

Minimization of Waste Due to BBD in FMCG Industry

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Abstract

Best before date (BBD) is the period of time that a commodity may be stored without becoming unfit for use, consumption, or sale. In other words, it means that a commodity should no longer be on a pantry shelf (unfit for use), or no longer on a megastore shelf (unfit for sale, but not yet unfit for use). Consumers misunderstand what the best before date actually means which lead to wastage of products by them. We model and study the reasons of BBD through Fishbone approach and Pareto analysis. With specific focus on best before date and remaining shelf-life, we develop methods of reduction of waste in FMCGs. RFID (Radio-Frequency Identification) has been proposed as an emerging technology that could help reduce wastage in perishable food supply chains.

1. Introduction

The products from a bottling plant which consumers consume are called fast moving consumer goods. Fast Moving Consumer Goods (FMCG) which are also known as Consumer Packaged Goods (CPG) are products that have a swift turnover and parallel low cost. Consumers generally put less thought for purchasing FMCG than they do for other products.

The Indian FMCG industry had seen significant changes through the 1990s. Many companies had been facing severe problems on account of increased competition from small and regional companies and from slow growth across its various product categories. Due to this companies were forced to improve their product, marketing, distribution and customer service strategies to strengthen their position in the market. The realization of the customer's growing awareness and demand and the need to meet changing requirements and preferences on account of changing lifestyles forced the FMCG producing companies to formulate customer-centric strategies. These changes had a positive impact, which led to the rapid growth in the FMCG industry. Increased availability of retail space, rapid urbanization, and qualified manpower also boosted the growth of the organized retailing sector.

In India, beverages are an imperative part of the lives of people. It is an industry, in which the companies constantly innovate, in order to come up with new and better products to gain more consumers without disappointing the existing consumers.

The beverage industry in India is very vast and there are various ways of segmenting it, so as to deliver the right product to the right person. There are different ways of segmenting industries as shown in figure 1.

- Alcoholic products, non-alcoholic and sports products.
- Natural and Synthetic beverages.

- In-home consumption and out of home on premises consumption.
- Age wise i.e. beverages for kids, for adults and for senior citizens.
- Segmentation is based on the amount of consumption i.e. high levels of consumption and low levels of consumption.

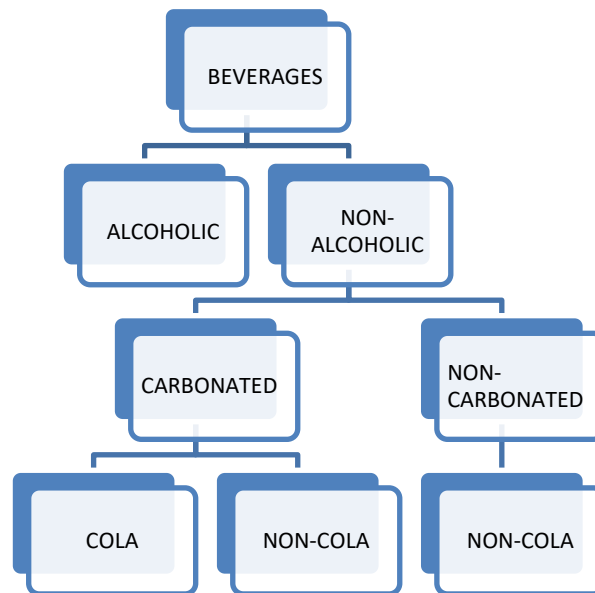


Fig. 1 Beverages In India

If we clearly notice the behavioral patterns of consumers in India, it could be observed that consumers understand beverages in two different ways viz. beverages are a luxury and have to be consumed occasionally. These perceptions are the two biggest challenges faced by the beverage industry. In order to restrict the decrease beverage industry, it is important to address this issue so as to increase regular

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consumption as well as and to make the industry more affordable. There are four strong strategic elements to increase consumption of the products in India.

- The quality and the consistency of beverages needs to be improved so that consumers are satisfied and they enjoy beverages.
- The credibility and trust needs to be built so that there is a strong and safe feeling that the consumers have while consumption of beverages.
- Consumer education is very important to bring out benefits of beverage consumption whether in terms of health, relaxation, taste, stimulation, well-being or prestige relevant to the category.
- Communication should be relevant and trendy so that consumers feel easy to find an appeal to go out, purchase and consume.
- The beverage market has still to achieve greater penetration and a wider spread of distribution. It is important to look at the entire beverage market, as a big opportunity, for brand and also sales growth in turn to add up to the overall growth of the food and beverage industry in the economy.

The beverage industries have great potential to reduce waste and close the recycling loop. A commitment to recycling and waste reduction helps in financial and environmental benefits. The EPA recognizes businesses as partners in waste recycling and reduction efforts. This partnering program, called Waste Wise, encourages businesses and organizations to practice responsibility with reduction in waste. Partners can receive help with outreach, industry resources, and nationwide recognition for their efforts.

1.1 Prevent Beverage Container Waste

Waste prevention or reducing it is the most efficient way of waste management. Beverage companies committed to waste prevention have implemented many practices, such as:

- Producing lightweight glass, plastic, and aluminum containers
- Eliminating the extra packaging around the base of plastic liter containers
- Switching the holding material for fountain soda dispensers
- Switching to lighter weight corrugated packages and cartons
- Using plastic cases instead of corrugated shipping boxes
- Reusing waste materials as feedstock for plastic pallet production
- Developing a glove reuse system opposed to disposing gloves daily
- Measuring and tracking the waste while production is on
- Refurbishing the vending machines instead of disposing of them

1.2 Recycling Commitments

The beverage industry partners maintain a commitment to expand, start and continuously improve recycling programs within their companies. These commitments may involve adding materials to a currently existing program, beginning a new program and increasing community outreach and education.

Beverage industry partners are particularly committed to:

- Recycling all the six-pack rings
- Bailing, collecting and recycling all corrugated cardboard
- Establishing a buy-back container program for promotion of recycling to customers
- Recycle all the plastic shrink wrap, drums, and strapping

1.3 Closing the recycling loop

Recycling does not end with detracting waste from landfills. A market created for materials made with recycled content ensures the sustainability of recycling process. Beverage companies can choose to use more recycled content in the products they produce thus purchase materials made with recycled content. Some sample efforts include:

- Increasing the percentage of recycled glass content.
- Increasing the percentage of recycled material in cardboard.
- Increasing the percentage of recycled plastic content in PET containers.

Bottle labels have information for date marks to tell us about safe shelf life. These marks help us to tell how long the food can be kept before it begins to deteriorate. All beverages having a shelf life of less than 2 years must be date marked.

'Use-by': beverages must be consumed or thrown away by the date

1. After this date beverages may be unsafe to consume even if they look good because the nutrients in the food may become unstable or a build-up of bacteria may occur.
2. It is illegal to sell beverages after a 'use-by' date.
3. Common 'use-by' beverages include milk, sliced ham and shaved meats.

'Best before': beverages are still safe to eat after the date as long as they are not damaged, deteriorated or perished

1. The 'best before' date simply indicates that the product may lose some of its quality after this date passes.
2. Beverages can be legally sold after a 'best before' date as long as they are not damaged, deteriorated or perished.
3. You can expect these beverages to retain their colour, taste, texture and flavour as long as they are stored correctly.
4. Common 'best before' beverages include canned beverages, cereals, biscuits, sauces, chocolate, sugar, flour and frozen beverages.

The Best before dates lead to waste by consumers. Consumers are throwing away thousands of dollars and kilograms of food each year just because they misunderstand what the best before date actually signifies. A 2013 study from Council concluded that the dates printed on packaged beverages serve to confuse consumers, leading them to trash their food and money. Food waste costs the Canadian economy an estimated \$31 billion a year. Much of that waste starts with consumers throwing out food that's still good to eat.

Lindsay Coulter, known as the “Queen of Green” of the David Suzuki Foundation, says “about a one- third of all the food produced in the world is wasted”. She attributes a vast majority of that waste to consumers concluding the best before date means food has gone “bad that day.”

1.4 Best before date

Best before dates relate to the “food quality,” explains Sandberg, who says that label has nothing to do with the food safety. They are labeled on products with a shelf life of 90 days or less. If we open up our fridge and find a container of beans with a best before date that has passed, don’t be so quick to toss it out. If it has been stored properly and is unopened, then according to Sandberg it is still safe to eat. Those best before dates display peak flavor. Once the date has passed, he says, the food may lose some of its freshness and flavor. Once opened, the food’s shelf life may also change. Best before dates indicates that the quality of their food might begin to deteriorate, but it is still good to eat and the shelf life is still active for a period beyond that of a pre-determined best-by date.

1.5 Expiration Date

Expiration dates tell consumers the last day a product is safe for consumption. These beverages are clearly marked with ‘EXP’ or with ‘Expiry.’ After that date has passed, throw it out as the manufacturers cannot guarantee that the food’s nutritional composition still remains stable. Shelf life is an important feature of all beverages. All those involved in the handling of beverages should be aware of it. These may include ingredient suppliers, growers, manufacturers, or distributors, retailers and also the consumers. Shelf life of a food product may be defined as the time interval between the process of its production and packaging and the point at which it becomes unacceptable under defined environmental conditions. Storage of the products and distribution are necessary links in the food chain. Quality (and safety) considerations order the conditions and maximum duration of these links in the chain although most food deteriorations take place gradually.

Reasons of BBD

1. Sales Over forecast
2. Overproduction:
 - a. By backtracking we can quantify it and thus show it’s share in BBD
 - b. Abrupt orders during production cause more production due to batch size (for those orders, we need to discuss with Production teams)
3. Price Change
4. Promotions
5. FIFO violation

2. Literature Review

India is the second largest economy after china in the world. Looking at the speed with which India is growing in the field of manufacturing and production industries, there is a great scope for every company. One such area is of production industries. Restricting to FMCGs in this paper, we model and analyze the waste of products due to the best before date. The FMCGs produces various products on large scale. The production of food products is a continuous work. Different departments are made for the quality of products, inspection, sales and marketing etc. Studies have been done on minimization of waste from the bottling

plants. Tromp,et el (2012)studied about retail benefits of dynamic expiry dates—Simulating opportunity losses due to product loss, discount policy and out of stock. Grunow et. el (2013) suggested a suitable method of BBD reduction referred as RFID. RFID (Radio-Frequency Identification) has been proposed as one of the leading technology that can help reduce wastage in perishable food supply chains. This is due to their cost reducing ability to reliably identify tagged items and gather information on their ambient conditions through appropriate sensors. The precursor to the concept of best-before date for a product was in the form of sell-by date introduced by Marks and Spencer of London in the 1970s mainly as a stock unit control measure to ensure a manageable and respectable turnover of products on its shelves. Gradually, best-before date or sell-by dates are assumed by the consumers as a guarantee for food safety. Many customers have no idea how long a certain item of beverage might last in the natural course of events; we without thinking throw away good beverages because they have crossed the best-before date which are mentioned on their labels. Once we read the best-before date on a product and find that it has that date, we do not want to consume it after that date. Due to this result is unnecessary wasting of the product. The very basic idea of best-before or sell-by date which is meant for stock management in the markets has inadvertently turned into a standard wrong by which the consumer chooses to throw away or consume the product. We tend to implicitly believe in the labels printed on the packaged products. Nowadays, the supermarkets and super stores sell grocery items in colorful polyethylene or packets with information on batch number, nutrition, and date of packaging and best before date or use by. Now think what is going to be done with these items that have overstayed on the supermarket shelves beyond the best-before date? Are they tossed away? Do these items really reach a state unfit for human consumption? Such information may be compulsory in developed countries where supermarkets shelves are filled with a variety of processed food items. This is a growing concern in the developed countries also about increasing amounts of food waste and the exponential rising in the cost of these items mainly due to customers buying more than they need lack of clarity around storage and labeling and estimating beyond the actual required value the quantities required for regular use. Many of the items are tossed away. In our country, the market for processed foods is comparatively small. However, with the size of the urban population increasing rapidly and young professionals getting handsome salary slips, they needlessly stock up on items that they will never use. Boxstael et. el (2014) worked upon the shelf life labels and dates on pre-packed food products by Belgian consumers. Based on an on-line survey using questionnaires, information on Belgian consumers ($n = 907$) regarding their understanding and attitude towards shelf life labels and dates was collected. 80.1% of the respondents were familiar with the terminology of the label *use by* and *best before* while 69.6% indicated to know the difference between the meanings of the two labels.

The best-before date on the labels confuses even the discerning customer. A popular brand of salt from a leading manufacturer has a label which tells that it should be used within 24 months of packaging. Does it imply that salt

would go bad after 24 months? Salt is obtained by the process of evaporation of seawater, which has been in existence for centuries. Do the processing methods make it unsuitable for us to consume them after 24 months? Mustard oils have been used by our parents and grandmothers to prepare pickles which used to keep its quality for years. Why, even packages of our staple grain of rice have labels indicating best-before 2 years of packaging. Does rice become unfit for us to consume after being stored for two years? There are infinite examples of food items which have dubious labeling which misguide the consumer. The term best-before date have however come to haunt with surprising strength, though these are not based on opinions of experts or certified by testing agencies. The manufacturers benefit by selling more of their products with the so called high-sounding concept of freshness and safety. Tossed and chopped onions which are imported from a foreign country several months ago could be packed in an attractive modified packaging to extend the shelf life and endow these old items with fresh-like resembling quality, which would be good for a fortnight after packing. This is indeed an anomaly.

3. Research Methodology

We model and study the reasons of BBD through Fishbone approach and Pareto analysis. Through fishbone diagram we have analyzed the causes and effects of BBD in FMCG Industries. We have done a study of the top factors which are contributing to BBD. We have taken an example of products in bottling plant which got BBD due to various reasons discuss above. We have identified various products which are in top 80% contributing to BBD and analyses them by making a Pareto. With specific focus on best before date and remaining shelf-life, we develop methods of reduction of waste in FMCGs. RFID technique is used to minimize the In House BBD. As a result FIFO violation is reduced and hence the products which get BBD (in other words loses freshness) or get expired in the warehouse are reduced.

4. Case Illustration

4.1 Company Profile

The prototype FMCG recipe was formulated at the Eagle Drug and Chemical Company, a drugstore in Columbus, Georgia by John Pemberton, originally as a coca wine called Pemberton's French Wine Coca. He may have been inspired by the formidable success of Vin Mariani, a European cocawine.

In 1886, when Atlanta and Fulton County passed prohibition legislation, Pemberton responded by developing ABC, essentially a non-alcoholic version of French Wine Coca. The first sales were at Jacob's Pharmacy in Atlanta, Georgia, on May 8, 1886. It was initially sold as a patent medicine for five cents a glass at soda fountains, which were popular in the United States at the time due to the belief that carbonated water was good for the health.^[9] Pemberton claimed ABC cured many diseases, including morphine addiction, dyspepsia, neurasthenia, headache, and impotence. Pemberton ran the first advertisement for the beverage on May 29 of the same year in the Atlanta Journal. By 1888, three versions of ABC — sold by three separate businesses — were on the market. Asa Griggs Candler acquired a stake in Pemberton's company in 1887 and incorporated it as the ABC Company in 1888. The same

year, while suffering from an ongoing addiction to morphine, Pemberton sold the rights a second time to four more businessmen: J.C. Mayfield, A.O. Murphey, C.O. Mullahy and E.H. Bloodworth. Meanwhile, Pemberton's alcoholic son Charley Pemberton began selling his own version of the product. John Pemberton declared that the name "ABC" belonged to Charley, but the other two manufacturers could continue to use the formula. So, in the summer of 1888, Candler sold his beverage under the names Yum Yum and Koke. After both failed to catch on, Candler set out to establish a legal claim to ABC in late 1888, in order to force his two competitors out of the business. Candler purchased exclusive rights to the formula from John Pemberton, Margaret Dozier and Woolfolk Walker. However, in 1914, Dozier came forward to claim her signature on the bill of sale had been forged, and subsequent analysis has indicated John Pemberton's signature was most likely a forgery as well.

In 1892 Candler incorporated a second company, The ABC Company (the current corporation), and in 1910 Candler had the earliest records of the company burned, further obscuring its legal origins. By the time of its 50th anniversary, the drink had reached the status of a national icon in the USA. In 1935, it was certified kosher by Rabbi Tobias Geffen, after the company made minor changes in the sourcing of some ingredients.

ABC was sold in bottles for the first time on March 12, 1894. The first outdoor wall advertisement was painted in the same year as well in Cartersville, Georgia. Cans of Coke first appeared in 1955. The first bottling of ABC occurred in Vicksburg, Mississippi, at the Biedenharn Candy Company in 1891. Its proprietor was Joseph A. Biedenharn. The original bottles were Biedenharn bottles, very different from the much later hobble-skirt design that is now so familiar. Asa Candler was tentative about bottling the drink, but two entrepreneurs from Chattanooga, Tennessee, Benjamin F. Thomas and Joseph B. Whitehead, proposed the idea and were so persuasive that Candler signed a contract giving them control of the procedure for only one dollar. Candler never collected his dollar, but in 1899 Chattanooga became the site of the first ABC bottling company. The loosely termed contract proved to be problematic for the company for decades to come. Legal matters were not helped by the decision of the bottlers to subcontract to other companies, effectively becoming parent bottlers. Coke concentrate, or Coke syrup, was and is sold separately at pharmacies in small quantities, as an over-the-counter remedy for nausea or mildly upset stomach.

On April 23, 1985, ABC, amid much publicity, attempted to change the formula of the drink with "New Coke". Follow-up taste tests revealed that most consumers preferred the taste of New Coke to both Coke and Pepsi, but ABC management was unprepared for the public's nostalgia for the old drink, leading to a backlash. The company gave in to protests and returned to a variation of the old formula, under the name ABC Classic on July 10, 1985.

On February 7, 2005, the ABC Company announced that in the second quarter of 2005 they planned to launch a Diet Coke product sweetened with the artificial sweetener sucrose, the same sweetener currently used in Pepsi One. On March 21, 2005, it announced another diet product, ABC Zero, sweetened partly with a blend of aspartame and

acesulfame potassium. In 2007, ABC began to sell a new "healthy soda": Diet Coke with vitamins B₆, B₁₂, magnesium, niacin, and zinc, marketed as "Diet Coke Plus". On July 5, 2005, it was revealed that ABC would resume operations in Iraq for the first time since the Arab League boycotted the company in 1968.

In April 2007, in Canada, the name "ABC Classic" was changed back to "ABC." The word "Classic" was truncated because "New Coke" was no longer in production, eliminating the need to differentiate between the two. The formula remained unchanged.

In January 2009, ABC stopped printing the word "Classic" on the labels of 16-ounce bottles sold in parts of the southeastern United States. The change is part of a larger strategy to rejuvenate the product's image. In November 2009, due to a dispute over wholesale prices of ABC products, Costco stopped restocking its shelves with Coke and Diet Coke.

4.1.1 Mission

Our Roadmap starts with our mission, which is enduring. It declares our purpose as a company and serves as the standard against which we weigh our actions and decisions.

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

4.1.2 Vision

Our vision serves as the framework for our Roadmap and guides every aspect of our business by describing what we need to accomplish in order to continue achieving sustainable, quality growth.

- People: Be a great place to work where people are inspired to be the best they can be.
- Portfolio: Bring to the world a portfolio of quality beverage brands that anticipate and satisfy people's desires and needs.
- Partners: Nurture a winning network of customers and suppliers, together we create mutual, enduring value.
- Planet: Be a responsible citizen that makes a difference by helping build and support sustainable communities.
- Profit: Maximize long-term return to shareowners while being mindful of our overall responsibilities.
- Productivity: Be a highly effective, lean and fast-moving organization.

4.1.3 Winning Culture

Our Winning Culture defines the attitudes and behaviors that will be required of us to make our 2020 Vision a reality. Live Our Values

Our values serve as a compass for our actions and describe how we behave in the world.

- Leadership: The courage to shape a better future.
- Collaboration: Leverage collective genius.
- Integrity: Be real.
- Accountability: If it is to be, it's up to me.
- Passion: Committed in heart and mind.

- Diversity: As inclusive as our brands.
- Quality: What we do, we do well.

4.1.4 Focus On The Market

- Focus on needs of our consumers, customers and franchise partners.
- Get out into the market and listen, observe and learn.
- Possess a world view.
- Focus on execution in the marketplace every day.
- Be insatiably curious.

4.1.5 Work Smart

- Act with urgency.
- Remain responsive to change.
- Have the courage to change course when needed.
- Remain constructively discontent.
- Work efficiently.

4.1.6 Act Like Owners

- Be accountable for our actions and inactions.
- Steward system assets and focus on building value.
- Reward our people for taking risks and finding better ways to solve problems.
- Learn from our outcomes -- what worked and what didn't.

4.2 Results and Discussion

4.2.1. Fishbone Analysis

When utilizing a team approach to solve problem, there are often many opinions for the problem's root cause. One way to identify these different ideas and stimulate the team's brainstorming on root causes is the cause and effect diagram, generally called a fishbone diagram. The fishbone will help to visually show the many potential causes for a specific problem or effect. It is particularly helpful in a group setting and for situations in which little quantitative data is available for doing analysis. The fishbone diagram has an ancillary benefit as well. Because the people by nature like to get right for determining what they have to do about a problem, this can help bring out a deeper explanation of the issues behind the problem which will lead to a more reliable and robust solution. To construct a fishbone diagram, we start with stating the problems in the form of a question, such as 'Why is the help desk is abandoning rate high?' Framing this as a "why" question will help in brainstorming, since all root causes idea should answer the question. The team would agree on the statement of the given problem and then place this question in a box at the head position of the fishbone. The rest of diagram then consists of one line drawn across the page, that is attached with problem statement, and several lines, or 'bones', coming out vertically from the main line. These branches are labeled showing different categories. The categories we use are up to you to decide.

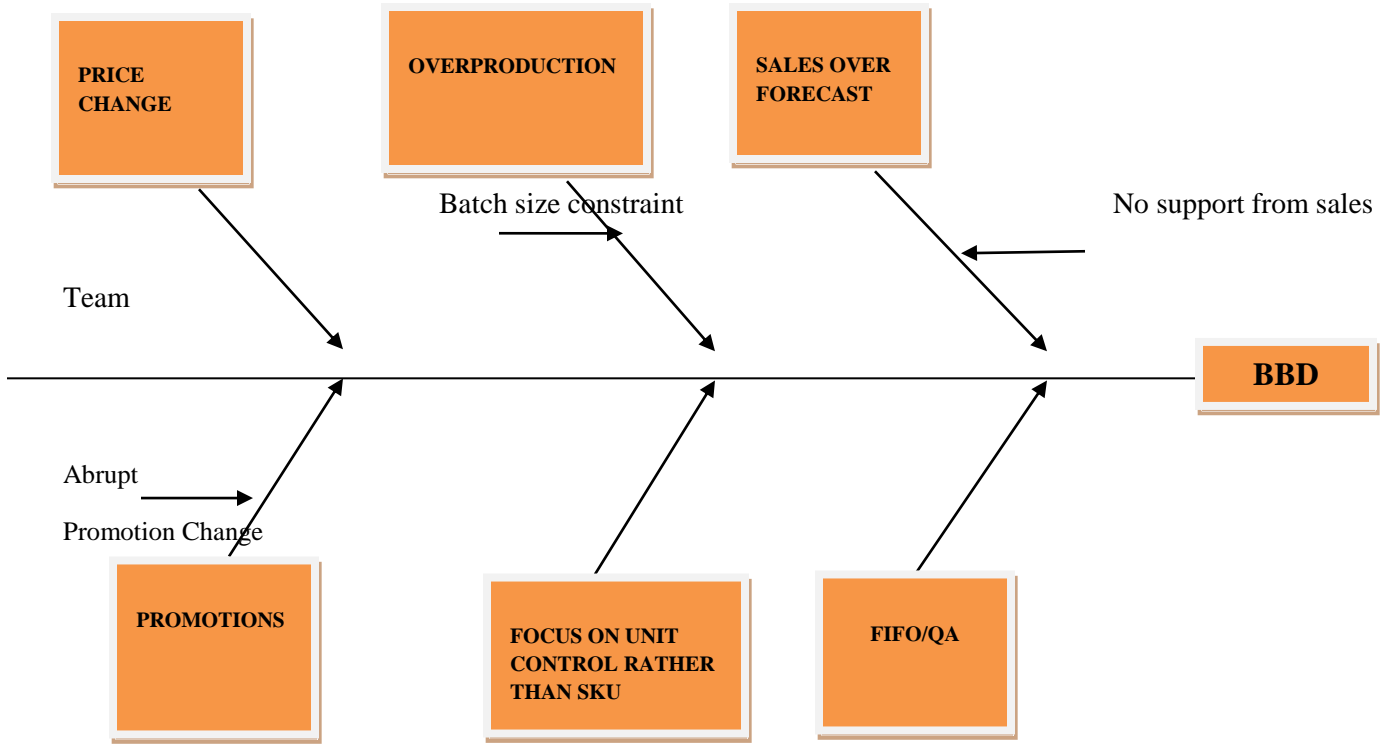


Fig.2 Fish bone Analysis

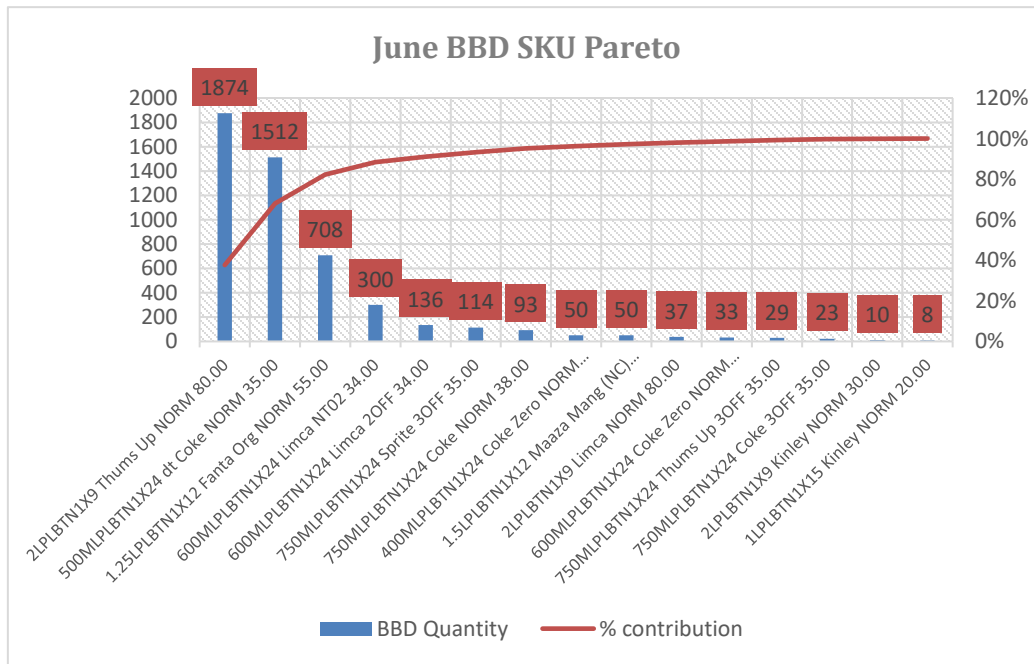


Fig. 3 BBD distribution in June

Table 1: BBD in June

BBD Quantity	% contribution
2152	46%
1162	71%
611	84%
255	89%
155	93%
139	96%
110	98%
37	99%
32	99%
13	100%
12	100%
4	100%

Table 2 BBD in September

BBD Quantity	% contribution
1874	38%
1512	68%
708	82%
300	88%
136	91%
114	93%
93	95%
50	96%
50	97%
37	98%
33	99%
29	99%
23	100%
10	100%
8	100%
4977	

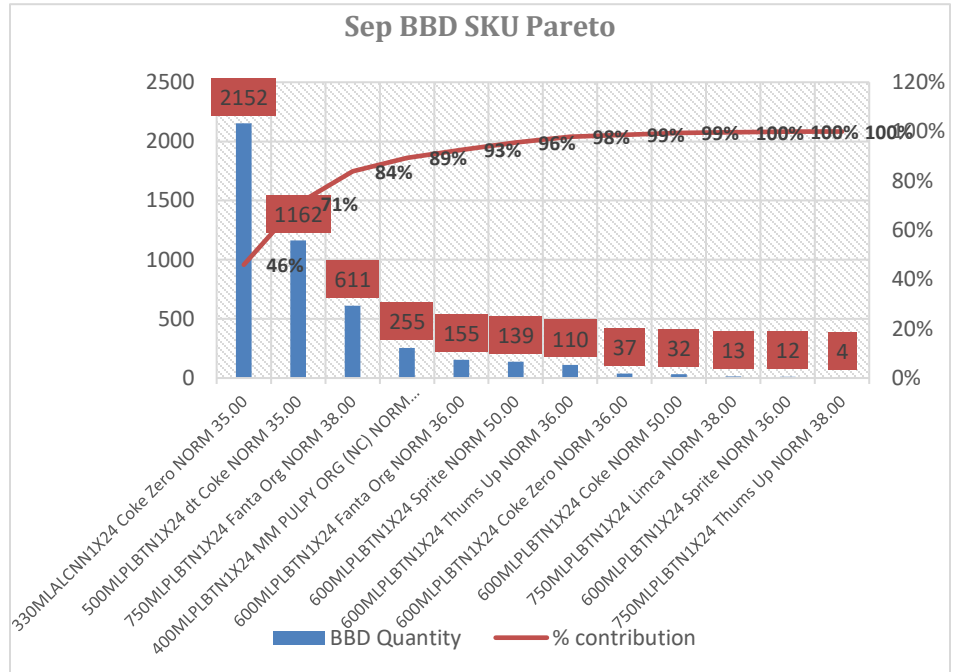


Fig. 4 BBD distribution in September

5. Conclusion

A best-before date provides details about the expected quality of the product and is the time beyond which, in the manufacturer's opinion, the product will lose its optimal condition. It will, however, probably still be fit for consuming and nutritious for some time after that date. FMCGs usually apply best-before dates to ensure that consumers have ample time after purchase to use the food in good condition. Consumers can judge about beverages beyond their best-before date if it looks ok, and smells fine; it's probably ok to eat, although not at its best. This approach is not appropriate for beverages beyond their 'use-by' date, because pathogens can be present without affecting the sensory qualities of the food. It is estimated that about 1.3 billion tons of food, about a third of all that is produced, is wasted globally. About 45 per cent of beverages, 35 per cent of seafood, 30 per cent of cereals, 20 per cent of dairy products and also 20 per cent of meat are so wasted. Our capacity to produce enough food for Earth's population had become a real concern, and then also 20-30% of the world's food is wasted. A consequence of this confusion about the correct specification of 'best-before' and 'use-by' dates is that some foods are unnecessarily tossed away even though they are safe to consume and nutritious. Developing appropriate 'use-by' and 'best-before' dates could help reduce or eliminate this wastage. Helping the consumers to minimize their wastage of food through understanding of 'best-before' dates offers other small, but potentially useful, contribution to global food security. As an additional advice to reduce wastage, if foods are not fit to be consumed before the 'use-by' or 'best-before' date, they can be frozen (which essentially stops the

spoiling processes) and thawed for consumption later, provided they're eaten pretty soon after thawing.

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