Design Process and Its Application on the Improvement (Re-Design) of the Coke Bottle

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Abstract Profitability of a product depends upon the supply chain as well as its acceptability to the end user in a good condition i.e. unspoiled and undamaged. The primary function of packaging of a product is to ensure the product for safe transit. The secondary function of packaging is to make it attractive to the customer and act as ‘silent sales person’. Here in this research work a hypothetical design project was undertaken upon 2ltr package of Coca Cola party/family bottles. Accordingly, a market research was carried out on the design of the bottle. Based on the market research a design possibility is planned and proposed for doing some modification on the Coca Cola family bottle. Finally the prototype of the bottle is developed in institute studio.

Keywords Consumer; Design Methods; Ergonomics; Form; Graphics; Packaging; User Interface

1. Introduction

Design as described by John Chris Jones in his book- Design Methods [2] (Second edition 1992), may be described as follows:

• A goal directed problem solving activity [15] (Archer, 1965)
• Decision making in the face of uncertainty with high penalties for error [16] (Asimow, 1962)
• Optimum solution to the sum of true needs of a particular set of problems [17] (Matchett, 1968)
• Relating product with situation to give satisfaction [18] (Gregory, 1966)

Let [19] us assume that a group of tribal people are staying together without many tools and resources. They are on a move and they are hungry (Ref Figure 1). They come across a tall mango tree. They crave to have mangoes (That is Desire). But the question is how to achieve the mangoes
(That is the Problem)? They look at the mangoes (That is the Goal) and start thinking of possibilities of achieving the goal utilizing the existing resources (that's the basic Brainstorming Process). The basic brainstorming process initiates a number of activities within the group to achieve the goal like throwing stones, using long branches, using climbers to climb the tree (that is Problem Solving Activity). All these decisions taken to achieve the goal are not certain and may bear consequences for error e.g. during the stone throwing process someone may get wounded.

The overall process led to a jump from present facts and resources to future possibilities and opportunities.

Lateral thinking [3] as described by Edward De Bono is a unconventional way of addressing problems. Edward De Bono defines Lateral Thinking as a technique of addressing problems by lateral thinking instead of vertical thinking. Idea is to consider [4] alternatives. It is extremely important to 'break out of the box'.

A simple interaction design model [12] in Figure 2.

![Mango Tree with Primitive Men](image)

**Figure 1: Mango Tree with Primitive Men [8]**

**Figure 2: Design Model [1]**
Exemplifies a user centred design approach. This is also followed in a big way while addressing product packaging. For example recent packaging of eggs found in hypermarkets (Figure 3 and 4).

The thermoformed PVC packaging is a complete break out of the box concept if compared with the traditional and generic practices of egg packaging (Figure 3). This packaging concept's role has extended in response to consumer's changing lifestyles. Generally eggs are transported in papier mache or plastic (HDPE) crates stacked together. Consumers usually carry eggs in poly bags/paper envelopes. The redefined packaging (Figure 4) provides better controllability to the person carrying it/user, resulting in better user experience brand manifestation. Thus it can be seen that there is a lot of scope in packaging design in design context.

In early days, packaging's [1] role was principally utilitarian. It facilitated the effective distribution/delivery of merchandise. To this day, these basic purposes play an important role in the form and function of packaging. Products may have become more sophisticated but still there is a basic prerequisite to protect them. Distribution may have become a complex process, but products still need to survive the transportation so that they not only arrive unspoiled on shelf but also look appealing to the consumers.

2. Progress and Change in Packaging

2.1. History

The earliest forms of packaging [5], for edible items were made from bi-products of animals and plants e.g. animal skins, large leaves etc. Water was kept in containers made from coconut shells, animal skins or the hollowed-out dried skins of fruit and vegetables.

By Egyptian and Roman times, containers were being made of clay and other materials. Later, glass, metal and paper were introduced. It evolve through the passage of time, e.g. in Victorian times, butter and cheese were kept in baskets and vinegar in barrels.

Nowadays, packaging may be very different, but its main functions are still to make food and other products easy to transport, and to protect it until it is consumed or used reduces the amount we waste.

2.2. Invention of Can

It was during Napoleonic Wars [5] can was developed and initiated to retain food fresh for the troops. In 1795, circumstantial need pushed Napoleon to offer a prize to any one for an idea which would keep food safe for the troops. Nicolas Appert, a chef from Paris, took up the challenge and invented a method of preserving food by heating it in a sealed container. Meanwhile, in England scientists
discovered that steel with a very fine layer of tin coat, can be used as packaging material for food items. It can retain the freshness of food for substantial longer duration.

By the Second World War, the steel cans evolved a lot. It was lighter than the original version, opened at the end of a can opener, and contained a wide variety of foods – from spaghetti, mushy peas and pilchards, to sardines, evaporated milk and soft drinks.

In 1897 Shiseido [1] introduced its first cosmetic product, Eudermine (Figure 5). Taking its name from the Greek “for good skin”, Eudermine skin lotion embodied the latest pharmaceutical technology and the company’s desire to create “cosmetics that nurture, beautiful healthy skin”. The product’s packaging always reflected the taste and design influences of the period, each time it is redefined. By 1997 Eudermine’s packaging had evolved radically (Figure 6). Good designers know how to adapt and manipulate the influences to exceed mere cult or fad, to develop designs that reflect the spirit of the time and are relevant and meaningful to consumers.

![Figure 5: Packaging in 1897](image1.png) ![Figure 6: Packaging in 1997](image2.png)

It is now established [1] that packaging is no longer a docile functional device, but a lively and vigorous sales tool that can make its presence felt in crowd, and sells a product at the point of purchase. Moreover, with the protuberance of branding, packaging is often the living quintessence of a brand’s, face, value and personality.

Effort is made to delineate these attributes and traits, understanding the consumer’s perception of them and then manipulating packaging design to communicate them. Packaging design plays a critical role in ensuring the consumer’s perception of the brand is mirrored on the pack. Consumers make a brand purchase just as much as they make a product purchase. They may in reality be buying a body lotion but their choice is affected by their perception of the brand and its inherent promise.

2.3. Consumer Lifestyle and Behavioural Patterns

Consumer’s changing lifestyles also affected packaging. For example people now live more mobile lives. In simplistic terms, this has led to travel size variants of products leading to packaging, designed specifically to fit in hand bags and luggages e.g. retractable razor [6].

It is advantageous [6] to add one or more features of the product on its packaging in addition to visual attractiveness. It provides consumers with a greater opportunity to appreciate. For Example, packaging that allows consumers to interact with a product, e.g. activate or manipulate the product, while the product is displayed within the packaging provides consumers with an opportunity to
appreciate the features and functions of the product.

One of the most renowned shapes in the world is the iconic contour fluted lines of the Coca-Cola [7] bottle. Recognized as a design classic and described by noted industrial designer, Raymond Loewy as the “perfect liquid wrapper,” the bottle has been celebrated in art, music and advertising. When Andy Warhol wanted a shape to represent mass culture, he drew the bottle and when Volkswagen wanted to celebrate the shape of the Beatle, they compared the car to the bottle.

The Root Glass Company [7] put forth a patent registration under Samuelsson’s name which was granted on November, 16th, 1915. In 1923, the patent for the bottle was renewed. Patents expire in 14 years so the bottle patent was renewed again in 1937. On April 12th, 1961, the Coca-Cola bottle was recognized as a trademark.

![Figure 7: The Coca-Cola Bottle Evolution with Years](image)

The form has evolved [7] [11] over the years with universal recognition. Just that the original patent from 1915 was a slightly fatter shape than the bottle that went into production. When King and Family sized packaging were introduced in 1955, Raymond Loewy was part of the team that worked to recast the bottle but retained the e proportions. The Company took advantage of this classic shape.

The Coke bottle has many nick names [7] [11] over the years. The most famous of them is the “hobble skirt” bottle. The hobble skirt was a fashion trend during the 1910s where the skirt had a very tapered look. The bottle was also called the “Mae West” bottle after the actress’s famous curvaceous figure. The first reference to the bottle as a “contour” occurred in a 1925 French Magazine, La Monde, which described the Coca-Cola bottle with a distinctive contour shape. To the general public, the shape is just “the Coke bottle.”

The Coca Cola company launched the first PET plastic bottle in 1978. Packaging [13] pushes the boundaries on sustainable innovation. This has led the Coca Cola company to innovate world’s first PET plastic bottle made entirely from plant materials. Coca Cola is presently into Plant Bottle packaging [14] using materials that are up to 30% plants-based instead of using petroleum and other fossil fuels to produce a key ingredient in the plastic (PET). It uses patented technology that converts natural sugars found in plants (sugarcane ethanol), into the ingredients for making PET plastic bottles.

Nowadays beverage products [8] come in a variety of packaging styles. For example, carbonated beverages are supplied in traditional glass bottles, in plastic bottles and in aluminium cans. Wine, by contrast has been traditionally sold in glass bottles, although the use of a cardboard cask container enclosing a bladder is also known and there have been more recent attempts, as yet not
commercially widespread, to promote wine in alternative packages such as aluminium cans or even cartons typically used for milk and fruit juice products. A further driver for the development of alternative packaging methods is the demand for packaging method/s that will allow the user to consume only a portion of the contents of the package without compromising the quality, or reducing the longevity of the remaining package contents and at great ease. Going by the principles of user interface design by Lary Constantine and Lucy Lockwood [9], i.e.

**Tolerance**: The design should be able to withstand varied usages by the user.

**Simplicity**: The design should make simple, common tasks easy and communicate clearly its affordance.

**Visibility**: The design should make all needed options and materials for a given task visible without distracting the user and should stimulate through one or more senses.

**Affordance**: Communicating to the user through form and design regarding its usage e.g. water taps and door handles.

**Consistency**: Uniformity pertaining to the performance in context to time and varied environments.

**Structure**: Most often the form along with the material.

**Feedback**: The design should communicate the users regarding actions or interpretations, changes of state or condition.

These seven principles may be considered at any time during the design of a user interface in any order. It engulfs the pedagogy of human factors and ergonomics within.

### 2.4. Silent Sales-Person

Good packaging [1] designers use their understanding of the marketing mix while devising their packaging solutions. It is a challenging task and sometimes it results in a design solution that gives a brand owner a device which can work across different media, in a holistic way. Packaging designer should understand the different magnitude “shout” that needs to be executed in packaging design in an attempt to create awareness about a product.

These days the Coca-Cola company practices [10] the 4Ps of marketing mix i.e. price, product, place and promotion. The company is aware of the potential of the Indian soft drink industry. The mission of the company is as follows:

- To refresh the world
- To inspire moments of optimism and happiness
- To create value and make difference

It silently says a lot about the heritage of the company and the packaging is very much integral part of it. The brand inspires creativity, passion, optimism and fun. The packaging so far has been instrumental in helping to achieve the same.
3. Methodology

A hypothetical packaging design project was undertaken upon the Coca Cola party/family (net quantity 2.25L) pack. The process began with role play and interviewing (with a questionnaire) a sample of approx 150 people in Bhopal, Delhi and Kolkata (who are frequent or regular consumers of party packs of beverages) of various age and different gender. SWOT analysis (refer to pg.no-9) was done on the packaging of Coca Cola party/family (net quantity 2.25L) pack based on the primary data collected, as depicted in Figure 10-12.

3.1. Primary Data Collection

Primary data was collected from consumers belonging to varied socio-economic background, varying between age group of 15-55 and both males and females.

Many consumers were keenly observed while using the bottle. The design process followed is depicted in the flowchart in Figure 9.

3.2. Analysis and Interpretation of Data

The sample segment was asked a few questions which are interpreted in the charts in Figure 10, Figure 11, and Figure 12 below.

**Question**-“What is the best thing about the (2.25L) party pack bottle?”

The interpretation is as follows in Figure 10.
Figure 9: Design Process Flow-Chart

Figure 10: The Best Thing about the 2.25L Party Pack Bottle
From Figure 10 it is observed that as per the comments received from the market research maximum persons selects 2.25L bottle for keeping the cold drinks in longer duration (53%). 31% of the sample choose the bottle for week end get together and 19% choose the bottle for its reusability as packaging in future.

**Question**-“What is/ are the thing/s or features about the (2.25L) party pack bottle that is disliked?”

The interpretation is as follows in Figure 11.

![Figure 11: Things that are disliked in the Bottle](image)

From Figure 11 it is observed that 56% of the respondent agrees that the due to formation of moisture over the bottle surface as well as the girth, it is a challenge to grip the bottle with one hand while pouring. So better gripping of the bottle, especially for the kids, are required. 31% of respondent agree that two hands are required to safely grip the bottle when pouring. 9% of respondents agree that at the time of pouring coke in the glasses the beverage tends to gush out from the bottle.

**Question**-“What is/ are the thing/s or features about the (2.25L) party pack bottle that is aspired?”

The interpretation is as follows in Figure 12.
A material which is ecofriendly

Substantial grip for all.

Controlled pour device like in liquor bottles.

Figure 12: Things that are aspired in the Bottle

From Figure 12 it is observed that 67% of the respondents aspire better gripping arrangements for family pack to avoid unwanted slippage when pouring and 23% aspired to have a controlled pour device like in liquor bottles.

3.3. SWOT Analysis

Strengths

• Iconic form / silhouette of the PET Bottle.
• Reusability
• Same size cap for every bottle. It comes as an advantage.
• Low production costs.

Weaknesses

• Ergonomically difficult to grip/pour especially when full.
• Lack of control while pouring the beverage, especially when the bottle is half filled because of gradual weight transfer from bottom to top of the bottle.
• As per present affordance the grip of the bottle lies somewhere on the label of the brand. Going by anthropometry the curvature of the bottle there doesn’t suit the palm size of teens and females mostly. Thereby making them conscious while pouring.
• Lack in stability.

Opportunities

• Stand out of the crowd by giving the form a new dimension retaining the iconic dignity.
• To provide a better experience with packaging thereby creating a larger impact of the brand.
• Enduring reusability thereby reducing garbage brooding.
Threats

- Competition in market. Almost every cold drink (party/family pack) packaging is similar. The packaging other than the graphics doesn’t stand out.

4. Results and Discussion

4.1. Design Philosophy

To empower the users with an utmost confidence while using the product.

4.2. Design Brief Statement

Redefining the packaging of Coca Cola (2.25 L) party/family pack bottles without disturbing much the iconic contour while incorporating a better grip and beverage flow would thereby enhance the controllability and affordance.

It should be within the existing cost of mass manufacturing which is done by Injection blow moulding process (excluding the die cost) i.e. Rs 2.00 to Rs 3.50.

4.3. Design Strategy

Refreshing optimism and happiness in style. A positive change would enhance brand value. A concept is recommended below in Figure 13 with the same material as existing i.e. Polyethylene Terephthalate and same manufacturing process as existing i.e. Injection blow moulding process.

![Figure 13: Redefined Coke Party Pack bottle 2.25 L](image)

It may be perceived as sculpting out cosmetic changes in the existing packaging without disturbing the iconic contour and proportion much. May be the size (existing size is 13.75” x 4” tentatively) will increase marginally because of the negative space created.

The negative space creates a distinct affordance towards the grip providing remarkable control to users of all age groups especially while pouring.
In the concept the neck is slightly moved forward by around 10°. It shall help in pouring the liquid with comparative ease. It is depicted in the 3D Studio Max screen shot in Figure 14.

![3D Studio Max screen shot](image)

**Figure 14: The Slight Bend at the Neck**

A tentative prototype is developed with plaster of Paris. As depicted in Figure 15.

![Plaster of Paris Model](image)

**Figure 15: Plaster of Paris Model**

Below mentioned in Figure 16 is the existing contour, the transformed contour of the bottle.
Below mentioned in Figure 17 the Figure depicts how the bottle works.

5. Conclusion

Controlled pour devise, as in liquor bottles, has not been used as hardware for reasons as mentioned below:

- There is already substantial transition in the packaging. Adding the hardware would be too much for the consumers to feel nostalgic with the form and brand.
- Cost implications.

The Coca Cola company has evolved from packaging [13; 14] in traditional PET bottles to Plant Bottles. 30% of material in Plant Bottles is sugars found in plants which are absolutely renewable. The Plant Bottle has a lighter footprint on the planet and its scarce resources. Due to its manufacturing ingredients it reduces potential carbon dioxide emissions and dependence on fossil fuels, like petroleum, when compared to traditional PET plastic. It is presently available in over nine countries including Sweden, Denmark, Mexico, Brasil, Japan, Chile, The USA, Canada etc. It is fully recycleable and thus may be proposed to be the ideal material to develop the concept.
The feedback from the respondents is as follows:

- The iconic dignity of the pack is not getting disturbed with the cosmetic changes in the form and unchanged graphics
- Ergonomically it reduces two hand handling to one hand
- It would have a endured and preferred reusability
- It will surely stand out of the crowd
- It will inevitably go with the brand mission (ref page 6) i.e. To create value and make difference.

References


Reference Images and Figures


