1 Design and technology

Everything changes and nothing remains still.
Plato, from The Dialogues, Cratylus, paragraph 402, Section a.

ALL IS FLOWING: πάνταῥεῖ

This is not a book about design, it is not a design text book, but rather a collection of thoughts, analyses, and examples, paired with critical discussion as to how design, combined with innovation and smart technology can be put to good use in the consumer goods industry, especially in the food industry.

The food industry is probably not the first port of call when you look for good design, let alone great design.

Much comes down to the basics, i.e. manufacturing, marketing, distributing, and selling industrial food products in the most efficient and, for consumers, affordable ways, food that tastes good, is safe and nutritious, and is inexpensive. Most often, this does not allow for design in any form, with exceptions such as graphics and industrial design when it comes to packaging, or media design where communications and marketing are concerned, although the latter is even more rare than the former.

To say it right from the start, we feel that design is grossly and almost "criminally" underused in the food industry. If it is used, it is mostly for the more trivial matters such as logos, fonts, and colors. This is not to say that these are unimportant or easy tasks, but they are, by far, not enough. If designers are present in the activities of the food industry, they are rather kept at arm's length and in check by the marketing folks.

This book intends to make the point that not only are designers of many more disciplines tremendously important for the present and future successes of food corporations, but that designers should actually play an active and decisive role at the executive board level of any food company that strives for greater heights and greater success. It is the thought process of designers that is perfectly complementary to the other, more traditional thought processes already represented at board level, the MBAs, the finance experts, the marketing experts, the odd technical expert, and the lawyers. Fresh blood is dearly needed and designers can supply it!

Food Industry Design, Technology and Innovation, First Edition.
Helmut Traitler, Birgit Coleman and Karen Hofmann.

The title of this chapter states that "all is flowing," the ancient Greek πάνταῥεῖ (panta rei) as Heraklitos of Ephesos formulated it around 500 BC and on which Plato elaborated in one of his "Dialogues." He was referring to water and life in general, which is pretty large and daunting in itself. What it refers to here is the fact that over the years of development in the manufacturing and especially consumer goods industry, the notion of design has always been present and has always changed in importance and relevance, very much depending on the importance of form and function in the context of manufactured goods.

When we look at the early days of the automotive industry, over 100 years ago, function and functionality, the surmounting of technical hurdles, and the solution of technical challenges were the most important, overriding principles. Design was not at the forefront of the thought process of mechanical engineers or engineers in general, for that matter. Getting things done and making them work was more important. The technical challenges were large and difficult enough, so there was not much room for anything else.

With the advent of the production line, as introduced by Henry Ford to manufacture the famous and notorious Ford T models, design elements were becoming more important, and engineers would design shapes and forms that were very much based on functionality and the direct needs of the end user, the driver of the vehicle. We may call this approach "down-to-earth" design (DtE design), with little or nothing that goes beyond the straightforward desire to deliver something that works, is functional, and, most of all, is affordable.

The element of "it works" is fulfilled by the increasing competence of the engineers, the "functional" is the first sign of good design, and the "affordable" can clearly be linked to the production methods that were introduced for the first time in those days.

The next quantum leap in the history of design came with the invention of plastic materials and their industrial usage. The year 1907 marked the invention of "Bakelite," followed by the creation of "Formica" in 1913. However, it took more than 30 years before the synthetic materials, plastics, came into the mainstream and were heavily used in many different industries, most importantly in furniture and consumer goods (Lewin, 1991).

Very rapidly, the automotive industry developed a very strong and years-long love affair with increasing design elements of a non-functional nature, and this trend can very easily be seen in the American cars of the 1950s and 1960s, which really seemed to be the playground of designers, where they could realize their most extraordinary fantasies and dreams. Functionality was second and design elements even became dangerous additions to otherwise very functional vehicles.

When the Bayer company of Leverkusen in Germany invented polycarbonate in the late 1950s and early 1960s they also wanted to show its versatility beyond simple household goods such as glasses, plates, cutlery, bottles, baby bottles, and the like, which resisted far higher temperatures than other plastic materials at the time. The first-generation polycarbonate could be used at temperatures of up to almost 130 °C and was therefore quite unique in those days. But Bayer had another ambition too: it wanted to prove that its innovative plastic material could be used in the automotive industry, and not just in a few parts here and there, replacing steel and other metals, but in the entire car, from the engine bay, to the trunk, to the passenger cabin, and the body.

Thus, back in the mid-sixties, Bayer revealed the first, fully plastic (except, of course, the engine, exhaust, and gearbox) concept car. Long before its time, this concept car was a strong harbinger of things to come and led the way to an increased use of plastic materials in the car industry and automotive design.

If we follow this line, we can also observe that metal shaping knowhow became increasingly sophisticated, and plastic molding and steel or aluminum forming became concurrently and widely used technologies during these years and into present times, thus enabling designers to play with all these materials in many new and exciting ways.

As we said above, "all is flowing," and so is design or rather the approach to design and its perception and role in today's world. When you ask people, "What is design?", most link it to fashion. It's the standard answer of the average, "uninitiated" person, which you will get probably two times out of three. What does this mean? Well, most likely, the world of fashion has made a better job in promoting one of their more important elements of success, which is, undoubtedly, design. This also means that other industries have not been equally successful.

Let us again use the automotive industry as an example. After the "sins of the 50s," the design of cars was very much toned down and safety elements became *the* driving force. There was and is nothing wrong with this, as it has certainly helped to make driving safer these days. There was one factor, perhaps, that weighed even more in increasing drivers' safety and that was the introduction of random checks by the police, which was by design, but has nothing to do with design.

Remember the Volvo bumpers? Huge promontories with lots of rubber, definitely advancing the safety features on vehicles, and also certainly helping the shareholders of the rubber industry. Every car, all of a sudden, seemed to have them, even the MGB of 1975. Design, once again, was secondary, the driving force was functionality in the constructive disguise of safety. Remember, all is flowing and so is design.

At the end of the day, it's all about form and function and the struggle to get a harmonious balance between these two basic and crucial elements. So, fashion has done a good job. Who else? Let us expand a little bit on education, on schools and colleges, places where design is taught and where the future (or present) designers will come from (came from).

Design schools probably existed longer than we would imagine and we may argue that Guarneri's or Stradivari's workshops with many students or apprentices were already design schools. What better item is there than a wonderful and well-sounding violin to show the fantastic equilibrium between form and function. And it goes farther: the choice of materials, not only the woods but also the paints, the mixtures of natural ingredients, the way of cutting, gluing, sanding, applying, and finishing off such an instrument. Students were taught and they learned how to do this work, how to create these objects of musicians' desires, and how to optimally balance form and function. If this is not design, and if this is not a school of design, then we would not recognize reality.

But we can go back even further: the Sumerians, Hammurabi's mask, and other related relics were not only works of devotion and art, but totally designed, the marble lions of Delos, the buildings in ancient Greece, where architecture and art, design ultimately, came together, joined forces, and left wonderful signs of design; all this was taught, and students, apprentices, and future masters went through schools that we would call design schools by today's standards.

All is flowing!

So, back to the present day, because that's what has to interest us in the context of this book, namely the role of design in today's industry, especially in today's food industry, and how this links to technology and innovation in general. And, back to the question, how today's designers are educated and where this takes place and what is the emphasis on the

different topics taught in such schools. Let's show a few examples and discuss the various orientations of these institutions.

Design schools can be found almost all over the developed world. Not so long ago in 2004/2005, Lim Kok Wing opened his "College of Creative Technology" in Cyber Jaya not far away from Kuala Lumpur in Malaysia. The school very quickly drew almost 4000 students with more than two-thirds from South East Asia and the remainder from Asia Pacific (Australia, New Zealand).

The location is a very interesting one, being one corner of the triangle "Kuala Lumpur—Airport and Formula 1 circuit—Cyber Jaya/Putra Jaya", the last being the seat of the prime minister and the government of Malaysia.

Cyber Jaya is the location of many more university colleges, the Lim Kok Wing School being just one, yet a rather large school given that it is a design college. The school intrigues by its architecture as well as the diversity of offerings, of branches that are taught. It's in a tropical environment, therefore the building has a center space that is just like a big tent, wide open on two sides and a meeting place for students from all the different design branches. And there are numerous branches, the usual ones from graphics to industrial design, but also the less typical ones such as hair design (yes, hair design is design too) to fashion and media design.

Staff and students proudly showed us different communication campaigns that the media design students did in the past for well-known politicians and that were a great example of what design can be, namely a vehicle to shape not only an object but even more so a process, an evolution, something that is on its way to being shaped and created.

It is not so much the final object and its perfect shape, form and function that are of importance, but almost more importantly the way, directional as well as procedural, that one gets there.

This aspect of "how we get there," of how "all is flowing" is a very crucial aspect of design and how it can apply to society, how it can apply to the individual, and, ultimately, how it can and will have to apply to corporations, especially those that operate in the fast-moving consumer goods area, such as the food industry.

As we are already, at least mentally, in South East Asia, let's turn to another example in the region, namely the LASALLE College of the Arts school in Singapore, one of two schools that will be briefly mentioned and discussed in this chapter. The LASALLE school, founded in 1984, very quickly became a school for drama and design, already having the creative vision of combining the arts, especially dramatic arts, with innovative design. When they moved into their newly constructed premises in early 2007, a very prominent place, almost a showcase, was given to dance; we could almost call it the "design of movement," basically the first thing a visitor can see when approaching the impressive modern and functional multi-tower building that houses the LASALLE school.

One can find all or most of the other traditional design branches, with industrial design being a very important leg. Staff members come from many different backgrounds, but given the British heritage, many of them come from the British Isles with educational backgrounds from Newcastle and other British design schools. Again, the intriguing part here is not only the diverse and modern approach to design, but the inclusion of other artistic activities, such as drama and dance, into the definition of what design is and can be, namely a truly inclusive approach.

Just a few miles away from LASALLE we find the Nanyang Polytechnic, a large engineering college with over 12,000 students, next to the NUS (National University of

Singapore), the largest university in Singapore. Nanyang has a small design department that is especially active in furniture design, but also packaging design, and has strong capabilities and competences in tooling, and mould design and creation for fast prototyping, which is an increasingly important activity in today's world of object design.

To finish off our short excursion to Singapore, it is certainly worthwhile to mention that there is a very attractive and active Red Dot Museum in Singapore that shows many examples of already proven and industrialized design objects, as well as some more exotic and visionary design solutions to recycling packaging materials, such as PET bottles for building purposes.

Another top-class design institution can be found in Pasadena, California, namely the Art Center College of Design (Art Center) with two campuses and several thousand students. In the past, the Art Center was mainly famous for its automotive design. Not so long ago, approximately 50% of all vehicles that were out on the streets were at one time designed by former students of the Art Center and there is still an annual show of such vehicles, depicting the strength and heritage of the Art Center in the world of automotive design. But that's not all, as we know by now, all is flowing, and so are the directions and orientations that even such a prestigious and well-established school as the Art Center have taken.

Being close to many different stimuli such as the arts (movies, entertainment, theme parks, etc.) as well as science (Caltech, JPL, UCLA, USC), the Art Center collaborates with all or most of the representatives of these very different areas. The Art Center has also added two new approaches to their traditional object design: the first one really touches upon the question of process versus object, and striking the right balance, whereas the second concerns the planning of new educational collaborations with business schools, especially with schools such as INSEAD in Versailles (France) and Singapore. Several courses were organized that combined the two worlds of business and design, with students from both branches.

There were even plans to enlarge this educational collaboration by including engineers from, for example, Caltech, but at this point in time it is unknown how far this really went. The idea is of course a wonderful and fascinating one; we know from experience and from historic examples that real creativity and innovation happens at the borderlines, the fault lines between different disciplines, and the theory goes that by increasing the number of fault lines we can dramatically increase the number of innovative events.

There is one last good example of a creative design school with lots of interfaces to scientific and business areas, namely the ECAL (Ecole cantonale d'art de Lausanne) in Switzerland. The school is located in a former industrial building that was transformed to fit the needs and requirements of a design school and has lots of space for work, as well as encounters. It is in the heart of what is called the "arc lémanique," which is the northern and center shores of Lake Geneva, especially around the city of Lausanne.

Lausanne sports two top-class universities the EPFL (École Polytechnique de Lausanne), as well as the UNIL (University of Lausanne). EPFL in global university rankings is one of the top 50 schools in the world and is amongst the 10 best in engineering.

All is flowing, and especially the old dividing lines between different, seemingly very far apart disciplines, such as design and science and engineering are starting to flow into each other, and are disappearing. ECAL has a strong graphics design department, but mainly lives on the strong interactions with the technical world, as well as the very numerous businesses in the "arc lemanique," which is home to a great number of large global companies. It is again the fault line between traditional design disciplines and other branches, such as

business and technology that is a fertile playground in which to use the full potential of design and its capabilities to create, shape, form, and make functional in the most efficient, simple, and aesthetic ways.

Chapter 4 discusses and describes in much detail design in academia, the role that design education plays, and the influence that it has on society, but also on the corporate world.

HOW DESIGN INFLUENCES OUR LIVES: FORM AND FUNCTION

We have actually not yet talked about what design really means and can present.

Merriam—Webster's Collegiate Dictionary (10th edn 2001, p. 312) actually gives three definitions that are of relevance to "our" design definition:

1. The arrangement of elements or details in a product or work of art
2. A decorative pattern
3. The creative art of executing aesthetic or functional designs

These are all very good definitions and we are not here to argue with them. However, they mainly describe an action (1 and 3) or a situation (2). Yet, design is more than that. One could argue that everything is design or to be more specific, is designed. Just to be clear, there are no theological undertones here, strictly observationally speaking, nature shows us that form and functionality perfectly well go together, and are the way that nature is designed.

The harmonious balance between form and function is the most basic underlying principle as to how a plant, for instance, is constructed: a mixture of fibrous substructures, lignified parts to give strength and the possibility to grow higher, channels to transport water with nutrients, branches to spread out to enable leaves to find the most exposure to light, rain as well as oxygen and carbon dioxide, the latter two being most critical for the growth and survival of any plant.

Surface structures of leaves are such that a leaf can do two things: adsorb and absorb carbon dioxide to transmit it to other parts in the leaf for subsequent photosynthesis, i.e. transforming CO_2 and water with the assistance of light and chlorophyll within the chloroplasts of the leaf into carbon backbone molecules, namely sugars, necessary for the plant to feed on, and oxygen, given back to the atmosphere.

Like every living being on our planet, the tree needs oxygen to breath as well, which happens during dark periods, i.e. at night, and that equally happens through the surface and inside the cell structure of the leaf, so this is a two-way street, a structural element with functions to absorb and desorb molecules of vital importance. This is a perfect example where form and function play wonderfully together and there are many more, thousands, if not millions, such examples in nature with similar form—function elements.

We can therefore truthfully say that basically everything around us is designed in one way or another, and all this with probably only one principal design element, which is the best harmony between form and function. By looking again at the origin, nature and application of "man-made" design, we can easily say, by simple personal observation, that most design and designed objects do not follow this principle and yet, it would be so easy.

There are few examples of really well-designed objects that respect the form—function principle, but not many. We will look at these further below.

Let us first look at the long list of design that is clearly not taking this into account and that we could classify as design for design's sake: it's just for the eye, which per se is not a real drawback, as long as the designed feature makes sense one way or another, either for aesthetic or economic reasons, provided it does not go against the fundamental principles described and discussed above. Automotive design of the 1950s and 1960s can be classified under the headline "Trying to please a specific customer base." Lots of chrome, exorbitant shapes, so-called trendy colors, and similar attributes. Of course, one can argue that there is still a certain form—function principle to be seen, at least to some degree, but it is very well hidden under a large amount of heavy design overload.

There are many more such examples in more recent times, not only in the automotive field; the evolution of graphics design through the last couple of decades can also be used as an example. When looking at newspaper logos and typesets of the last 30 to 40 years we can clearly see a trend to a more sober, "cleaner" image, plus the introduction of color into mass-produced newspapers and other printed items. There are two main reasons for this. Firstly, technology has evolved and up to 11-head large industrial printers for multiple colors and other graphic elements are a reality today, although still fairly expensive to use to their full potential. Secondly, public taste has evolved and tends to be more sober and simple, despite the fact that we can find hundreds of different fonts in the word processors of our computers. It appears that more choice has led to a lower uptake! How come? Like every aspect of our lives, much of this is linked to fashions, fashions that come and go and come again, and so on. And we cannot even state, with certainty, that fashion is only driven by one side that has an interest in change so that new products with new designs can be created, manufactured, and sold. It is not as simple as that. Fashion is driven from many angles. It is certainly driven by the party that wants new economic success, but it is also driven from the consumers' end and probably many more "interested parties." It goes beyond the scope of this chapter and also this book to analyze all elements and factors that drive fashion and fashion changes, but it is important to understand that fashion is an extremely important element of design and ultimately design choices, often overriding our well-established form—function principle.

If fashion drives design then we should also deduce that design drives fashion; and this is certainly the case, very much so. As with the infamous chicken-and-egg, it is unclear what comes first and any speculation might be futile. However, we should look at the two sides, just for the argument's sake.

When Volvo introduced the well-known enormous safety bumpers, it subsequently drove a new fashion of enormous, rubber-lined bumpers on almost every car, even on an MGB, as mentioned earlier.

When the public expectation drove a fashion to smaller and more multifunctional objects, Apple created its first iPhone. It is arguable whether public expectations really came first, but it is a likely description of the situation and the argument can be made that Apple was better at reading consumers' desires, although they would probably not entirely agree: their argument would be that they were just more visionary and foresightful than anyone else. Whichever way, it just shows that the question whether "fashion drives design" or "design drives fashion" cannot be answered unequivocally. This is an important notion to keep in mind, now and for the following sections of this chapter, as well as the entire book. We will discuss this aspect as we discuss the important elements of this book,

namely the influence of design and design thinking on the fast-moving consumer goods industry, especially the food industry.

If fashion or rather fashions and design are so interwoven, then we need to discuss in more detail the important interactions between design and the "receiving end," the consumers, the different communities and, why not, society at large. It is a very visible fact that fashion and design influences the look of a society: what clothes do we wear, what accessories do we use, what haircut do we sport, what gadgets do we surround ourselves with, what cars do we drive, what condominiums do we live in, what furniture do we sit or sleep on, what materials are used in our condos or houses and who tells us what is fashionable and therefore desirable?

THE HGTV EFFECT

HGTV or Home & Garden TV is a very successful, originally Canadian TV station. It features shows like House Hunters, House Hunters International, Income Property, Love it or List it, Property Brothers, and many more, all linked to homes, very few to gardens anymore. There is, however, one very strong common element to all these shows: they drive desires by driving fashions by insinuating, more than subliminally, that certain materials and styles are a must for the masses today. There are always four recurring messages and they come in all "colors and variations". First, it has to be open-plan living with lots of kitchen space because "we love to entertain"; most often, "entertainment" is then depicted by cutting a few fruits in a gigantic kitchen! Second, appliances *have* to be stainless steel and the cooktop *has* to be gas! Induction heating, increasingly also used by professional chefs is just beginning to find HGTV's blessing. Third, countertops *have* to be granite; it's just what you have to have. More recently, quartz countertops have become fashionable too, and they certainly start to show the next trend. Fourth, floors have to be hardwood, and large tiles or marble in bathrooms. The funny thing is that these four rules seem to apply to any type of house, in any location, any style, and any price range.

So, who drives what? In order to answer this, we may have to dig a little deeper into the story and look back a few years. Increasing affluence, especially after WWII and the 1960s and 1970s has, amongst many other phenomena, such as two cars per family, more exotic vacations etc., also led to increased sizes of condominiums or houses. As an example, most of the new condos built in Switzerland before 1980 were below 1000 sq ft, since then, 80% of condominiums in Switzerland have a size of more than 1000 sq ft.

It may be argued that, eventually, such bigger space also led to the idea or the desire to spend more time at home and render one's place more cozy and stylish. That, of course was the opportunity for related industries to propose new materials, and out went the old, cheap stuff, like linoleum, parquet, carpets or small-sized tiles, and in came hardwood floors and large-sized tiles, the latter also because technological advances were made in that industry allowing for tile sizes of 25 inches or, more recently, even larger. Out went the old-fashioned laminate or tiled countertops and in came granite, almost exclusively these days, without much questioning whether it really makes sense and fits in the environment. Out went the old-style wardrobes, and, because houses and condos became bigger, there was space to put walk-in closets, ideally one for her and one for him, hiding all the stuff that would either go into wardrobes or be lying around in a not so orderly fashion. The next item on the increased size list was the kitchen. Kitchens more recently have become really fashionable spaces.

Most importantly these days, they have to be open to the dining and/or family room so that the person or the persons who prepare(s) the meal can communicate, visually as well as orally, with the rest of the family or their guests. It is suspected that this trend did not start as a feminist off-shoot, but rather it was first created in the restaurant industry.

In the early 1990s, Disney created open kitchen restaurants in all their theme parks. All kitchens were totally open to the dining room and guests could see the professional chefs at work. There is no proof that Disney was the first in this trend, but it was a very strong instigator and promoter [D. Hannig, Disney Food & Restaurants, personal communication, 1994]. Many restaurants followed this trend and many popular food chains in the USA have designed their restaurants in this open-plan fashion since. It can be deduced that once the trend was well established in the popular restaurant world, it would not take long before it was followed in the homes of fashion- and trend-motivated individual home owners.

In the early 2000s a new trend, the "cocooning trend" could be observed. After a peak of out-of-home eating of around 50% in the USA and other developed countries at around the same time, and with the improved home quality, space, and coziness, it was maybe to be expected that people, especially young professional couples, would discover their own space again and stay home more. Staying home more also means having friends and family over to one's home more often, thereby using the increased space and more open nature of one's kitchen and living area in a much more efficient way.

Here's a controversial, yet believed to be true, personal observation and statement: most kitchens in Italian homes are small, if not to say tiny, and yet, meals that come out of Mama's kitchen are, most of the time, close to divine. So the statement could be: "The tinier the kitchen, the better the meal"; for the reader to contemplate and discuss, maybe over a meal with your friends in the open-plan, large environment of your home?

So, let's get back to the initial question as to who drives what? From the short analysis above, it can be said that the answer is not simple and clear cut: most likely, because and as a result of the trends described above, HGTV, and similar programs, drive fashions and desires, and the consumers, the real-estate clients, see these as a must, to be followed almost religiously. Just think of the alternatives: what about white or colored appliances, following the color scheme of the surrounding kitchen, what about induction stove-tops, what about polished concrete, colored or gray, what about, what about, what about … ? Moreover, brass fixtures, tiles with large grout lines and electric coil stoves are seen as a thing of the 70s (and they are, no doubt about that!), but the point is, some of these just may fit into my very personal color and design pattern.

Wait, there are more must-haves of our day: large master suites with "tons of light" through extra large windows seem to be a must too, although one typically sleeps in a bedroom. Yes, there are other things too that happen there, but none of these require "tons of light," but they rather require "tons of window treatments" to get the room dark enough to sleep. All this is in no way a rant against HGTV, but just shows a rather large number of really striking examples as to how fashion is driven and desires are created and steered, and the relevant industry has all the responses and solutions readily available, and available fast.

When watching other shows like "Grand Designs" and "Grand Designs Australia," you observe similar trend patterns, although they are subtly, often strikingly different from the ones constantly repeated by HGTV. Kevin McCloud, host and presenter of the show, makes a very fine job when insinuating certain trends, but ultimately the results are the same: fashions are created and desires are driven, not so much towards the "four HGTV commandments," but here we are subjected to the use of exotic building materials such as car

tires, inside—outside houses, energy independence, all-transparent glass houses, and, as the title of the show says, grand designs, not just grand meaning big, but grand meaning daring and different, and demonstrating that grand yet humble architecture shapes the people who live in such places. It has to be said that what sticks most when watching shows like Grand Designs is the word sustainability, which, after all, is not such a bad key word to retain. However, the patterns, as said above, are similar, and people will follow these, more or less convinced that this is the way to go, the way to follow.

How much chance does the individual have to escape these fashion musts and how daring can and will the individual be in creating his or her own fashions and patterns in any situation of their lives, especially when it comes to design and design-related matters? It is probably the same as with all fashions, from clothes to shoes to cars to computers, smart phones, cameras, and many more items of our daily lives: we can hardly escape what is dictated by many players, especially the consumer goods industry and everything linked to it, such as advertising, media, and, increasingly, the social media.

We will discuss the role of social media in a later chapter, but we can say this much: social media are already replacing and will increasingly replace traditional communication channels, and it is debatable if the importance of traditional media and their influence on consumers will develop in parallel with the rise of social media channels. Today, the number of hits on YouTube or the number of followers on Twitter is an increasingly important measure for present and future successes of products or fashions, as well as new behavior patterns in many communities and societies.

It can safely be concluded that there is no escape from prevailing trends, and maybe this is not such a bad thing. There will always be individuals who can and will escape and create their own, new space, which may or may not become larger and more successful, and eventually replace existing trends to such a degree that they will take over the public at large and become mainstream. It is not bad at all and gives hope to the outsiders who will, as in the past, drive future innovation, together with the many other drivers in this landscape of fashion and innovation.

DESIGN IN THE FOOD INDUSTRY

As stated in the very first sentence of this book, this chapter, the food industry is maybe not the first port of call when it comes to looking for good design, or any design at all. This sounds like a strong statement, but from personal experience it can be said that it comes very close to reality, obviously with many good exceptions and examples that prove the contrary. Why has the food industry been so negligent in the design field? The answer is pretty simple: because it could.

But why could it? Well, because no one cared or at least didn't see this as an important, missing element. After all, food is just food and there are other fish to fry when it comes to food products.

Let us be more specific. Major criteria for industrial food products read like:

- Tasty and good, expected flavor and texture
- Safe
- Healthy and nutritious
- Convenient to prepare or finish

- Good value for money
- Little out-of-pocket spending and overall affordable (in many instances)
- And yes, there is packaging as well, and yes, hopefully it is not overpackaged
- Increasingly, sustainability and environmental responsibility, small carbon footprint are on this list as well.

It can be said that there are more criteria linked to good industrial food products, but the above is already a rather comprehensive list. It should also be stated that the individual importance of these criteria may differ from location to location, from culture to culture, and even the term "nutritious" may have different meanings, for instance for a country like Eritrea versus the UK, just as an example. Good nutrition in the UK may mean low fat with a good mix of fatty acids, or low sugar or salt, whereas in Eritrea it could just simply mean to get enough calories and salt, the latter to retain water in the body.

The one element in the list above that has the strongest and most logical connection is packaging and all packaging-related matters, although it should be said at the onset that good design does not stop at the packaging of a food product, but can and must apply to the food product itself. We will discuss several examples of this further below and in later chapters.

Let us first look in some detail into the role of packaging in the food industry and how this can relate to design, technology, and innovation. Traditionally, and from our own experience, packaging in the food industry was and maybe even still is, despite many good examples pointing to the contrary, the unloved child of the industry. When first being exposed to packaging in the food industry in 2002, and this after more than 20 years of having worked in parts of the industry that were concerned with new products, ingredients, and process development, the term "packaging" was not on the top 10 list of words being heard. A first encounter with packaging was accompanied by explanations such as: costs too much, can we reduce the amount of materials that we need?, it's a necessary nuisance, make it go away as much as possible. This pretty much explains that many in the food industry, and we specifically refer exclusively to the food industry, and not other branches of the consumer goods industry, saw packaging as a problem to make go away and not as the opportunity and defining element that it really can and must be.

In a very emotional and defining moment during a meeting with the president of the Japanese Association for the Elderly [Private Communication, Tokyo, November 2003], the role of packaging was discussed in great detail and particularly outspoken and important, if not essential, needs for packaging were listed and established.

Figure 1.1 depicts, in an overview, the various needs that were listed, but most importantly, good packaging was defined as being based on "universal" and "inclusive" design, meaning that such packaging takes note of the needs of all parts of the population, the very young and the very old, and by consequence, everyone in between. It has to be "friendly to human beings".

This is how we established principles of good packaging:

As can be seen in Figure 1.1, there are seven main elements, the criteria that are of primary importance when we speak about concepts of good packaging in the food industry. There is one increasingly important and even overriding criterion for good food packaging: it has to be environmentally friendly and respect the rules of sustainability. It goes without saying that many or most of these criteria apply to other members of the consumer goods industry as well, such as household goods, small appliances, audio and video media,

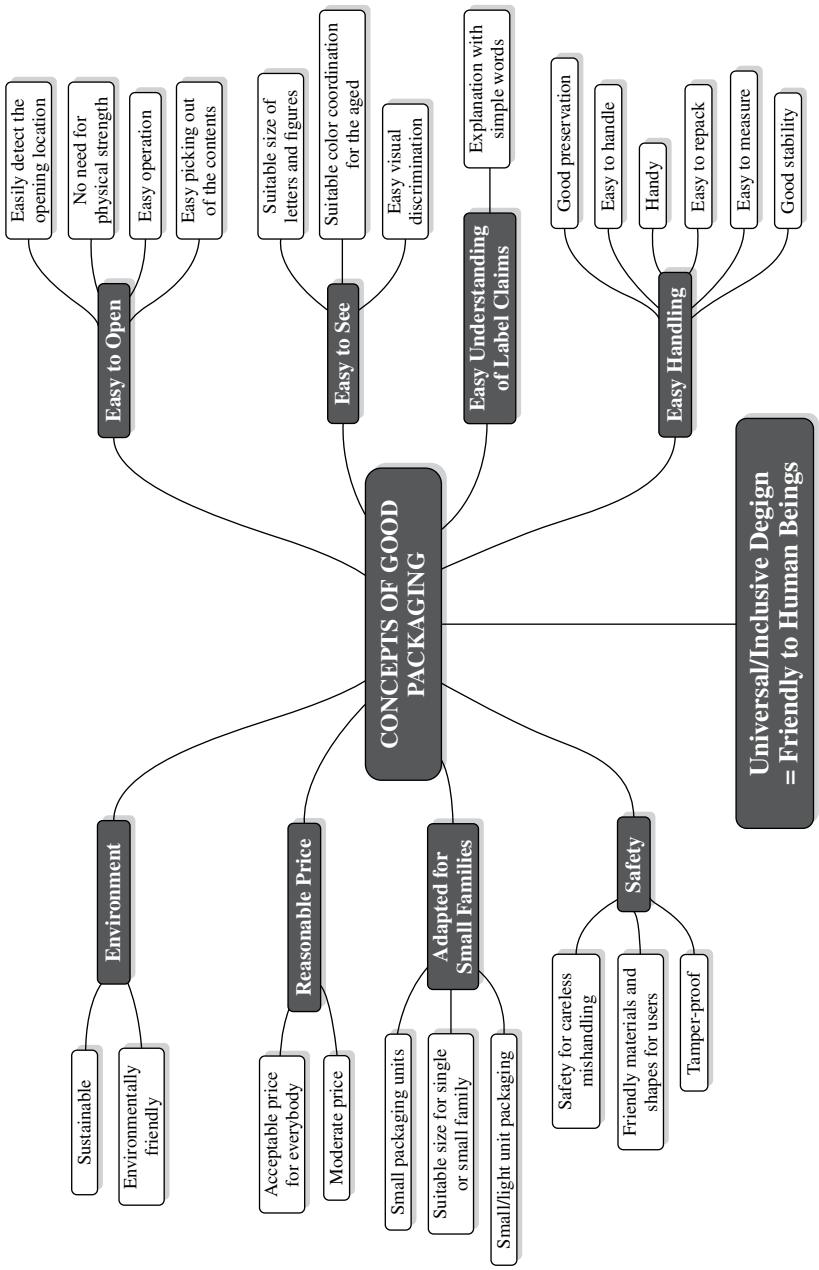

Figure 1.1 Concepts of good packaging in the food industry.

perfumes and fragrances, and similar areas. In discussing these criteria it should be noted that they are not listed by importance; they are all equally important in a general sense, and depending on the type of product, target consumers and geography might be weighted differently, but as a first approach, we do not weight these criteria differently.

Reasonable price

It is difficult to put an exact number on the value that a package represents for the consumer, but it is obvious that the more of the other boxes of good packaging are ticked, the better and more valuable the perception by the consumer. Anyhow, for the consumer it is difficult to judge what cost ratio of product/packaging any given packaged, industrial food product represents, and he or she, unenlightened, would have a hard time seeing that in a canned soda sold in the USA, the can costs more than its content, at least in most cases, and that in a bouillon cube sold in Nigeria, for instance, the content, i.e. the cube, outweighs the package cost wise. In the end, protection of the product is the major driving force, and that often has its price. In light of the above, the notions of "acceptable price for everybody" and "moderate price" are becoming more understandable and meaningful, although they are yet to be understood in relative terms.

Adapted for small families, households with smaller numbers of people

Undoubtedly, there has been a rather strong and sustained trend towards households with smaller numbers of people in developed countries since the 1960s and 1970s. We can quote the following examples:

- In the US State of Maryland, the average size of households dropped from 3.25 in 1980 to 2.61 in 2010 (Pew Research, April 22nd 2011). The same source states, however, that since 2010 no further decline has been observed.
- A US census showed the following numbers nation-wide: from 5.8 persons per household in 1970 down to 2.62 persons in 2005 (Jiang and O'Neill, 2007).
- A UK study showed the following numbers: from 3.1 persons per household in 1961 down to 2.4 in 2009 (Social Trends, 2010).
- A US article from June 24 2011 makes the following two further observations, which support the above trend observations:
  - First, the share of households in the USA with children dropped from 36% in 2000 to 33.5% in 2011.
  - During the same period, and only superficially related, the USA has more households with dogs now (43 million) versus households with children (38 million).

  The latter observation, which is a fairly visible reality in our cities today, has important effects and influence on product and packaging developments in the food industry, which will be discussed and analyzed in later chapters (Chapter 3 and others).
- In Japan, the average household size was mostly unchanged during the period between 1920 and 1950 at around five persons per household. In 1970 this number dropped to 3.41 and is presently (since 2010) at around 2.42 persons per household, very similar to the UK.

Households and Household Members

Year	Households (1,000)	Average annual rate of increase (%)	Household members (1,000)	Members per household	Population (1,000)	Average annual rate of increase (%)
1970	30,297	a) 3.00	103,351	3.41	104,665	1.08
1975	33,596	2.09	110,338	3.28	111,940	1.35
1980	35,824	1.29	115,451	3.22	117,060	0.90
1985	37,980	1.18	119,334	3.14	121,049	0.67
1990	40,690	1.38	121,545	2.99	123,611	0.42
1995	43,900	1.54	123,646	2.82	125,570	0.31
2000	46,782	1.28	124,725	2.67	126,926	0.21
2005	49,063	0.96	124,973	2.55	127,768	0.13
2010	51,842	1.11	125,546	2.42	128,057	0.05

a) Annual rate of increase between 1960-1970

Figure 1.2 Household sizes and household members in Japan, 1970–2010. (From Ministry of Internal Affairs and Communication, 2011.)

Figure 1.2 depicts these numbers in more detail and gives a good insight into the population evolution and the food and food-packaging requirements that come with these.

All the above suggests that smaller households with fewer members need smaller numbers of portions and the packaging that goes along with this trend towards smaller items. It is suggested that packaging unit size should be smaller, organized in such a way that a one- or two-person household is well served, meaning that the packaging size should be suitable for one or two people. Packaging should therefore be adapted to smaller portions and it would be desirable that packaging is lightweight and does not add too much weight to the product. The latter is especially important when it comes to shopping and carrying shopping bags to and from the car or up the stairs or to any other destination. Especially in a country like Japan, where the pantry is non-existent and fridges are small, the role of personal food storage is played by the ever-present neighborhood stores that one can find every few hundred meters, even in residential areas. Shoppers go there several times a day to specially buy refrigerated or frozen products and carry them home.

Safety

Food safety in general has become one of the most crucial aspects in the food industry. It has actually become more important than costs, ex-factory costs, margins, taste, marketing and sales, and everything else in the value chain. All these other aspects can be perfect, but if food safety is not guaranteed and delivered to the consumer, then nothing else matters. Apart from safety that has to be built into any food product through the hurdles of acidity, heat treatments, aseptic filling, or similar techniques, packaging plays the ultimate protective and preserving role.

A few features of safety in packaging have to be remembered. Packages have to be safe and protective even if there is careless mishandling in the supply chain. This is not an easy task, as this means that the packaging material and design have to be made in a way that takes abuse in the supply chain into account and that obviously means higher costs for the packaging solution. We therefore walk a fine line as to how much additional safety through

packaging strength, barrier properties, or similar features is to be built in without adding too many costs. This is where good, no great, design, mostly structural, meets with great material knowledge and intimate knowledge of the supply chain and what types of abuse could happen.

Another important feature is not too far away from the one just discussed, but concerns the end consumer. Materials not only have to be safe on their way through the supply chain, but have to be equally safe, friendly, and good to handle, touch, and dispose of. Haptics are of utmost important, the consumer needs to have a good feeling when touching a packaged food; it should feel strong and good in his or her hand and should instill a feeling of safety and solid preservation.

Finally under the heading of safety, food packages have to be absolutely tamper proof. This is not always easy to obtain, but again is a function of packaging material quality in combination with great design. To some degree, tamper-proof packaging is also linked to eliminating or rather reducing the danger of counterfeiting, although this is a separate topic and we will discuss this later, in Chapter 3. There are several ways to render food packages tamper proof and they are very product dependent and differ slightly in their execution from flow-wrapped candy bars to bottled beverages to breakfast cereals. Common to all is a feature that can easily be detected by the end consumers and which can assure the user that the specific packaged good has not been opened before, by anyone.

We will not discuss criminal tampering by injecting poisonous substances with hypodermic needles through flexible or soft packaging into the food product. These incidents are very rare and can hardly be prevented if some criminal mind really wants to perform such an act of tampering.

Easy to open

Easy-to-open packages should be a natural given in the packaged goods industry, but, from many years of experience and many years of technical and design struggles, it clearly is not "natural" at all! Why is that so? Contrary to safety, which is a "killer" if it is not right, easy opening is not a must, not an absolutely necessary feature, maybe not even "nice to have" in the eyes of developers and marketers in the food industry. It is a totally wrong position, but it is a reality. Every marketing person will ask for easy opening and technical packaging experts, together with designers, will find really good solutions, often not even difficult to introduce into the packaging, but maybe costing one cent more per pack and that's a NO.

Consumers put a big YES on the need for easy opening and it is very interesting, even amusing, to watch some video ethnography of, for example, Chinese homemakers sitting in a room and being asked to open a series of different packaged food products of all sorts. If it wasn't a serious matter, it would almost be comical. The author has personally seen such a film and the results were really striking. In the absence of easy-opening devices, one could see a lot of packaging "mutilation" going on, with or without tools such as scissors or knives.

Let us list a few key, necessary sub-features here. First, we recognize the need for an easily detectable location for the opening. Sounds logical, sounds like a must, and yet, it is not consistently executed. In the absence of good visual detectability, even the most efficient easy-opening feature will not function as desired. Why is this not done consistently? Again it is cost that is a driving factor and, ideally, the marketing group will tell the technical and design group to make it happen, but at no extra cost. It's a mantra that we will hear again

and again throughout this book, and it should be taken for what it is: a reality and not an excuse, and an opportunity for designers to work their magic and make things happen at no extra cost.

However, there is something else that the technical and design group needs to learn to apply: it's the notion of "holistic costs," i.e. what does it really cost the company to lose the sales they could make, had they applied common sense and logical solutions to packaging that may cost a bit more, but largely offsets the extra cost by increased likeability of the product and consequently increased sales, profitability and margins.

The second important point is for the consumer not to have to apply much physical strength to open a packaged food product. If this is not done right, it is one of the most important deterring factors when it comes to packaging. One could jokingly say that the lowest-calorie product is the one that I cannot access because its package resists opening, but this is definitely the wrong approach to low-calorie products. Consumers will just not buy again, which is bad news for the marketing and sales people, and blame will quickly go to the designers and technical people who have come up with "such a bad packaging solution."

Remember, "It's the costs, stupid … " No excuse, just a reminder and again a great opportunity to find ingenious solutions.

A pretty similar aspect is easy operation, meaning that once the consumer is able open the pack, he or she can easily handle the package itself, possibly heat up the product in the package (before or after opening), and, finally, the last aspect relates to easily picking out the contents of the package, pouring them out, scooping them out, handling them easily and logically in any necessary way.

Easy to see

The package of any industrial food product represents a unique opportunity to depict and describe its contents in the best possible way. Marketing has certainly realized this, and designers, most of the time, do a fine job in creating and executing good visual content on food packages. However, a few points may be worthwhile mentioning. First, any graphics such as letters, numbers and logos should be executed at a suitable size so that the entire graphic display can still be read, even by those who might have to scramble for their glasses. Second, especially with regards to the aged consumer, suitable color combinations should be applied; this is not a cost factor and designers, together with marketing, should find the best possible solutions based on experience and know-how of experts in this field. Last, easy visual discrimination is a must, the consumer *must* be able to make something meaningful out of the graphic landscape on a food package.

All these elements present unique opportunities to make "my product" really stand out and be appealing to the eye of the consumer, and therefore are the most obvious to execute in the best possible way and a fantastic playground for designers, technical packaging experts, and marketing to collaborate in a very close-knit fashion.

On a similar note but in a different industry, the Hanes Company (makers of underwear) in summer 2013 started to release a TV commercial that talked about "Go Tagless". It emphasized the advantages of eliminating any tag (label) from the interior of their underwear products, because it is a recognized nuisance and bothers the wearer. It is difficult to judge whether such a thing could be possible for food products, at least with today's legislation in place, but it might be an interesting thought and worth further reflection.

Easy understanding of label claims

This is a frequently grossly overlooked area and the wrong approach can very often lead to very unsatisfactory packaged food products. Although the graphic landscape on the package may look very decent or even appealing, explaining in simple words what the various claims and numbers on the food label mean is not an easy job. This task is most of the time left to a group of people that has no or very little knowledge of good communication and therefore often fails the task. Consumers are simply overwhelmed by the complexity of the message and, "less is more" is an absolute must, i.e. explain in as simple as possible words what the message and claims are all about.

Again, this is not an easy task and requires some communication mastership, or, like the former British Prime Minister Winston Churchill (and several others to whom this quote is attributed) once wrote: "If I had more time, I would have written a shorter letter." The art of being short and concise is a difficult one and it may be suggested that marketing people in a food company should hire the services of daily newspaper journalists, who have a great, sometimes too great, mastership of being short and concise, out of sheer need and space limitations.

Actually, this whole aspect can be summarized in one simple message: "The medium is the message," (Marshall McLuhan, Monday Conference on ABC TV, June 27 1977). The medium is the food package and it should carry the message of what it is all about in the simplest, most understandable way. Not an easy task, but a great challenge for communications and media designers.

Easy handling

The last concept of good packaging we have to look at is easy handling. The handling part covers all areas of the supply chain, starting from the end of the line to the mouth of the consumer. The following elements are of importance and some or all of them overlap in their desired and required functionalities.

Good preservation is an important requirement for good food packaging. The packaged product should and must have the indicated shelf life under the proposed storage conditions. This means that the product, from the day it is put into its package, has to be stable and safe until its consumption, even if such consumption only happens on the last official day of its shelf life.

Let us bring in an example from the world of industrial confections, chocolate and chocolate related products. In a country, a market as the food industry calls it, like the United Kingdom, empiric evidence shows that a candy bar is typically—on average—consumed some four months after it was put into its wrapper. That is to say that some candy bars are eaten earlier and some much later, but the vast majority is finding its way into the consumer's mouth after around four months. In the USA, the numbers are slightly different, but only by approx. $1/2$ month, i.e. the peak of consumption is after $4\,1/2$ months, largely due to the longer distances in transport and distribution. Despite this knowledge, products have to be safe and taste good until the end of their legal shelf life.

It is clear that distribution chains largely depend on the nature of the product. Whilst confectionary products or other ambient-temperature-stable products typically have shelf lives between 9 and 18 months (in the past even longer), refrigerated products such as yoghourts, fresh cheese, and other dairy products have much shorter shelf lives (depending on the

geography, between 28 and 40 days, some even slightly longer) and therefore packaging solutions, as well as distribution efficiencies have to be adapted to this situation.

In the supply chain it is of utmost importance that packaged goods can be handled easily, multi-packs and secondary packaging containing 12, 24, 48 or any other combined number of individual products, is easy to grasp and does not exceed a certain weight, making it difficult for handlers in the supply chain to grasp and carry a secondary packaged box from a production belt or a pallet. This also means that the packaging itself, whether primary around the product or secondary in a transport carton, is solid and has good mechanical stability, not only when it comes to handling, but especially when it comes to stacking.

Finally, for the end consumer it is often of additional importance that a food package is handy, can easily be grasped and held, and, once opened, can easily be reclosed, repacked, or measured when taking out part of its contents for cooking or other consumption purposes.

THE ROLE OF PRODUCT DESIGN IN THE FOOD INDUSTRY

Thus far we have linked design in the food industry only to packaging design, in all its relevant forms, such as graphics design, industrial design, and communication and media design. This is not surprising as the food industry itself sees design pretty much only linked to these areas, and therefore negates or simply forgets that there is product design already existing, or ongoing in some major industrial food products. However, there are probably many more opportunities for applying the concept of form and functionality to the food products themselves.

Let us look into two prominent examples that represent the world leaders (or close second) in their respective classes.

The first is freeze-dried Nescafé® from the Nestlé company, the most popular and most global soluble coffee in the world. At its inception back in 1938 (Max Morgenthaler, Nestlé Orbe, Switzerland, 1938), Nescafé® was a more or less uniform, more or less stable powder that was based on liquid extraction of roasted coffee beans. Before the industry "law" was created that soluble coffee could only be based on ingredients such as coffee and water, the initial hygroscopicity of the first Nescafé® was alleviated by the addition of a carbohydrate such as maltodextrose. It is clear that a powder does not really lend itself to being designed to follow the quest for "form and function," if not to say that the form is small particles and the function is good and rapid solubility but, admittedly, it's not only a simplistic, but also a rather dull view. So how can a soluble coffee powder be designed? What type of design, still following the form—function mantra, can be performed? Form meaning shape, meaning different types of particle shapes, meaning larger particles, meaning ultimately granules of a specific shape and size, still with the functionality of being perfectly soluble.

This is where the invention of freeze-dried coffee by Nestlé's continuous freeze-drying process (Nestlé Research & Development Center/Product Development Center Marysville, Ohio, USA, 1966) came into play. This process, without going into much procedural detail, has made it possible to come up with rather defined granular particles that had very little powder (fines) in the final mix and which, due to the porosity of the particles, led to excellent dissolution properties. It can safely be said that this product design was not an active act of design, led by designers, but the engineers involved in this process apparently had a very good notion of the concept of "form and function" and applied it intuitively totally correctly, especially as one of the co-inventors of the continuous freeze-drying process was

a microbiologist, well versed in nature's approach to this very concept (Tom Roth, personal communication, 1992).

Staying in the field of coffee, let us look into what one could call a "hybrid design concept," namely the well-known shape of the Nespresso® coffee capsules. We call it hybrid, as this is neither a pure packaging design solution, nor a product design, but the shape, size, and material of the capsule are exactly designed to meet the product requirements of the roast and ground coffee within. In a following chapter (Chapter 3) we will discuss this in more detail. In that chapter we will also, for comparative purposes, look at good product, graphic, and communication design in nearby industrial areas, such as household goods and small appliances.

Another well-known example for product design is the original Four-Finger KitKat®, created by Joseph Rowntree, coincidentally also in 1938. The product was licensed out to Hershey's for exclusive distribution in the USA back in 1985 and Nestlé acquired the Rowntree Mackintosh company, including KitKat® in 1987 and has the ownership of the brand and sells the product everywhere else. KitKat®, after Mars' Snickers candy bar, is the second largest selling candy bar in the world. Joseph Rowntree, an equally shrewd and visionary business man, conceived KitKat® in a very distinct and designed fashion with two main criteria in mind. First, he wanted to have a candy bar that combined the full taste of good chocolate and the lightness of biting into a layered wafer, and second, he wanted to have ideal processability, where specific ideal shapes for molding and de-molding drove the ultimate geometry and ratio of the KitKat® finger. We can truly speak of very insightful product design, forcefully applied to the product shape and manufacturing, as well as eating function. Due to the fact that KitKat® was composed of four thinly attached fingers, the consumer experience was one of breaking of finger after finger, therefore giving great portionability, as well as the starting point of a fantastic marketing campaign that has lasted decades and still lasts.

Other, more mundane examples of product design in the food industry are again to be found in the confectionary area, especially in seasonal confections, such as chocolate Easter eggs (UK, Germany, Switzerland), Easter bunnies or Santa Clauses, and the like. Recently a court case was settled between the Swiss chocolate company Lindt and the German confiseur Riegelein regarding the "golden Easter bunny," in which the German side got the upper hand by claiming a long-standing and publicly perceived notoriety with consumers with regards to their golden Easter bunny, thus not allowing Lindt to claim exclusivity on their golden bunny.

We will discuss and analyze these and some more products, especially in the area of ice cream, where we also find good examples of designed food products, as well as combinations of product and packaging design.

CONCLUSIONS

In this chapter we discussed and analyzed the following areas:

- We very briefly introduced the idea of elevating the role of designers in food companies, ideally having a designer at board level.
- We did some looking back at design in general, some historic perspectives as to the importance of design from the onset of the second industrial revolution (the automotive era) and how design was perceived and used.

- We discussed some of the consequences of the next industrial revolution, which started with the invention of plastic materials and which gave the freedom to designers not only to experiment but also to exaggerate.
- We discussed design education, some global examples, and their specific strengths.
- We introduced the concept of "form and function" as a very basic, yet extremely important concept, especially in the field of industrial/product/packaging design. Nature basically "builds" all its elements (plants and animals) following this concept!
- We analyzed and discussed fashions in design and some of the mechanisms as to how such design trends are created with the examples of home design and home improvement.
- We analyzed and discussed design in the food industry, especially along the lines of packaging design and more specifically discussed the concept of "universal and inclusive design" by listing the necessary elements for good packaging solutions.
- Finally, we discussed the limited importance of functional design in the area of food products themselves.

TOPICS FOR FURTHER DISCUSSION

- Based on your observations and experience, please list examples of good packaging concepts and solutions in the fast-moving consumer goods industry, especially the food industry.
- Discuss in more detail the content of Figure 1.1 and list elements that are missing, according to your own observations and experience.
- Discuss fashion trends and how they are created, and how a product developer, a scientist, an engineer, and a designer could possibly play the game of fashion creation equally successful.
- Can you come up with further specific examples of good design in food products? Please list such examples.
- Do you have or know of creative solutions to solve the improved functionality versus cost riddle? Please list and discuss good examples from your environment and don't get too much hung up on a long list of negative examples, if possible.
- If "all is flowing," as is stated in the introduction, and if nothing remains still, how can we make this work for design in the best possible fashion? Probably a good occasion to discuss this over a good glass of wine, or two.
- The authors would appreciate receiving feedback on any of the above questions from you.Thank you!

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