augmented Reality (AR) apps and other methods of the digital realm interacting with print – is a growing trend and these methods are predicted to have a large presence in luxury packaging over the next five years. Pernod Ricard has plans to add QR codes to all products sold in China in 2014.

Despite its relatively slow take off in mobile, QR codes are quickly becoming a mainstay in luxury brand campaigns. Gucci, Givenchy, Fendi, Ferrari, Ferragamo Michael C. Fina, Norma Kamali, Neiman Marcus, Audi, Fortnum & Mason, and Bloomingdale's are all luxury brands, which are using QR codes in out-of-home ads, mailers and in-store. A lot of the uptake seems mainly to be in magazine, brochure and out-of-home advertising.

One of the factors that can put luxury brands off utilising QR is their lack of visual appeal. However luxury brands are finding new ways of altering the look of the

traditional QR code. This includes changing colour, shape, size and superimposing images. For example the Champagne brand Don Perignon equips its bottles with a stylised QR code (changing colour, shape, layering and additional detail) on the occasion of its new collection –a tribute to Andy Warhol in a limited edition. Jidvei wines have also produced a limited edition bottle with an enlarged gold QR code covering most of the bottle made to look like a maze with inscriptions appearing under black light. Gucci’s QR code has the shape of a handbag embedded in the code.

Some brands such as Johnnie Walker are going even further than employing QR with its smart bottle. The leading global drinks-maker is in Barcelona with a prototype for a JOHNNIE WALKER BLUE LABEL “smart bottle” that can communicate with users through NFC-embedded labels, a technology it developed in collaboration with Thinfilm and Diageo. The connected “smart bottle” aims to enhance the consumer experience by using printed sensor tags featuring Thinfilm’s OpenSense™ technology, which can detect both the sealed and opened state of each bottle. The tags and the sensor information they contain will allow Diageo to send personalized communications to consumers who read the tags with their smartphones.

Krug has included an ID code on its Champagne bottle labels. The process works by consumers either typing the code into the Krug website, or alternatively consumers can download the Krug ID app on a smartphone or tablet, which allows consumers to scan the ID code from the label. As a result, the packaging fulfils an additional role, and becomes a source for interaction between the packaging, the consumer and the digital realm.

.....  
**Rondo-Pak**  
**watermarking**

Source: *Healthcare Packaging magazine*



In the case of folding cartons, confectioner Fauchon Paris has a QR code as the decorative design for its box of 12 macaroons. The QR code spans

the whole front cover of the box in pink on a black background with the brand name located in the middle of the code. French fashion house Givenchy, meanwhile, is connecting consumers to its mobile-optimized site and Le Rouge campaign through a QR code on lipstick packaging. The brand placed a QR code on the box of its Le Rouge lipstick that leads consumers to its mobile site where they can discover more about the product and the campaign. The brand's logo is placed in the middle of the QR code.

### Augmented reality

As well as codes, Augmented Reality (AR) is becoming progressively more widespread and may be increasingly used in conjunction with luxury packaging. The benefits of AR technology are not only that consumers can gain additional information about the product, but also the engagement that is created with the product, giving consumers a richer experience.

### Anti-counterfeiting

A wide range of anti-counterfeiting technologies are employed for brand protection, including digital watermarks (although this is a very small market). Holograms represent a much more significant market, with other forms of protection including coding, tamper-evident packaging and other methods. The usage and range of anti-counterfeiting technologies and techniques is both widespread and growing in luxury markets, with marketers under pressure to remain one step ahead of the counterfeiters.

The global market for brand protection was valued at \$2.33 billion in 2013, encompassing value-added tamper evidence, track and trace, product authentication and anti-theft technologies (this does not include the value of the basic packaging). The luxury goods element within this is hard to assess, but in the case of cosmetics it is thought that this market will exceed \$100 million worldwide in the near future.

Anti-counterfeiting, track & trace and tamper proofing are three methods used to provide protection for brands. Security protection is vital for luxury brands as counterfeiting and supply chain security lapses are huge problems that result in the reputation of products being at risk as well as the potential for financial loss.

In order to combat these issues, there are various technologies that are applied to the packaging and labelling of luxury goods. These technologies are not only valuable for brands, but they also build consumer confidence due to confirmation of product authenticity.

Counterfeiting is prevented by label technologies, including security papers, holograms, taggants and radio frequency identification (RFID) technology. Supply chain lapses are being prevented by the use of track and trace methods, preventing products from being lost, misplaced or diverted.

Tamper proofing methods have been developed whereby any tampering with the product will lead to noticeable and permanent damage on the packaging.

In order to meet the demanding requirements of the perfume sector for quality of decoration, precision, sophistication, special effects, tamper-evident features and optimised packaging, Sleever International has developed a range of individual solutions which have been used in luxury brands such as Giorgio Armani, Yves Saint Laurent, Estée Lauder, Issey Miyake and Jean Paul Gaultier. Technologies include the tamper-proof Seelcap, or the Holosleeve which combines mono-oriented heat shrink film technology with holographics to guarantee the authenticity of a product and its integrity. It can be reinforced by covert UV printing which can only be detected by certain wave lengths and special relief effects. Rémy Martin and Hennessy cognacs use the Holosleeve on their products.

Italian luxury carton supplier Grafiche Bramucci has partnered with Ingenia Technology to provide an anti-diversion and anti-counterfeiting solution. Grafiche Bramucci has installed Ingenia’s scanning and coding system LSA. This involves scanning each individual carton to create a ‘fingerprint’ based on intrinsic, naturally occurring and microscopic randomness of the surface of the item. A double scan-head allows the LSA system to scan the inside as well as the outside of each product enabling any design or material type to be used.

**State-of-the-art technology**

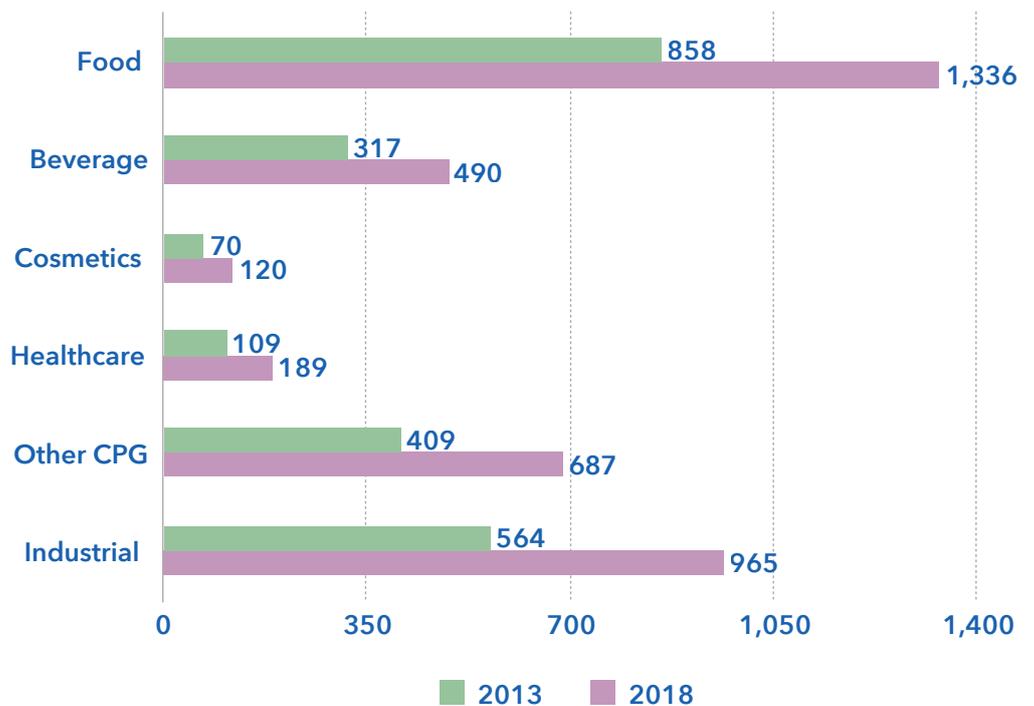
The latest state-of-the-art technology is used for luxury packaging in order to achieve the highest quality print and finish, and in particular, digital and 3D printers are increasingly being used in this sector.

3D printing is increasingly accessible, and is used by packaging manufacturers to create a prototype of a product, or to produce the final product itself. A 3D printer can make the building of a prototype a much quicker and more efficient procedure, allowing a turnaround of just a few hours.

Digital printing is set to be used more frequently for luxury packaging over the next five years, particularly for luxury packaging launches and personalised packaging campaigns. Digital printing can be used to achieve a wide range of textures and finishes of paperboard packaging, as well as for printing directly onto a glass bottle for a no-label look.

Track and trace -  
Theseus  
Andrews and  
Wykeham is  
responsible for  
Theseus, a track

.....  
**FIGURE 7.2 Global value-added brand protection sales by end-use, 2013-2018 (\$ million)**



Source: *Smithers Pira*

and trace system that allows each product to be tracked from its point of origin to the point of purchase.

The benefits of Theseus are that it minimises counterfeiting, contraband and parallel trading, and allows consumers to check the authenticity of their product. It works through holograms that contain QR codes, which carry information specific to that product. This safety measure is made with state-of-the-art Electronic Digital Signature (EDS) technology, which prevents the hologram from counterfeiting risks.

### Key application markets

Key application markets that require luxury packaging include alcoholic drinks, cosmetics & fragrances, tobacco and confectionery. Brand managers in these luxury markets work with packaging manufacturers to produce packaging solutions that are innovative, unique and conform to expectations of 'luxury'.

### Premium alcoholic drinks

Paperboard is frequently used for the secondary packaging of premium alcoholic drink. High quality board grades are used for the carton box and insert, particularly GC1 and SBB.

The role of luxury packaging for premium alcoholic drinks is to protect the product, reinforce brand identity and communicate brand values, give the product a presence on shop shelves, and it can also be a means of digital interaction. Packaging is also used as a platform to express seasonality, for example Valentine's Day, and it is important for gifting, particularly in Asia.

As well as using high quality materials, other features of luxury packaging for premium alcoholic drinks include the use of finishing effects such as foil blocking, metallised and pearlescent inks, a strap or handle on the case and ribbon. In addition,

metal is used for added-value elements, particularly for the label, and it is also used for caps and closures.

Isothermal packaging solutions are increasingly being used by Champagne brand owners; this added-value element of the packaging keeps the bottle chilled for approximately two hours.

### Cosmetics & fragrances

Luxury cosmetics & fragrances packaging is among the largest luxury packaging sectors, and demand is set to grow over the next five years, driven by the recovery in fragrance markets as well as strong growth in emerging markets.

After glass paperboard is the second most commonly used material in this market; it is used as secondary packaging to protect the product and add luxury appeal. Various techniques can be applied to add value, for example hot stamping and lamination.

The purpose of the overall packaging is to portray the image of the brand, draw consumers' attention and facilitate ease of use. Finishing techniques are widely used to enhance the packaging, particularly metallic finishes, as well as different colours, shapes, printing effects and materials.

### Tobacco

Paperboard is the main material used in luxury tobacco packaging. Wood and metal represent the main competition, particularly for luxury cigars. Asia dominates the luxury tobacco packaging market and - along with other developing markets - is set to grow over the next five years, whereas developed regions are forecast to decline.

Across the entire tobacco sector within developed regions, the packaging has never been more important; this is due to government regulations that restrict the

promotion of tobacco brands through media and advertisement. As a result, even mass-market tobacco brands, as well as premium brands, often employ high-quality packaging. However, prospects for high quality paperboard packaging in this sector are uncertain given legislative moves towards plain packaging in some countries.

Luxury tobacco packaging uses the highest quality paperboard grade, SBB, ensuring the board is thick and sturdy for durability reasons. Luxury tobacco packaging also uses more colours, well-crafted openings, and a number of finishing processes including high gloss and hot foil stamping. The ability to lock in freshness is an important feature of luxury tobacco packaging. High quality inner foil is used to maintain freshness; the foil is often made even more premium by the application of finishing techniques, such as embossing and de-bossing. Poly-wrap or cellophane wrap is also used around the outside surface of the carton box to lock in freshness. In addition, different formats and shapes are used for innovation and distinctiveness.

### Confectionery

Paperboard is also the most commonly used material in luxury confectionery packaging, competing mainly with plastics and metal. Western Europe dominates luxury confectionery packaging.

The function of the packaging is to keep the contents fresh and in line with food regulations, as well as keep the contents safe and intact during the supply chain to prevent damage.

One of the key aims of luxury confectionery packaging producers is to achieve a handcrafted look to make the box appear special, for example by using ribbons.

The shape of carton boxes differs depending on the product and also the cultural occasion, for example Valentine's Day and White day.

Added-value elements include finishing techniques such as hot foil stamping, the use of fabrics on the carton box such as satin, unique box construction and special shapes, window patching and high quality ribbons.

## 8 SUMMARY

• There remain significant growth opportunities for paper and board packaging worldwide, with containerboard demand rising steadily today, tied to the fortunes of the global economy and also world trade, and cartonboard growth driven in particular by rising demand in emerging economies. Furthermore, while paper has lost share to plastics in flexibles, flexible paper packaging demand continues to grow, partly driven by renewed growth in industrial packaging but also strong overall growth in consumer flexibles. In addition, there are a number of factors that are driving ahead demand for paper & board packaging, as well as influencing its design:

- Paper packaging sector provides recyclable and renewable solutions for many packaging needs
- Overall paper packaging market is stable with growth in many developing economies
- Rising energy costs and sustainability considerations are driving the demand for lighter weight packaging – less raw material consumed, less material to be transported
- Growth in e-commerce and rises in distribution costs have resulted in a rapidly increasing demand for lightweight containerboard
- Innovative developments are increasing the applicability and functionality of paper packaging

All paper-based packaging is influenced by a range of factors that affect performance, functionality, market acceptability and environmental performance. These include:

- Variability in recycled fibre quality used in the manufacture of a number of products;
- The increased application of digital printing for packaging applications;
- The application of increased automation and robotics in conversion to improve productivity and quality of the resultant packaging products;
- The capability and input of the various players in the value chain;
- Balancing the demand of packaging functionality with the increasing demands of sustainability, and
- The role of packaging in developing brand strength

Whilst competition from plastics is increasing, the future outlook for all paper-based packaging remains promising. It provides recyclable and renewable solutions for many packaging needs that meet many of the developing sustainable criteria of brand owners and end users and matches the changing needs of the market.

- From a market point of view many of the end use sectors requiring paper packaging are continuing to grow and the majority has made up ground lost during the economic downturn.
- From a sustainability stand point, paper-based packaging meets many of the sustainability criteria. Some of them are comparable with those of other industries, but paper packaging has its own unique and specific ones: the raw material is renewable, it is produced for the most part by renewable energy, it performs well as a package, it can be recovered for energy and it is widely recycled.

The clear, environmental advantages of paper based packaging have increased the overall desirability of such packaging by consumers, brand owners and retailers. For example, Procter & Gamble will “replace 25% of all petroleum-based packaging materials with sustainably-sourced renewables by 2020.”

In addition to the continued development of existing products in the carton, flexible packaging and containerboard sectors, there are further future opportunities that include:

- Flexible-packaging papers as wraps, bags and pouches that could substitute for films in some applications by providing: Better barrier protection (functional coatings added on- or off-line), clear substrates for product visibility (cellophane or next-generation papermaking), more durable substrates with higher tear and burst strength (through new fibres and nano-based coatings), and excellent print surfaces (via coatings and laminations).
- Foodservice and industrial paper wraps will reach into new end markets based on anti-corrosion, freezer-tolerant, chemical absorption/release, wax-replacement, oxygen-scavenging and other functional capabilities.
- New packaging shapes and structures will be developed with paper as the primary substrate. These include moulded-fibre paper bottles, paper alternatives to plastic clamshells and 100%-paper canisters which are starting to find more and more end uses. Even simply thinner, paper stand-up pouches are taking share away from traditional paperboard folding cartons.