

# Food Product Development and the 40 Inventive Principles

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“Worryingly...a significant number of Irish food companies are not actively developing any new food products, while many that are engaged in new product development do not explicitly involve consumers in their research” (DeBurca and Ledwith 2000: 30).

The 40 inventive principles can be an aid to new product development. The question that this article attempts to answer is: Are the 40 inventive principles relevant to new food product development and innovation? This article examines selected, relatively innovative food products that exhibit one or more of the inventive principles. It also highlights other inventive principles that may assist food product development and some that are less relevant.

## **Food Product Innovation:**

Innovation in the food product comes in two forms:

### Food Packaging innovations:

- new packaging materials that improve product shelf-life, freshness and quality.
- new packaging that presents the food product in new and different ways (i.e. new packaging shapes, new graphic design etc).
- new packaging that increases product versatility (i.e. packaging that can be used in the microwave and the oven).
- new packaging that increase ease of use (i.e. milk carton designs that are easily opened).

### Food Product innovations:

Where the foodstuff itself is new or innovative in some way:

- new ethnic concepts.
- Organic foods and health foods
- Fortification (i.e. addition of vitamins, minerals, bacterial cultures).
- Prepared meals.
- new manufacturing techniques that improve sensory qualities such as minimal processing, heat treatments, freeze-drying etc.

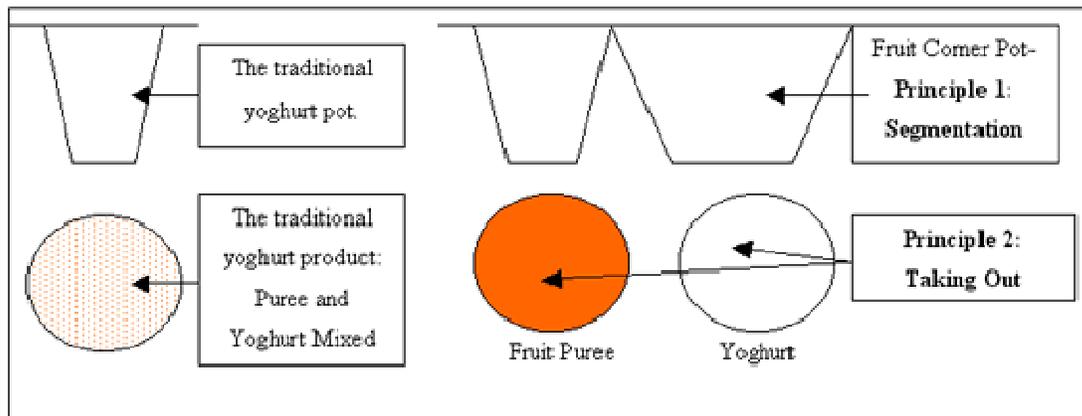
The lists above are by no means extensive, however they do give a good idea of what form innovations can take in new food product development. According to Mitchell (1997:15) food companies “should worry much more about business and marketing strategies in terms of *what*

new products they want to make and *why* they want to make them rather than *how* the products will be made as the technology is almost available". So, the idea generation stage- involving a multi-functional team (food technologists, marketing etc.), is an extremely important step in the development of a new food product and it is at this stage that the 40 inventive principles could find application in focusing and assisting brainstorming sessions. The following section examines selected innovative food products that exhibit one or more of the 40 inventive principles in order to illustrate their relevance to food product development.

**Food Products exhibiting one or more of the 40 inventive principles:**

Take the example of 'Muller Fruit Corner'. It is basically a yoghurt product, however the fruit

**Figure 1.1:** Yoghurt Product innovation exhibiting inventive principles 1 and 2:

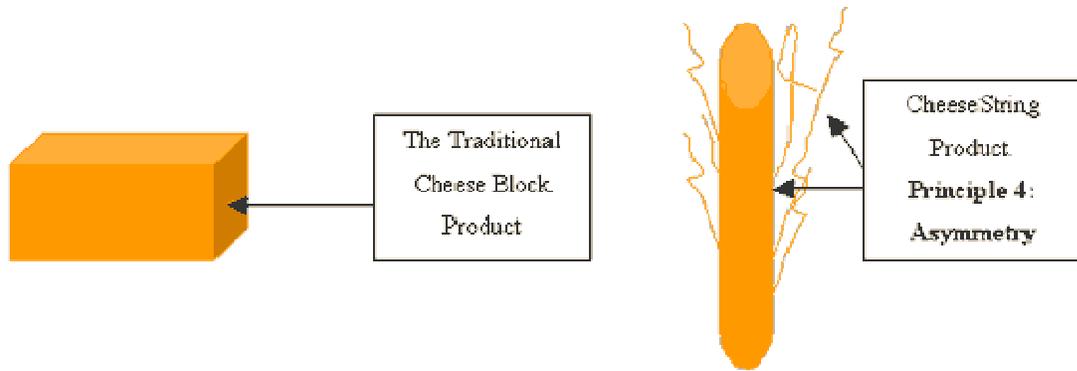


puree has been 'TAKEN OUT' (Principle 2) of the yoghurt and the food packaging has been 'SEGMENTED' (Principle 1) (See Fig: 1.1). The sensory characteristics are not hugely different to a traditional yoghurt product- most people mix the fruit puree with the natural yoghurt on opening the product anyway. What the manufacturer has done, however, is to present the product to the consumer in a way that offers a choice regarding how the product is consumed - either mix at the start, mix at each spoonful, or eat separately - and as such may be seen as offering distinct 'mass customization' (see also Mann/Domb) directed innovation advantage.

Using the inventive principles this type of innovative food product could have been quickly developed. This method can also lead to further product differentiation. For example, Principle 1: Segmentation could be interpreted as: Why not introduce two, complimentary, segmented fruit puree flavours into the yoghurt product? (i.e. Principle 1. C. Increase the degree of fragmentation or segmentation), or possibly add a third type of product (e.g. a topping, or textured 'crumble'). Alternatively we can look to other inventive principles such as Principle 7: Nestled Doll- instead of placing the puree and natural yoghurt why not place puree inside the yoghurt, in a circular container within the package.

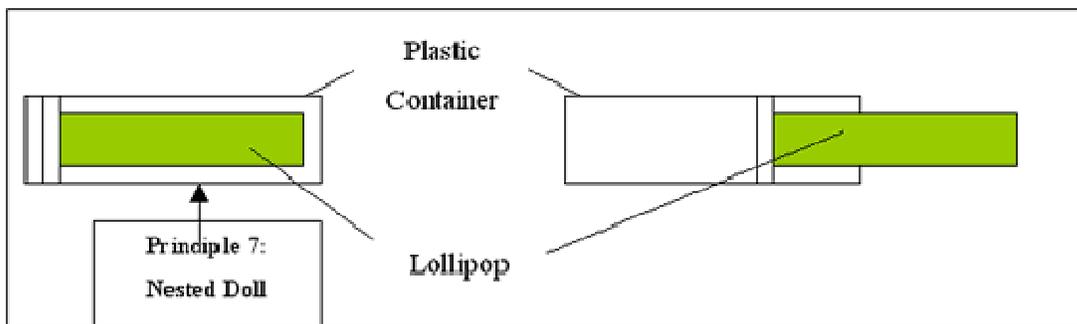
Another example is Goldenvale's 'Cheesestring' product, an innovative reshape of a traditional product to make it more attractive to children, exhibits inventive principle 4: ASYMMETRY, the changing of the shape of an object from symmetrical (i.e. basic cheese block) to asymmetrical (i.e. the cheesestring) (See Fig: 1.2).

**Figure 1.2:** Cheese product innovation exhibiting inventive principle 1:



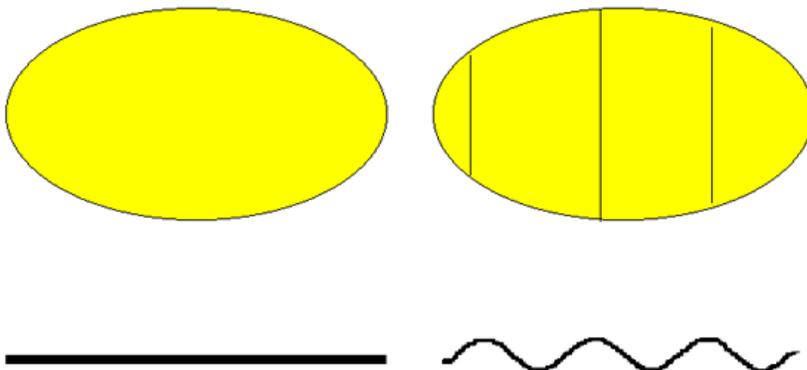
The 'Push-Pop' product, an innovative take on children's lollipops, exhibits principle 7. NESTED DOLL, where the actual lollipop product is placed within a plastic container. The lollipop can then be pushed above the plastic container to be consumed (See Figure 1.3). Again the product is innovative without any major focus on sensory characteristics (the lollipop tastes similar to many other products).

**Figure 1.3:** Push Pop product exhibiting Principle 7: Nested Doll



Looking more to the processing of the food, another example of the Inventive Principles in action is the 'crinkle-cut' potato chip shown in Figure 1.4. The crinkle-cut crisp allows the consumer to insert more crisp into the mouth (assuming one is of a mind to eat them singly) with more surface area than a plain-cut chip. The solution uses Inventive Principle 17, ANOTHER DIMENSION (which, incidentally is one of the Principles suggested from the Matrix for the volume versus area contradiction the crinkle-cut crisp solves).

**Figure 1.4:** Plain-cut versus Crinkle-Cut Potato Chip



Ketchup and other sauce containers have also been the focus of significant changes in packaging in recent times. Perhaps most noticeable has been a shift away from glass containers to squeezable, thin-walled plastic containers. We might see this as Principle 35 PARAMETER CHANGES in action (Principle 35c -'change the degree of flexibility'), and that it comes as recommended solutions to both the Loss of Substance versus Device Complexity and Duration of Action versus Use of Energy (i.e. the amount of time it takes to shake the sauce out of the bottle versus the vigorous shaking action required with a conventional bottle) contradictions.

Also related to product dispensers, Principle 1 SEGMENTATION may be seen to be used a lot. We see it most obviously in things like striped toothpaste (a concept which appears not to have been adopted in other foodstuffs yet - e.g. cheese spreads, spreadable pate, etc), in TV dinners, and the incorporation of multiple dispenser holes into things like herb dispensers where the consumer may wish to vary the flow rate of the product. Such variable dispensers also make use of Principle 15, DYNAMICS and as such allow the user to switch from one dispensing mode to another.

So from the examples previously cited the inventive principles do describe adequately these food product innovations. However, these food innovations represent only a minuscule amount of new food products introduced onto the marketplace every year. What of the other inventive principles? The following section highlights other inventive principles that may be useful in the food product development process.

### **Other useful inventive principles in food product development:**

Other inventive principles that could assist in innovative food product development include:

Principle 1: Segmentation: Many examples and opportunities for product packaging innovations make use of Segmentation. Segmentation is particularly relevant in instances where the manufacturer is looking for simple ways of allow consumers to customize products to their personal needs. 'Salt-n-Shake' potato chips, for example, contain a separate sachet of salt in order that the consumer can decide exactly how much salt they apply to the chips (why hasn't this been extended to other flavours yet?). 'Multi-packs' offer another form of segmentation where the consumer is given customizing options to use only a part of the product at one time depending on the number of servings required.

Principle 5: Merging: This could be interpreted as the merging of two similar or complimentary flavours, for example the Cadbury's Marble product, where milk and white chocolate are brought together. This principle could also be interpreted as bringing complimentary products together- for example DairyLee Lunchable products where crackers, ham and cheese are brought together in the same packaging.

Principle 6: Universality: Eliminate the need for other parts: The inclusion of small fold-out spoons in M&S prepared salads (this is also Principle 15 Dynamics in action)

Principle 10: Preliminary action: Pre-cooked meals and meats, de-seeded vegetables are good examples of this very commonly applied food industry principle in action.

Principle 9: Preliminary anti-action: also common in food related products, desiccation processes such as custard powders - where the consumer gets the advantage of less weight to carry home but the down-side of having to re-hydrate. The emergence of dried herb-mixes (often consumer blendable) for dip-based products is a recent new use of this Principle.

Principle 11: Beforehand Cushioning: used in a variety of products where possible tampering presents a consumer threat. Pressurised 'click-lids' on baby food containers are perhaps the most

commonly observed examples of this Principle in action. Other possibilities include use of age-chromic labels to more effectively inform consumers when a product has passed a 'best by' date, paper labels shaped so that they cover the lid and rip if the lid is opened, or double lids (e.g. in cottage cheese tubs).

Principle 17: Another Dimension: used in pyramid-shaped tea-bags ('in order to allow better circulation of tea-leaves in the pot').

Principle 25: Self-service: the emerging range of 'self-heating' and 'self-cooling' food containers demonstrate good examples of Principle 25 in action.

Principle 31: Porous materials: An excellent example of a food product exhibiting this principle is Polo Mints/Lifesavers - by putting a hole in the middle of the sweet the manufacturer has created a new and very recognisable food product. Porous materials is also used frequently in the manufacture of chocolate bars - in which the manufacturer gets to sell less chocolate in a product that looks like it contains more than it actually does (although, they would claim, the porosity improves texture and rate of taste transfer to the tongue). Drink sachets containing a foaming agent (e.g. packet cappuccino) are also examples of Porous Materials in action.

Principle 32: Colour changes: This principle almost seems too simple. However colour changes of food packaging can be an important method of differentiating one food product from another. For example a Crisp products' flavour in Ireland is easily identified- green for cheese and onion, and blue for salt and vinegar. That was until Walkers Crisps introduced their product onto the shelves- completely reversing the colour trend. Other examples of the importance of colour in product development are sausage and cheese products. Consumers expect certain sausage and cheese products to be a certain colour. The Colour Changes Principle is used in another way on beer labels printed with a thermochromic ink - whereby the label changes colour when the beer is at the manufacturers recommended drinking temperature.

Principle 35: Parameter changes: This principle could be interpreted as using liquid fillings in sweets instead of a solid filling, such as chocolate liqueurs or bubble gum products will gel or flavoured liquid fillings. Change the amount of real oranges in orange juice to improve taste, increase thickness of sauce to improve 'home made' quality (Change consistency or concentration). Principle 35 is increasingly being used in food packaging, particularly with regards to a shift from tins to plastic containers for ever higher shelf-life products. Anyone that has struggled trying to open a corned beef tin longs for the day when this product will be packaged in an easy to open plastic container.

Principle 36: Phase Transition: obvious in many frozen products, but still offering possible opportunities for new product innovations. 'Herb-ice-cubes' containing freshly chopped herbs is a recent innovation in specialised food outlets in the UK presents one such opportunity.

Principle 39: Strong Oxidants: not immediately obvious, but interpreted as 'activated' products, Principle 39 is seen most obviously in fizzy drinks, and less obviously in 'exploding' chocolate bars.

Principle 40: Composite Materials: the concept of combining foods with different properties into a single structure is present in cereal bars, filled pasta, multi-vitamins, 'bubble-and-squeak', and a wide variety of other products, particularly those where the consumer is looking for convenience of use - cereal bars are increasingly been sold as 'wholesome, balanced breakfast meal on the move' products.

From the list above, the 40 inventive principles can help food product developers in generating new concepts at the idea generation stage. There is an obvious need for research into all of the

principles and how they can be applied to new food products. There are also some principles that may have to be added, for example- Fortification: The addition of a nutritional improving factor, or Ethnicity: The reinterpretation of a traditional product with ethnic twists- both concepts are being utilised in food product development today. Through use, application and research the 40 inventive principles and the contradiction matrix could become a valuable aid to food developers in the future. Let the research commence!

**References:**

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