"PACKAGED FOOD"

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REVIEW

BY

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This is to certify that KOMAL MOHAN PATIL of B.Sc. Biotechnology, Sem VI, has satisfactorily completed the review for partial fulfilment of Bachelor Degree is Biotechnology as a part of curriculum at Rajiv Gandhi Institute of IT and Biotechnology, B.V.D.U, Pune for the academic year 2015-2016.

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Abstract

The growth of packaged food market is increasing today rapidly. Because of busy life and changing lifestyle and income pattern, the demand is increasing day by day. Children's are highly attracting towards the packaged foods today. With the healthiest benefits of packaged foods, there are some disadvantages also. Some packaging materials in packaged foods make it unedible. These cause many health hazards.

Today, many innovations, many new techniques are coming which gives many types of packaged food products with high nutrition and these products are healthy to our body. This review report gives the deep information about the packaged food products, its demand in market at international level as well as at national level. This also shows about the materials used for packaging packaged food products, the advantages and disadvantages also.

In this review, with the current scenario of packaged food products, the future prospectus is also summarized. This is also summarized the factors which causes the growth of packaged food in detail.

1.0 Introduction

The packaged food is defined as, the food which is produced by enclosing unfrozen or frozen food in an airtight container which can be directly cooked by heating in a microwave oven or stored in a refrigerator for a longer period (Sachiko Hiyoshi, 2001). The packaged food related to factors such as easy cooking, consumption, handling and safety from external tampering. The main factors which improve the growth of packaged food market are Changing lifestyle, Convenience of consumption and increasinghealth awareness. Packaging materials used for food should be convenient for carrying, displaying, opening and closing (Amit Kumar Gupta, 2015).

Packaged food can be categorized as lower water content and higher water content packaged foods.

- Lower water content packaged food includes, bread, pastry, butter, cereal based products.
- High water content packaged food includes meat, fruit, vegetables, sauces, eggs, cheese, milk products and combinations thereof (Sean Savage, 2004).

Packaged food includes sales by corporations, retailers as ''private label'', artisanal and generic/unbranded (Eleanore Alexander, et.al. 2011).

Mainly, packaged food can be classified into following four types:-

1. Bakery products,
2. Canned or dried processed foods,
3. Frozen processed foods,
4. Meat replacement product and condiments (Ankush Chibber, 2012).

Packaged food includes baby food, bakery, canned, preserved food, chilled-proceeded food, confectionary, dairy, dried processed food, frozen processed food, ice cream, meal replacement, noodles, oils and fats, pasta, ready meals, sauces, dressings and condiments, snack bars, soup, spreads, sweet and savoury snacks (Eleanore Alexander, et.al., 2011).

By survey of ASSOCHAM (Associated Chambers Of Commerce and Industry of India), it shows that, the demand of packaged food is increasing day by day and people consuming more and more packaged foodtoday. It shows that, more than 82% workforce peoples prefers packaged foods rather than roadside food as packaged food is contaminant free and healthy.ASSOCHAM also shows that, the demand for packaged food is higher in urban areas because of rising incomes and changing lifestyle.

By ASSOCHAM, in 2012, it shows that, the consumption of packaged food in urban areas is about 71% (Ankush Chibber, 2012). Consumers prefer packaged food products which is suitable for storing in a refrigerator and heating directly in a microwave oven (Sean Savage, 2004).

2.0 History

In the late 1800s and during the turn of the 20th century, packaged food companies and food processing companies are originated. In Western Europe and United States, firstly packaged food companies are developed. After some time, the demand for packaged food products is increased more and more. This is due to increasing incomes and evolution of industries. Large scale production of packaged foods was begins firstly in Western Europe and in U.S. (Mark Gehlhar, 2003).

In India, the Defence Food Research Laboratory (DFRL), Mysore, was established on 28th December 1961 under defence research and development organization to fulfil the needs of various foods of Indian army, navy and paramilitary forces. Their aim is to design and engineer light weight convenient packaged food with longer shelf-life under varying climatic conditions.

Using the self developed technologies, DFRL has produced many ready to eat quick cooking and instant foods with longer shelf life.

The some packaged food are long keeping chapatti's, high protein snacks, potato parathas, fruit bars, mutton pickle, stabilized chikki, fruit juice powder, pineapple, mosumbi, chicken pulav, precooked dehydrated dal/ curries, PD rice, PD potato peas curry, instant pulav mix, instant curries, dal, instant kheer mix, instant khichadi mix, instant basmati rice ,instant upma mix, instant halwa mix. After that by increasing the incomes and changing the lifestyles, the packaged food market is growing day by day. After that packaged food comes for sale in markets and then by increasing population and urbanization the growth of packaged food market gets increased.In India, low incomes and preference for fresh food has acted as an inhibitor to packaged food growth in the past (Sushil Chavan).

3.0 International Scenario

The global packaged food market is based on product type and geography. Based on product type, the market is divides into 16 major packaged foods. They are- ready meals, baked foods, breakfast cereals, soup, baby foods, potato chips, nuts, instant noodles, pasta, biscuits, chocolate confectionary, cheese, yogurt, ice creams, sauces, dressings and condiments and non-alcoholic drinks (Amit Kumar Gupta, 2015).

U.S. makes largely upper hand in packaged food (John M. Conner, 2003). The Asia pacific region is expected to be the fastest growing market due to the growing awareness and increasing adoption of packaged foods. Geographically, North America is the largest market in the current scenario followed by Europe, APAC, and LAMEA (Amit Kumar Gupta, 2015).

The top companies in packaged food market include- nestle, Kraft foods, Unilever, PepsiCo, Mars, DANONE, Cadbury, Kellogg, general mills and Ferrero.These companies contribute 15.2% globally in the packaged food market (Eleanore Alexander, et al., 2011).

Following are the some globally packaged food company shares-

China- 2.3%

U.S. - 25.9%

India- 4.2%

South Africa- 7.3%

Egypt- 48%

Brazil- 21.1%

Mexico- 31.5%

Turkey- 56.9%

U.K. - 2.8 % (Eleanore Alexander, et al., 2011).

In baby foods and soups, Enfamil, Gerber and Similac makes 70% sale world- wide. For soup, Campbell's, Knor, Maggie, other some progressed brands accounts for about 60% marker.

The global scenario of packaged food market is as follows-

3.1 North America

North America is top continent in packaged food market. The demand for packaged foods is higher than fresh vegetables and fruits in North America .The top companies in North America include, General Mills, ConAgra, Ferrero, and Nestle. General Mills is extended the market in North America. The products are bakery goods, canned and frozen foods. This company is extended its market in North America which is strong company today. ConAgra is also other top company in the world packaged food market as its primary market is North America (Mark Gehlhar, 2003).

3.2 South America

In South America, countries with more multinationals in leading positions tend to have higher concentration levels of packaged food market.The growth are not high as compared to North America. In Latin American countries, however, Nestle, Unilever and Parmalat are pervasive throughout the region. Today, South America is the region where U.S. and European-based firms are trying to establish themselves for the future growth (Mark Gehlhar, 2003).

3.3 Australia

The packaged food market is higher in Australia with America. Nestle is the leading company in the Australia (Mark Gehlhar, 2003). Currently, Australia has a strong packaged food industry with $81 billion turnover.

The immediate challenge for packaged food market for Australia are-

- Rising input costs in raw materials
- Energy and labour
- The high exchange rate
- Regulatory compliance cost
- Adequate food security
- Need for substantial saving in waste use through reduction and recycling
- Infrastructure inefficiencies.
- The package d food market of Australia is expected to be growing in the future (Ron Johnston, 2011).

3.4 Asia

Compared to all countries, packaged food market is lower in Asia. Unilever Company makes only 1% shares in Asia. In Asia, nestle company makes 1.3% shares for packaged food products (Mark Gehlhar, 2003). But, Asian growth of packaged food market is increasing now. The reason for increasing demand for the packaged food markets in Asia are;

- Population growth increases demand for packaged food
- Higher demandrises by rising incomes.

The criterion for increasing the demand for packaged food market includes;

- Globally competitive raw materials
- Asian –market research and knowledge
- Export packaged consumer product/ ingredients
- Supply chain efficient and competitive
- Economics of scale
- World-class research and effective adoption
- Valuable business model.

In that, research criteria plays a major role in the growth of packaged food market as it understand the sector, contribute to market sector and consumer insight, support to leadership and the strategic direction n mainly it present the technology and product option and gives healthy and safe product to consumers (Martin Cole, 2014).

Packaged food market in Russia is raised by 30% today from 2010-2015.This growth will be due to new product development, improved distribution, and increased demand from consumers. The increasing development will not only help to increase consumer demand, but also improve and help to manufacturers to make new products with investment and high production of packaged foods. In Russia today, fruits and vegetables, meat and dairy products age grown locally today day by day, because of reasonable prizes and easy to available and also because of fresh natural products. But in Russia, packaged food market is not more expanding. It is about 0.2% accounted market for packaged food. This is due to high prizes and lack of national certificate system in Russia. It is expected that, the demand for packaged food market will be increase by allowing national certificate system. In Russia, Nestle Company makes about 58.9% shares for dehydrated foods (Mark Gehlhar, 2003).

China is also coming in top most countries in packaged food market. In Singapore, peoples prefer to shop convenience and packaged food rather than cooking food in home.The increasing markets in countries in Asia shows expected growth in next some years.

3.5 Europe

Europe is the leading country in the packaged food market growth with America. Of the fifty's large companies of packaged food in the world, about 36 companies are in the Western Europe (Mark Gehlhar, 2003). As packaged food company is firstly started in the Europe, from 1980s the packaged food market is growing unexpectedly in Europe.

The packaged food product like baby foods, soups, coffee, chocolate confectionary, tea and breakfast meals, canned fruits, vegetables and fish, Europe is top from beginning in the world till today.

The reason for increasing demand for European packaged food product is that, European grocery retailers tend to be more vertically integrated toward agricultural suppliers and they also converging foreign direct investment into United States.

In Europe, national concentration of packaged food products is much higher because of the smaller economic size of Europe's national markets relative to the U. S. Market. In larger European countries, packaged food market accounts about 40%-50% and in smaller countries like Sweden, Norway, Finland, Netherland, Switzerland, it accounts about 70 % (John M. Conner, 2003).

3.6 Africa

The market for packaged food products is increasing in Africa with increase in per capita income and changing and developing the lifestyles in consumers. The key success for packaged food companies in Africa includes

- The ability to focus on specific opportunities
- Develop differentiated, relevant offers that address substantial needs.

The top four companies in packaged food products include Nigeria, Ethiopia, South Africa and Kenya. In most, South Africa is most developed market in packaged food products in Africa. The most sale products in African packaged food market consists of, bakery products, confectionary, dairy products, frozen sea foods, processed foods, and vegetables.

In Africa, it is seen that, Nigeria provides an attractive market for packaged food products in the future because of factors such as local demand, political and economical situation, and competitors.

The agricultural base is strong in Africa, so the manufacturing cost and also other is low, so the demand for packaged food is high in Africa (Hariprasad, 2014). DANONE is the top most company of packaged food products in Africa (Mark Gehlhar, 2003).

Table 1. Leading 50 food manufacturing firms in packaged food sales worldwide

Sales Rank	Company name	Country origin	Firm sales in packaged food percent
1	Nestle	Switzerland	51.7
2	Kraft Foods	USA	30.4
3	Unilever	UK/Netherlands	50.2
4	PepsiCo	USA	61.2
5	Danone	France	73.9
6	Mars	USA	50.4
7	Kellogg	USA	97.7
8	ConAgra Foods	USA	81.0
9	Heinz Co	USA	58.2
10	Campbell Soup	USA	90.4
11	General Mills	USA	87.1
12	Dean Foods	USA	100.0
13	Hershey Foods	USA	99.0
14	Parmalat	Italy	66.3
15	Cadbury Schweppes	UK	43.9
16	Ferrero SpA	Italy	100.0
17	Bimbo	Mexico	96.0
18	Meiji Dairies Corp	Japan	86.6
19	Morinaga Milk Industry	Japan	na
20	Sara Lee	USA	28.6
21	Yamazaki Baking Co	Japan	92.9
22	Lotte Group	South Korea	100.0
23	Wrigle Jr Co	USA	100.0
24	Arla Foods Amba	Denmark	94.2
25	Snow Brand Milk Products	Japan	90.0
26	Sodiaal SA	France	89.3
27	Pfizer Inc	USA	6.3
28	George Weston Ltd	Australia	na
29	Nissin Food Products Co	Japan	100.0
30	Barilla G. R Fli SpA	Italy	100.0
31	Interstate Bakeries Corp	USA	100.0
32	Procter & Gamble Co	USA	10.5
33	Bristol-Myers Squibb Co	USA	9.8
34	Lactalis, Groupe	France	85.5
35	Ezaki Glico Co Ltd	Japan	na
36	Fonterra Co-operative Group	New Zealand	40.1
37	Hormel Foods Corp	USA	79.3
38	United Biscuits (Holding) Plc.	Belgium	na
39	Ajinomoto Co Inc.	Japan	na
40	Bongrain SA	France	na
41	Abbott Laboratories Inc	USA	7.1
42	Perfetti Van Melle Group	Italy	100.0
43	Orkla Group	Norway	28.8
44	Morinaga & Co	Japan	na
45	Del Monte Foods Co	USA	78.6
46	Friesland Coberco Dairy Foods	Netherlands	na
47	Tine Norske Meierier BA	Norway	na
48	Meiji Seika Kaisha Ltd	Japan	65.4
49	SanCor Cooperatives Unidas	Argentina	na
50	Ting Hsin International Group	China	na

(Mark Gehlhar, 2003)

4.0 Indian Scenario

Packaged food products are giving a large potential in the Indian market today. The demand for these ready- to- eat foods is rises, and this makes an enough potential market which is waiting for exploiting through developmental efforts. Packaged food market is large food retail market in India today.

The factor which causes the growth of packaged food market includes, changing lifestyle, changing eating and cooking habits, increasing the young population. Globalization is the most primary catalyst in the growth of packaged food market. In international market, India shows a positive response in packaged food market. The another factor which causes development of the packaged food market is that, consumers lookout for ready- to- eat foods that are offered to them in hygienic, nutritional, and attractive packaging at an affordable cost, so due to this the demand is rises.

By 2012 India view, India makes world's second largest producer of food next to china. As food is the biggest category in India, it accounts for near about 21% India's GDP with a market size of $181 billion (Surendra P. Singh, et al., 2012).

In the past, India acted as inhibitor of packaged food because of low incomes and preferences of fresh foods. In last 10-15 years India rapidly changes the positive shift towards packaged food market. Large categories like biscuits, edible oils, snacks, and packaged drinking water shows growing chain by 15-20% in recent years. PepsiCo and ITC make higher growth in snack foods. This makes higher expand in this market. Also it makes higher triggers in biscuit category.

Indian namkins is a higher grown Sub-category. This makes about 30% growth in 2010.Also other food categories like Curd, breakfast cereals and energy drinks makes more than 30% growth in the market. In 2010, curd makes higher expansion as more than Rs. 800 cr.

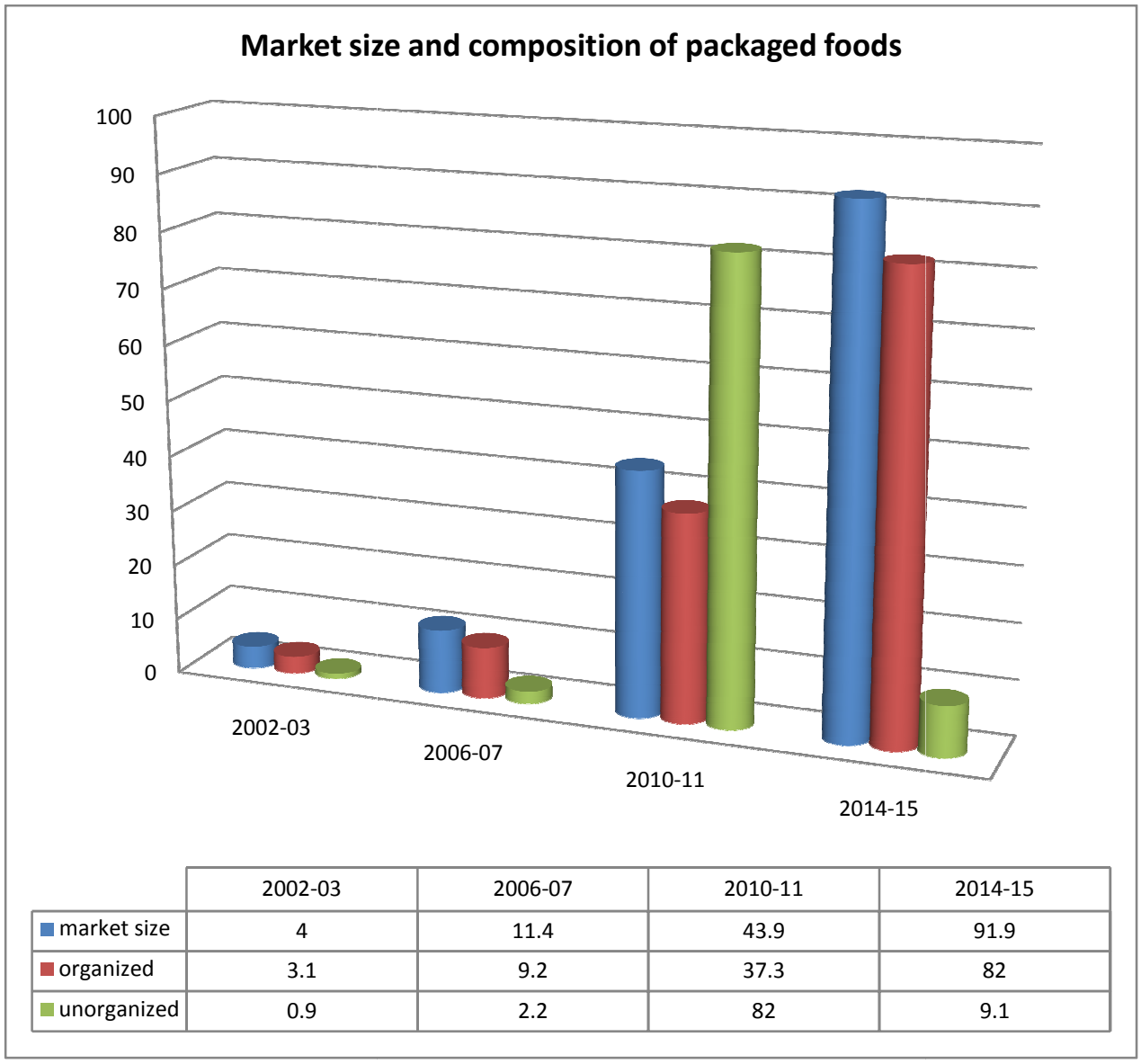
With the packaged food player companies like Waltueart, Catrefour, India make increased number of sales and this also allow showcasing newer products. For higher sale, companies focus on merges and partnership, Like Kraft foods partnered with ketchup Giant, Tyson foods collaborated with Godrej foods in instance in India (Eleanore Alexander, et al., 2011).

As peoples looking today for innovative flavours and new taste, packaged food companies has witnessed a growth in recent times with new combination of foods. The snack food market makes about 3 billion market size in India today.

Today, different domestic players are coming every day with the sector to tap the market opportunities and take the advantage of the sector. At the same time, increase in the awareness of the consumers provides a boost for the expansion of packaged food market. Annual production of bakery products is higher in the market today.

In packaged food products, a bakery product makes major contribution of market growth. Out of these, bread and biscuits constitute about 82% of the overall bakery products (RH Jaju, 2014).

The total market size of packaged food products in 2006-07 is about Rs. 11400 Cr and it is projected to grow up to about 91100 Cr in 2015-16. The following figure indicates market size and composition of packaged food over the years.



	2002-03	2006-07	2010-11	2014-15
market size	4	11.4	43.9	91.9
organized	3.1	9.2	37.3	82
unorganized	0.9	2.2	82	9.1

Fig. 1: Market size and composition of packaged food from 2002 onwards

Table 2: List of major players in packaged food industry

Companies	Key Brands	Key Products
American Dry Fruits		Banana chips, mixtures & chivdas, snacks, bhel, dry fruits
Bindra Agro Industries Corp.	Dr Bindra's	Range of 'Ready to Eat' Dr. Bindra's curried veg and non veg dishes
Capital Foods	Ching's Secret, Smith & Jones	Ready to eat, sauces, chinese ingredients
GITS Food Products	Gits	Savouries, meals, desserts, biscuits, cookies
Haldiram's	Haldiram's, Taka Tak, Bolletos, Chips	Range of ready to eat, packaged chaats
ITC	Kitchens of India	Range of ready to eat cuisines
Kohinoor Food Ltd.	Kohinoor	Ready to eat curries, meals, cooking pastes, cook-in-sauces, spices & seasonings, frozen Indian breads & snacks and basmati rice
MTR	MTR Foods	Curries, gravies, rice, snacks, soups, spices, pickles
Pepsico Ltd.	Frito Lay's, Cheeto's, Dorrito's	Potato chips, cheese snacks, tortilla chips
Priya Foods	Priya	Ready to eat curries and dishes from south to north Indian, pastes, instant mix
Vadilal group	Vadilal Quick Treat	Curried vegetables (ready to eat), ready to cook (frozen), canned and frozen vegetables, ice cream
Bikanerwala	Bikanerwala, Bikano	Namkeens, sweets, papad, syrups, panipuri

(Ministry of food processing Industries, Technopak Analysis)

5.0 Materials used in packaging

Fig. 2: Different types of materials used in packaging (Luz Claudio, 2012)

Package design and construction play a major role in determining shelf life of food product. Prolonged shelf life involves retardation of enzymatic, microbial and biochemical reactions through various factors like temperature control, mixture control, addition of chemicals like salt, sugar, carbon dioxide, or natural acids or removal of oxygen or a combination of these (Aaron L. Brody, et al., 2008).

The right selection of packaging material maintains product quality and freshness of food which is packaged (Kenneth Marsh, et al., 2007). The function of packaging includes retardation of deterioration, extent ion of shelf life and maintenance of quality and safety of packaged food (Adron L. Brody, et al., 2008).

Packaging protects from following agents:-

Environmental particles like heat, light, moisture, oxygen, pressure, enzymes, spurious

Odours, microorganisms, insect, dirt and dust particles gaseous emissions, etc

The major types used in packaging of food are Glass, Metals (aluminium, foils, laminates, tinplate and tin-free steel), paper and paperboards and Plastics.

5.1 Glass

- It has a long history in food packaging. It is believed that a first glass object for holding food was appeared around 3000BC (Sacharow and Griffin, 1980).
- The production of glass involves heating a mixture of Silica, Sodium Carbonate and Alumina to high temperatures until the material melt into a thick liquid mass that is then poured into moulds.
- Recycled broken glasses can also be used in manufacturing.
- It accounts for about 60% of all raw materials.
- Glass has several advantages over food packaging. Glass preserves taste well and is chemically inert (Luz Claudio, 2012).
- It is impermeable to gases and vapours, so it preserves freshness of a product for a long time without impairing taste.
- As glass has ability to withstand high processing temperatures, it gives good advantage for heat sterilization of both low acid and high acid foods.
- Also because of transparent nature, it allows to consumers to see product.
- The main advantage is glass packaging benefits the environment as it is reusable and recyclable (Kenneth Marsh, et. al., 2007).
- There are some disadvantages also.
- Because of its heavy weight, the transportation cost is high for Glass- packaged foods.
- Its brittleness, and susceptibility to breakage from internal pressure, impact, or thermal shock is also the other disadvantage.
- Also many efforts are having to taken during making thinner glass.

5.2 Metals

It is most versatile form which offers combination of excellence physical protection and barrier properties, formability and decorative potential, recyclability and consumer acceptance.

This includes following types-

5.2.1 Aluminium

- They are commonly used to make cans, foil and laminated paper or plastic packaging.
- Aluminium is light weight, silvery white metal derived from bauxite ore, where it exists in combination with alumina.
- Magnesium and manganese are added to improve its strength.
- The natural coating of aluminium oxide provides a highly effective barrier to the effects of air, temperature, moisture and chemical attack.
- The major advantage of it is that its natural coating provides excellent barrier to moisture, air, odours, light and micro-organisms.
- Other advantage shows good flexibility, surface resilience, excellent malleability and formability and outstanding embossing potential.
- It is also recyclable.
- It is used for light packaging of food like, soft- drink cans, pet food, seafood, etc.
- Aluminium foils are also used for wrapping foods.
- It also shows some disadvantages like high cost, inability to be welded (Kenneth Marsh, et al., 2007).

5.2.2 Aluminium foil

- Aluminium foil is made by rolling pure aluminium metal into very thin films, which follows annealing gives dead- folding properties which caused tight folding.
- It is used widely in folding food with thinner foils and thicker foils for trays.
- It also provides barriers against moisture, air, odours, light, and micro-organisms.
- It is inert to acidic foods and it does not require other protection.
- Aluminium foils cannot e made from recycled aluminium.

5.2.3 Laminates and Metalized Films

- This involves binding of aluminium foil to paper or plastic film to improve barrier properties.
- It is used for high value foods such as dried soups, herbs and spices.
- They are mostly used in package snacks.
- Metalized films are plastics containing a thin layer of aluminium metal.
- This also shows barrier properties to moisture, oil, air and odours.

5.2.4 Tinplate

- Tinplate is product of coating both sides of black plate with thin layer of tin.
- They are produced from low carbon steel i.e. Black plate.
- It shows excellent barrier properties against gases, water vapour, light and odours.
- They are used widely for cans for drinks, processed foods, and aerosols.
- Also they are used for containers for powdered foods, sugars and flour based confections.
- It is an excellent substrate for metal coating and litho printing technology, enabling outstanding graphical decoration.

5.2.5 Tin Free Steel

- It is also called electrolyte chromium or chrome oxide coated steel.
- Tin free steel requires coating of organic material to provide complete corrosion resistance.
- They are used for food cans, can ends, trays, bottle caps, and closures, large containers (drums).
- It is less expensive than tinplate.

5.3 Plastics

- Plastics can be made by condensation polymerization or polyaddition of monomer units.
- In polycondensation reaction, the polymer chain grows by condensation reactions between molecules and is completed by formation of low molecular byproducts such as water and methanol.
- Polycondensation involves monomers with two functional groups as alcohol, amine or carboxylic groups.
- Fluid and mouldable Plastics can be made into sheets, shapes and structures, offering considerable design flexibility.
- Plastics can be mainly categorized into two types**,** Thermosets and Thermoplastics.
- Thermosets are polymers that solidify or set irreversibly when heated. But they are used in automobiles and not in food packaging.
- Thermoplastics are polymers that soften upon exposure to heat and then return to its normal position at room temperature.
- In food packaging, many types of plastics are used. They include, polyolefin, polyester, polyvinyl chloride, Polyvinylidene Chloride, Polystyrene, polyamide, ethylene vinyl alcohol (Kenneth Marsh, et al., 2007).
- There are more than 30 types of plastics are used in packaging of food.
- In them, the most commonly used plastics are polyolefin and polyesters.
- The advantage of plastics is that they are highly mouldable onto infinite shapes, they are light weight, inexpensive and Easy to seal and durable (Luz Claudio, 2012).

- The disadvantage of plastics is that, it has variable permeability to light, gases, vapours, and low molecular weight molecules.

5.4 Paper and Paperboard

- The use of paper and paperboard started in 17th century with accelerated usage in the later part of the 19thcentury (Kenneth Marsh, et al., 2007).
- It is made from interlaced network of cellulose fibres derived from wood by using sulfate and sulfite.
- The fibres are then pulped and bleached and then treated with chemicals such as Slimicides and strengthening agents to produce paper as a product.
- This type of packaging materials are used in milk cartons, folding cartons, bags and sacks and wrapping paper, corrugated boxes.

5.4.1 Paper

There are four types of papers are used in packaging of food. They are as follows-

5.4.1.1 Kraft paper

- This is the strongest paper used in food packaging compared to other type of papers.
- It is produced by a Sulfate treatment process (Kenneth Marsh, et al., 2007).
- It is used for packaging of flour, sugar and dried fruits, and vegetables.
- It is found in various forms such as natural brown, unbleached, heavy duty, and bleached white.

5.4.1.2 Sulfite Papers

- They are lighter and weaker than Kraft paper.
- It can be coated for higher print quality.
- It is used in laminates with plastic or foil.
- It is also used to make small bags or wrappers for packaging biscuits and confectionary.

5.4.1.3 Greaseproof Paper

- They are made by the process called beating, in which cellular fibres undergo longer than normal hydration period which causes fibre breaking and makes gelatinous.
- These fibres are then packed gently produce surface which is barriers against oil.
- Greaseproof papers are used to wrap snack foods, cookies, candy bars, and other oily foods.

5.4.1.4 Glassine

- It is a greaseproof paper which is further hydrated to produce very dense sheet with a highly
- Smooth and glossy finish.
- They are used to liner for biscuits, cooking fats, fast foods and baked goods (Kenneth Marsh, et al., 2007).

5.4.1.5 Parchment paper

- It is made by acid treatment of pulp in which pulp is passed through a sulfuric acid bath.
- It causes increase in strength, smoother cellulose and impermeable to water.
- They are used to package fats such as butter and lard.
- It has some disadvantages. They are as, they do not provide good barrier to air and moisture, and also they are not heat sealable.

5.4.2 Paperboard

- Paperboard are thicker than paper and they are commonly used to make containers for shipping- such as boxes, cartons, and trays.
- There are following five types of paperboards which are used in packaging of food. They are as follows-

5.4.2.1 Whiteboard

- They are made from several thin layers of bleached chemical pulp. They mainly coated with wax or laminated with polyethylene for heat seal ability.
- They are used for inner layer of carton.

5.4.2.2 Solid board

- It contains several layers of bleached sulfate board.
- They are used to create liquid cartons such as milk board, when laminated with polyethylene.
- Also it is used to pack fruit juices and soft drinks

5.4.2.3 Chipboard

- It is made from recycles paper. So, it is unsuitable for food packaging.
- For use it is first lined with whiteboard which improves both strength and appearance.
- They are used to make outer layer of cartons for food such as tea and cereals.

5.4.2.4 Fibreboard

- This type of paperboard shows inner white and outer Kraft layer.
- It provides good protection against impact and compression.
- They are used to package dry products such as coffee and milk powder (Kenneth Marsh, et al., 2007).
- They are resistant to impact abrasion and crushing damage which makes wide use in shipping bulk food and case packaging of retail food products.

5.5 Paper Laminates

- This type of packaging used to package dried products such as soups, herbs, and spices.
- The main advantage of paper and paperboard is that Paper and paperboard are economic to produce and easy to print on. (Kenneth Marsh, et al., 2007)
- The other advantage of it is that they are light weight, so they reduce the transportation cost (Luc Claudio, 2012).

6.0 Ethical Issues

Ethical issues arise when actions benefiting one group, and harm another. Food choices impact both business and behavioural issues in relationship to economic, political, social and environmental outcomes (Denis P. Rudd, et al., 1982).

This includes following types of issues;

1.1. Production methods and distribution

The following issues should be considered in production method and distribution of packaged foods;

- Animal welfare in the meat products industry.
- Use of child or bonded labour, or employment of illegal immigrants. The international labour organization standards provide useful benchmarks in this area.
- Misuses of water resources and the consequent impact on local farmers.
- Soil degradation and other environmental damage to the land.
- The sale of imported agricultural products that involves high transport costs and therefore unnecessary carbon emissions.
- Growing genetically modified crops.

1.2. Marketing issues

It is the major area regarding to issues related to food industry. It includes;

- Marketing campaigns that could encourage obesity.
- Packaging that that leads to excess purchase with implications for obesity.
- Wastage during packaging.
- Aggressive marketing campaigns.
- Inappropriate marketing campaigns e.g. snack products or sports equipment for schools requires larger confectionary.
- Sponsorship that promotes ethically inappropriate food products.
- Misleading any information or failure to label clearly to that product.
- Negotiating exclusive contracts for vending machines. Examples like, soft drink machines in schools where there is a captive audience.

1.3. Fair Trade and Trade Justice Issues

- For fair marketing, it involves adoption of programmes for farmers and other local communities.
- If there is a poor practice related to this, this gives a lower benefit as farmers gives negative response to be there.
- Other issue is this benefit gives only for rich consumers like the farmers which are lives in developed countries.
- Respect for trade justice issues and avoidance of lobbying activity that disadvantages poor producers and countries.

1.4 Environmental issues

- Companies should encouragetreating the environment with respect.
- It includes following points-
- A responsible approach to use genetically modified food.
- An Adoption of and compliance with robust environmental policy.
- A clear policy which limits use of antibiotics, pesticides and herbicides.
- A Policy to reduce carbon emission and evidence of their efficiency.
- A policy of reducing sales of imported or out of season foodstuffs.
- Policies that support biodiversity, i.e. evidence of respect for living organisms.
- Respect of small farmers and traditional land tenure practices.
- Avoidance of bad things like destruction of forests, etc. (Denis P. Rudd, et al., 1982).

7.0 Applications

- The main advantage about packaged food is they are easy to get and they are available in all seasons.
- The packaged food is bacteria free as they are airtight.
- For busy peoples who don't have a time to cook, packaged food is such a good source.
- Foods like pre-cut vegetables and meat are quality convenience foods and they save the time for busy peoples.
- Packaged foods are considered a boon for peoples living away from home.
- Also these foods are ready to eat at any point of the day (Lari Warjri).
- Also other main advantage is they are convenient to keep and store.
- The shelf life of such foods is more.
- They are last longer and stay fresh for a longer time.
- The food quality of packaged food is better.
- Also, it packaging provides protection from physical and environmental damage during handling, transport and storage of foods.
- They save our time.
- Also it saves our efforts from shopping to preparations and cooking as Well (Sukrati Rastogi).
- Also, packaged food is easily stored in a refrigerator foe a larger period of time as compare with non-packaged food.
- Also, they can be directly cooked by heating in a microwave oven as some non-packaged food cannot be cooked directly (Sean Savage, 2004).

8.0 Drawbacks

- Packaged foods are not always healthiest choice as there are some disadvantages also.
- Different types of packaging materials pose different potential chemical exposures.
- Chemical components from packaging migrate it into foods which cause health hazards.
- Some glass bottles and jars may contain lead.
- Some foods in glass jars sealed with polyvinyl chloride gaskets were found to contain Di-phthalate and other phthalates at some levels.
- Phthalate causes endocrine disruption.
- Printing inks from paper also contains some amount of phthalates.
- In some metal cans resins are used which contains Bis-phenol-A.
- This compound adversely affects the brain and prostate gland in foetuses, infants, and children's at exposure levels.
- In America, it shows that most of the sodium in the American diet comes from packaged and processed foods like pizza, snacks, soups, breads, meat dishes, pasta dishes, sandwiches, processed meats, cheese.
- Sugary drinks, sweets and baked goods contribute high levels of added sugars to diet which causes some diseases related to sugar level (Luz Claudio, 2012).
- High amount of sugar in diet causes diabetes, high cholesterol, heart disease, obesity, and tooth decay.
- Pre-packaged food often contains fat, including Trans fats as Trans fats gives longer shelf life to food.
- Also any food which lists hydrogenated oil they also contains Trans fats.
- Tran's fats increase the risk for high cholesterol, heart disease, stroke and heart attack.
- Some foods like corn syrup contain high fructose sugar.
- Major disadvantage of packaged food related to environment is food packaging requires for packaging of food results in lots of waste.(Jessica Bruso, 2008)
- So, Packaging of food requires high cost, so it is costly compared to unpackaged food.
- The biggest disadvantage is related to health.
- Additives and artificial flavours are unhealthy to humans.
- These cause allergic reactions, indigestion, and increased susceptibility to the variety of diseases such as lung diseases or heart diseases (Sukrati Rastogi, 2011).
- Thesubstancesorchemicalsusedforincreasingtheshelflifeoffoodareharmfultothebody

9.0 Key factors for growth of the packaged food industry

The key factors includes

- ✓ Increasing literacy
- ✓ Rapid urbanization
- ✓ Rising per capita income
- ✓ These three factors increase higher growth of packaged food market.
- ✓ Liberalized policies with specific incentives for high priority packaged food sector provides favorable environment for investments and exports in the sector.
- ✓ Stable and flourishing democracy is also the other opportunistic attribute for the developing countries like, India as it is large country with extensive administrative structure and independent judiciary.
- ✓ Diverse Agro-climatic conditions lead to a wide ranging and large raw material base suitable for packaged food and processed food companies.
- ✓ But in India, currently, less than 2% of these are used in value added products.
- ✓ One of the best factor is consumers, in India has more than 1 billion populations and in these, 49% of household expenditure on food items.
- ✓ Also, India has a 55% of age population in the age group of 29-59 years. This gives a higher boost of expansion of packaged food market.
- ✓ Cheaper workforce availability provides low cost production for domestic and export markets (Mark Gehlhar, 2003).

10.0 Key challenges for packaged food industry

- ✓ Some packaged foods are processed foods. Some processed foods are susceptible to spoilage by biochemical processes, microbial attack or infestation.
- ✓ So, there is a need of good post harvest practices, like good processing techniques, proper packaging and transportation, and also storage. The key challenge here is to maintain these practices with proper hygiene.
- ✓ Also, sometimes during processing of some foods, the flavor, aroma, texture and the nutritional value is depleted.
- ✓ So, the key challenge is during processing, it is important to maintain all these natural factors of that particular packaged food.
- ✓ Also, packaged foods need to be offered to the consumers in hygienic and attractive packaging at low increment costs, this is also another main challenge for packaged food industry.
- ✓ The another challenge for packaged food industries is, food engineering professional needs to develop sufficient awareness and appreciation of the relevant principles of the life sciences, physical sciences, as well as varieties of some other topics such as, nutrition, preservation, storage techniques, processing unit operation, bioprocessing, waste management, distribution and supply chain management, food laws and regulations and so on.
- ✓ Also, other challenge for this industry includes, these industries needs to develop the innovations in the technologies like, newer and novel food preservation and storage techniques, colloids and dispersal systems, packaging polymers, sensors for detection and process control, etc.(Mark agehlhar,2003).

11.0 Future Prospectus

The demand for packaged food market is increasing as household no longer afford the time for processing farm products (Mark Gehlhar, 2003). The recent past has seen input prices putting pressure on profitability for packaged food players. This causes increase in cost.

The packaged food consumption increases day by day today. In developing and developed countries, it shows higher value. The Indian packaged food sector is expected to be continuing rise and it becomes 2300-2500 Bn. Global investments coming from through organic and inorganic routes increase the packaged food sector. This gives a clear indication of international confidence in India about packaged food marketing. Recent examples includes, Mc Cormick acquiring the domestic operations of Kohinoor, Kraft bringing their portfolio into India through Cadburys and DANONE acquiring Wockhardt's infant nutrition business.(RajivSubramanian,2011)

Today 60% peoples are depends on snacks. So the demand for snack foods is increasing, so the packaged food demand is increasing. By analysis of global packaged food market it shows that companies project enough growth $560 billion global snack market Most of the packaged food companies bite into snacks for a healthier bottom line.

Companies like Frito –Lay and Kraft foods have long enjoyed hearty market shares in snack. Frito-Lay is adding more premium and low price chips to give more growth in those prize ranges. While Kraft will separates its North American grocery business for purchasing growth in market (Diane Toops, 2012).

12.0 Conclusion

Europe and U.S. makes higher market for packaged food today. In other countries like Australia, Africa, and Asia growth is increasing slowly. Nestle is the top most company today for packaged food products. By survey, it shows that, baby food, yogurt, and nuts will be the fastest growing packaged food products. Growing demand for yogurt drinks is the key factor propelling the yogurt market growth. The increasing consumption of nuts as raw food and the growing awareness of its nutritional value give higher growth of nuts marketing. The Indian packaged processed foods industry is estimated at US$ 10.87 billion- US$ 13.05 billion including biscuits, chocolates, ice- creams, confectionary, snacks, cheese and butter.

By urbanization, disposable incomes and developing lifestyles in India, the packaged food market is developing. An increasing number of women working in urban India with less time for preparing food at home also supported the strong growth for increasing market if packaged food. Also an increasing demand for packaged foods in rural area with low priced stock- keeping units plays an important role in developing packaged food market. Indian packaged food market is about 15-16% growing from 2008-2015.

The Indian packaged processed foods industry is estimated at US$ 10.87 billion- US$ 13.05 billion including biscuits, chocolates, ice- creams, confectionary, snacks, cheese and butter. The industries are growing by 15-16% over past two- three years. The growth factors for packaged food in India includes-

- Packaged food is boost for the peoples who want to eat balanced meal or a person who don't have a time to cook.
- Rising disposable incomes and ongoing urbanization
- The government plans to open 30 mega Food Parks and many Cold Storage in some years
- The calories, carbs and protein are predetermined, making it perfect for health conscious peoples
- The arrival of food multinationals, rising popularity of quick- service, restaurants, modern retail trade and technological advancements.

The growth of the consumption packaged food in increasing day by day. With Increasing packaged food market, many other problems are also increased like marketing issues, environmental issues, fair trade issues. Also food borne diseases are also being increased. By increasing the market growth, there have to important to take care of these types of issues.

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