ANALYTICAL STUDY OF ECONOMIC PROBLEMS OF PACKAGING INDUSTRY WITH SPECIAL REFERENCE TO CORRUGATION INDUSTRY IN & AROUND PUNE REGION

A thesis submitted to

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In
Economics
Under the Board of Mental And Moral Sciences

Submitted By

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Under the Guidance of

Dr. K. P .Bairagi

December 2014

DECLARATION

I hereby declare that, a thesis entitled ""**Analytical study of Economic Problems of Packaging Industry with special reference to Corrugation Industry in & around Pune region"** completed and written by me and has not been previously formed the basis for award of any degree or other similar title of this or other university or examining body.

Place : Pune

Date: 18/12/2014

Research Student
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CERTIFIFACTE

This is to certify that Mr. **Shri. Ravindra Motilal Kothari** has completed successfully his research thesis entitled **"Analytical Study of Economic Problems of Packaging Industry with Special Reference to Corrugation Industry in and around Pune Region"** submitted herewith for the award of the Degree of Doctor of Philosophy in Economics under the faculty of Mental and Moral Sciences, Tilak Maharashtra Vidyapeeth, Pune. He carried out this research work under my supervision and guidance and to the best of my knowledge and belief the work embodied in this thesis has not formed earlier the basis for the award of any degree or similar title of this or other university or examining body.

Place: Pune

Date: 18 /12/2014

Dr. Bairagi K.P.

Research Guide

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1.1 Introduction:

The technology and art of packaging has a logical origin, arising from the need for processed products to be conveniently transported and stored with no damage. Packaging serves two purposes – promoting the product and protecting it. The promotional effort is to grab the attention of a customer in less than few seconds towards a product on a super market shelf and say "*take me home*". The protective function is to protect the product, and in some instances, to keep the product from damaging surrounding items. Centuries ago, packaging meant only cloth bags, wood boxes or crates. Most food was sold in bulk from which the grocer would scoop out the quantity needed and put it in another bag[1].

Since the Industrial Revolution in the late 18th century, packaging became an important tool for marketing. At that time, so many new products were being manufactured that the consumer had a variety of choices. Often the package determined whether one product would be purchased over another. Nowadays, packaging design is transforming from a creative process to a technical and functional process. Everything from the shape of the packaging to the position and color of the graphics is based around costs and ease of production, transportation and delivery. Brands are paying more attention on packaging because packaging affects the product sale, protect product and facilitate the safe delivery to the consumer's premises. Product packaging often serves as the first impression of a brand for a consumer that is why companies are trying to make their packaging design something fresh, eye-catching, and unique. New packaging designs trends being followed like seasonal, environment friendly, localized, retro packaging etc. New packaging systems have emerged, such as aseptic packaging, which enables milk, fruit juices, and other liquids to stay fresh without refrigeration for many months[2].

[1] Encyclopedia Britannica : Online Dictionary, available on www.britanica.com/packaging
[2] Ibid.

The Indian packaging industry, growing at an annual rate of more than 15 cent, is valued at $ 15.6 billion (INR 85,000 crore) as in 2010-11. In the next five years, the sector is expected to triple to around $ 60 bn. The net profit of the packaging industry spurted 104.5 percent during Q3 FY08, against a growth of 29.5 percent in the December '06 quarter. The large growing middle class, liberalization and organized retail sector are the catalysts to growth in packaging. More than 80 percent of the total packaging in India constitutes rigid packaging. The remaining 20 percent comprises flexible packaging. There are about 600-700 packaging machinery manufacturers, 95 percent of which are in the small and medium sector located all over India. Indian packaging machinery imports are $125 million. The import (customs) duty for packaging machinery is 25.58 percent for 2007-08. Germany and Italy are the latest suppliers of packaging machinery to Indian but focus is now shifting on Taiwan, Korea and China. Indian packaging machinery exports are rapidly growing. India's per capita packaging consumption is less than $15 against world-wide average of nearly $ 100. The total demand for paper is estimated to be around 6 million tones, of which about 40 percent is consumed by the packaging industry. Laminated products including form-fill-seal pouches, laminated tubes and tetra packs are growing at around 30 percent per year[3].

"The packaging market in India seems set for the next level of growth. Strong favourable demographics aside, factors such as increasing disposable income levels, rising consumer awareness and demand for processed food, and the multinational giants taking rapid strides in the food, beverages, cosmetics & toiletries and pharmaceuticals space, are expected to be the key drivers of this growth story. These factors are forcing both packaging suppliers and end-user industry to shift from bulk packaging to retail, and unit-level and small-sized packaging. In addition, exploding organized retail growth and newly relaxed Foreign Direct Investment (FDI) norms in retail and other sectors, augur well for packaging market in India"[4].

[3] . A report by Indian Association of Corrugated Manufacturer (2012-13), II p.15

[4] Aranca Report (2012), The Assocham Packaging Summit, accessed on http://www.aranca.com/downloads/special-reports/The-Aranca-Report-Packaging-Industry-A-Review.pdf

"Robust growth in demand for rigid plastic packaging, especially in sectors like drinks, cosmetics, toiletries, and household and personal care products, is stimulating packaging materials are receiving a boost from sectors like perishable foods, healthcare, convenience foods and various industrial markets. Corrugated board consumption is being egged on by the processed food sector and a number of non-food applications including personal and household care, chemicals, electrical goods and others. At the same time, folding carton consumption is benefiting from the growth found in healthcare products, electrical goods, and frozen and chilled foods, among other"[5].

Packaging is described as a "Complex, dynamic, scientific, artistic and controversial segment of business". Packaging is dynamic because it keeps on constantly changing. New materials need new methods, new methods demand new machinery, and new machinery demands better quality and better quality opens up new markets which requires change in packaging[6].

According to the Report of Packaging Industry Association of India (2014)[7], "The Indian packaging industry is one of the fastest growing sectors spanning across almost every industry segment. Right from packaging of food and beverages, fruits and vegetables, drugs and medicines, to highly dangerous products, the packaging industry has led to greater specialisation and sophistication over a period of years. In fact, packaging involves one of the highest standards of technological expertise, and the entire process from packing to shipment can be right called as the art and science of packaging. At present, Indian Packaging Industry is currently valued at US $13 billion and ranks 11th in the world and industry experts are of the opinion that the Indian packaging industry is expected to grow to US $16.5 billion by 2015. However, it is to be noted that the packaging industry in India is highly fragmented and the above figures quoted represent the official companies that have been registered within

[5] Mariwala Harsh (2012), The Corrugator, Bi-monthly Journal, July-September 2012, FCBM, Bangalore, pp.130-133

[6] Rani R.S. (1985) Proceedings of Technical Sessions (Dec. 1982 - Aug. 1990), Published by Federation of Corrugated Box Manufacturers of India, New Delhi p.E-32

[7] Report of Packaging Industry Association of India (2014), available on http://www.piai.org/About_Packaging_Sector.aspx

the industry forum. The unofficial sector contributes a decent segment and efforts are on to tap this particular segment within the larger purview of the packaging industry".

Packaging industry involves various types of packaging material, one of that is corrugated box packaging industry. This industry is also growing at faster rate and has greater potential. The researcher has selected this industry for the study.

1.2 Packaging Industry in Global Economy:

Packaging Industry is growing worldwide at faster rate. The emerging retailing industries and change in the lifestyle of the people in various countries has led to grow the packaging industry. The World Packaging Organization Report (2010) has explored the global packaging industry. According to the report, the global packaging industry is growing in most of the country and developed countries have larger share in the world economy. Some of the extractions from this report has been given here.

1.3 Packaging Industry in Selected Countries[8]:

Including packaging machinery, the global packaging industry turned over around $485 billion in 2004 with packaging container sales of almost $460 billion and machinery sales of around $25 billion. Used in a wide range of industries across food and drink, healthcare, cosmetics and other consumer goods as well as a range of industrial sectors, packaging has become an essential everyday item, with its usage growing broadly in line with the global economy. In 2003, North American markets, including the USA, Canada and Mexico, accounted for the largest share of global packaging at $132 billion (32%), ahead of Western Europe (26%) and Asia (26%). The largest single national packaging market during the same year was the USA with sales of $113 billion. Japan ranked second with sales of $49 billion, ahead of China at $32 billion, Germany at $21 billion and France at $19 billion.

1.4 Packaging Materials[9]:

[8]. World Packaging Organization Report (2010), Market Statistics and Future Trends in Global Packaging, available on www worldpackaging.org

[9] Ibid

Packaging encompasses a wide range of material types across paper, board, plastic, metal, glass, wood and other materials. The largest share of global packaging is accounted for paper and board packaging with sales of $165 billion in 2003, equating to 38% of the market. Paper and board will remain the single largest element of the market into 2009, growing at an annual rate of around 4% in real terms, driven on the one hand by rising demand in fast-growth national markets as well as steady growth in secondary/ bulk packaging across the globe. Plastic packaging accounted for 30% of sales, with rigid plastics alone taking an 18% share of the market. A rigid plastic was the fastest growing sector of the market during the period 1999-2003 at an annual rate of 6.2% to $77.2 billion. This was driven by several factors: rising demand for PET bottles in soft drink and bottled water markets; the consistent substitution of traditional metal, glass and sometimes paper-based materials in food and other markets; increasing incursions by packaging as a whole into food markets, particularly in the case of meat, fish and poultry products; and rising consumption of ready-meals and other convenience-oriented products. Rigid plastic packaging will continue to be the fastest growing sector of the market, with consumption forecast to progress at an annual average rate of 6.5% in the period to 2009 to reach $116 billion, with consumption of flexible plastic packaging also set to grow at an above-average rate, driven by rising demand in fast-growth markets in Asia and other emerging regions.

Across other sectors, metal packaging, accounting for 18% of the market in 2003, is set to grow steadily, but will lose further share to plastics in beverage markets with food cans also losing share. Glass packaging, meanwhile, accounting for 7% of the market, will see only steady growth as further share is lost to plastics across food, beverage, healthcare and other key end-use sectors.

1.5 Paper and Board Packaging[10]:

The world market for paper and board packaging was valued at $164.7 billion in 2003, representing an increase of 10% on 2002 – principally as a result of the weakness of the dollar boosting non-US sales with consumption growing at an annual average rate of 3% since 1999. North American markets accounted for 32% of sales at $52.2 billion, growing at a rate of just 0.4% over the period as US demand fell back.

[10] Ibid

Growth was of the order of just over 3% in Asia, depressed somewhat by weak Japanese demand where sales fell by almost 3% year-on-year. The fastest growing markets for paper and board packaging between 1999-2003 were in Eastern Europe, with investment in new capacity on the up as major players in this sector – as well as key customers – have shifted the balance of production away from high-cost locations in western Europe. In addition, there has been strong growth in Russian paper and board packaging demand, with consumption rising from $1.2 billion in 1999 to almost $3 billion in 2003. On the whole, the paper and board packaging industry has experienced difficult trading conditions in developed markets in recent years, affected by downward pressure on prices from end-customers, exacerbated by overcapacity within the industry. With only very modest growth in shipment volumes and declining shipment values in some mature markets, there has been a greater focus on developing markets in Asia, Latin America and Eastern Europe. While there was strong output growth in both Asia and eastern Europe in 2003, output fell back in South America with corrugated board volumes down by around 6% on 2002 levels After growth of the order of 7% in 2004, the market for paper and board packaging is forecast to grow at an annual rate of 4.2% in the period 2004-09 to reach $216 billion. Aside from the Middle East, the fastest growing regional markets will be found in Eastern Europe, South America and Asia where annual growth of the order of 6% is anticipated. Asia's share of the market is set to rise from 34% to 36%, with strong growth in China – overtaking Japan to become the second largest market with sales of $30 billion by 2009 as well as Indonesia (growing at almost 10% annually to $5.4 billion) and India (growing at an annual rate of 12% to reach almost $4.5 billion).

1.5 History of Corrugated Industry[11]:

The corrugated industry has a long history. The Board Containers Magazine (1998) has given the history of corrugated industry in the world. The corrugated industry started more than 2,000 years ago, two centuries before the death of Christ. In China, a man named T'sai Lun, using waste products such as old rags, pieces of hemp-rope and discarded fishing nets for the corrugated packaging paper. Thus T'sai Lun began his experiments and introduced paper to the world in 250 B.C. This was the first primitive form of paper. In the 13th century, the art of papermaking had made

[11] Boxboard Containers Magazine, June 1998 available on http://www.ecsabox.com/history_of_corrugated.pdf

its way to Spain, but it would take another 300 years for it to reach France, Germany, Italy and England where the first known British mill was built in Hertfordshire in 1490.

In the European countries, a fine wire screen had taken the place of cloth as the porous bottom of the papermaking mold and linen fibers were substituted for mulberry bark, which is rare and difficult to attain in Europe. The printing press, invented in the 15th century, brought about enormous change in communications. For the first time, books could be mass produced. This meant that great quantities of cheap paper were needed instead of the expensive parchment used for hand-written books. To meet growing demand, papermakers were encouraged to speed up their production, but no real breakthrough came until the 17th century. In 1485, a printer in Rome, seeking to replace the wooden slabs that covered early books, made a much lighter, hard cover substitute by posting together the pages of old books and other scrap paper. About 100 years later, this pasteboard went to commercial production. At the tail end of the 15th century, book publishers discovered another method of making hard covers. They poured an unusually heavy layer of pulp onto the hand mold and dried it out to form a product they called "pulp board," what today is known as paperboard. This method spread through Europe and crossed the Atlantic with the American settlers.

Corrugated packaging was initially produced by young girls who hand-fed sheets of strawboard through very simple bench-mounted machines that closely resembled those then in common use by laundries to pleat and crimp the edges of window curtains and the lace cuffs and collars of shirts and blouses. Samuel G. Cabell received a patent in 1866 for a laundry machine for fluting linen and laces. Comprised essentially of a pair of hollow, fluted brass or bronze rolls that were heated by inserting hot rods or pokers and driven by hand crank, this machine was soon to be used in the production of the first corrugated.

Corrugated paper material was patented in 1856 in England by Edward C. Healey and Edward E. Allen. The material patented was a form of fluted material for the sweatbands of hats. As a packaging material, it would be another 15 years before its introduction. On December 18, 1871, Albert L. Jones obtained U.S. patent, which envisions the use of unlined corrugated paper, formed with tubes and small boxes, for packaging small fragile articles such as glass vials and bottles. This packaging was resilient, lightweight, clean and inexpensive, and a market was promptly created for it.

But it was dimensionally unstable and difficult to control due to its extremely flexible, stretchy nature.

At the end of the 19th century corrugated paper was used primarily for packing purposes as shipping cases were not yet developed. Robert Gair Co. (in the year 1894) began producing corrugated cartons and bottle boxes. These containers featured not only side protection but also "absolutely safe covers," according to the company. "Bottles so packed may be relied on to reach their destination intact." Corrugated wrappers featured an outer paper with a gummed surface for sealing purposes. Corrugated packers were manufactured for such uses as outer protection for candy boxes being expressed or mailed. The company emphasized both strength and economy as features of these packers.

First came scoring of straw board and, after that, gluing took place. As boards were pasted, blanks were formed that made ends and sides of boxes. Next, on a rotary cutter, board was cut to sizes required for box depths. Corner-cutting (by machine) followed, and after that came ending of the boxes. The final operation was the covering of boxes, unless box orders called for pasting or gumming of labels. Steam power ran machines at the plant, which typified large-scale production of paper boxes of this time. Other features included the use of flour paste at gluing tables and straw board for raw material.

Throughout the long history of corrugated packaging, the retail environment remained fairly static. Every store had a clerk, or a multitude of clerks, who assisted shoppers with their purchases, explaining all the products to them, providing them with important buyer information on everything from teapots to toasters. That changed in the 1980s. Large super stores soon dotted the landscapes of many cities, in metropolitan and suburban areas alike. The way in which goods were being sold to the consuming public had changed, and it appears that the metamorphosis is irreparable. The road to high graphics on corrugated has been strewn with innovative machinery introductions and pioneering box makers who had no fear experimenting with printing methods never before attempted in the corrugated industry.

1.6 Corrugated Packaging Industry[12]:

In area terms, corrugated packaging shipments grew by 3% in 2003 to reach 144.4 billion m², rising at an annual rate of 1.8% according to data from the International Corrugated Case Association (ICCA). The ICCA anticipates acceleration in output growth in the period to 2008, forecasting annual growth of the order of 3.8% to reach 173.4 billion m², with growth rates rising in all regions with the exception of Oceania. Asian output of corrugated grew at an annual rate of 5.7% between 2000 and 2003, and expected to accelerate to nearer 6% into the second half of the decade. Much of this growth will be attributable to China. Currently standing at around 13 million tonnes, output is forecast to grow by 7% year on year, driven in part by rising output across a range of consumer products. Elsewhere, Russian corrugated capacity is doubled between 1998 and 2003 to around 1.8 million tonnes, and is set to reach around 2.8 million tonnes by 2007. The industry remains principally in the hands of Russian investors, although a number of western companies have set up shop in the country. North American corrugated output declined by 1.4% on average between 2000 and 2003. Into 2004, however, there were signs of a recovery in US demand, reported to have grown by around 5% by mid-year, with inventory levels falling back and many plants operating at full capacity.

1.7 Advantages of Corrugated Packaging:

Corrugated packaging offers a number of advantages. They are right weight and compact, thus resulting in saving of transportation costs. They are strong and sturdy. Being collapsible when empty, they save storage space. The flutings impart cushioning property making it deal for packaging of fragile articles. They are extremely versatile and can be used for packaging of variety of products. Corrugated boxes can be printed in one or more colors to make them attractive and enhance their shelf appeal. They can be surface-coated to offer effective resistance against moisture etc. They are ideal both ass transport packs and as retail packs. More and more products are today being packed in corrugated boxes. Corrugated boxes being successfully used for packaging of fruits and other horticulture products.[13].

[12] Ibid
[13] Ibid , p. M-9

1.8 The distinctive advantages as listed are as below[14]

i) They consume no wood. Hence, there is no drain on our scarce forest resources.

ii) They are cost effective when compared to other packaging materials when viewed in terms of National loss due to deforestation.

iii) They are biologically pure and free from toxic conditions. Hence fruits packed in corrugated boxes are hygienically better.

iv) They provide better respiration which in turn helps in better and quality preservation of fruits.

v) They ensure better safety and security. Bruising loss and damage to the fruit is negligible as compared to wooden cases.

vi) They can withstand loading and unloading operations besides transportation hazards.

vii) They are lighter in weight, collapsible and occupy lesser area. Even the transport cost is less.

viii) They have standardized dimensions and easy to containerize and palletize.

ix) They are printable, have better sales appeal and publicity. They increase sales opportunity and help establish one's own trade name.

x) Above all, they are recyclable and repulpable, thus they relieve ecological problems.

1.9 Present Status of Corrugated Packaging Industry in India

In the last decade (1996 – 2006), the corrugated packaging industry has grown at remarkable rate. This shows the potential growth in the future. According to the report of Federation of Corrugated Box Manufacturers, the average number of single facers per company has increased from 1.86 to 2.69 per cent. The average production per day per single facer has increased from 1575 Kgs. to 2724 Kgs. The consumption of 7 ply boxes has reduced from 23 per cent to 11 per cent. The consumption of 3 and

[14] Ibid. pp. M-12-13

5 ply boxes has increased from 54 per cent to 86 per cent In the last decade (1996 – 2006) Significant growth is observed in consumption of paper above 150 GSM[15].

In the last decade, there is a significant growth in consumption of corrugated box in – 'Processed Food Industry', 'Fruits & Vegetables', 'Electronic Industry' and 'Consumer Durables'. The large and growing Indian middle class, along with the growth in organized Retail in the country, are driving demand in the packaging industry. Another factor, which has provided substantial stimulus to the packaging industry is, the rapid growth of exports, which requires superior packaging standards for the international market. With this, the need for adopting better packaging methods, materials and machinery to ensure quality, has become imperative for Indian players. Two specific segments can be identified for opportunities in packaging equipment in the Indian market. The Un-organized Sector represents the larger opportunity, given the increasing quality- consciousness of end customers. The cost of equipment and upgrades hold the key to success in this segment[16].

1.10 Technical Description of Corrugated Factory:

Corrugated paperboard is the most popular raw material for transport packages of a wide variety of products, varying from fresh fruit and vegetables, consumer-packed manufactured products, household appliances and industrial machinery to semi-bulk transports of various commodities in large bins. It is equally suitable for all the different modes of transport, by sea or by air. This versatility is largely due to the possibility of using different types of raw material combinations and thereby adapting the quality to each particular requirement and distribution system in a tailor-made way.

The manufacture of corrugated paperboard is a very capital-intensive production and consequently, it is not feasible to set up local production facilities at every location. Empty corrugated boxes are also bulky and expensive to transport even in a collapsed state. It seems advisable to set up small, local converting facilities

[15] Federation of Corrugated Box Manufacturers Report (2010-11) accessed on http://www.indiapackagingshow.com/Corrugated%20Packaging%20%20Overview%20and%20Prospects.pdf

[16] Ibid.

(sheet plants), who would buy the corrugated board in large sheets and make the required small quantities of tailor-made boxes locally on simple and inexpensive converting equipment. Standardization of box sizes and quality grades for typical products in the area would certainly also improve the supply situation.

1.10.1 Types of Raw materials[17]

a) Paper:

The outer and inner facings (liners) of corrugated paperboard are usually made from the long softwood fibers of coniferous trees, which have the desired strength properties. These papers, made by the sulphate pulping process, are known as kraftliners (linerboard) and their natural colour is brown. They can also be bleached fully or partly (mottled) white, but the bleaching process reduces the material strength by 5-10%. Linerboards can also contain various amounts of recycled (waste paper) fibres and are then called testliners. Another designation for this material is juteliners, which is improper since it has nothing to do with jute (hessian). The use of recycled fibres in corrugated box liners considerably weakens their strength properties, particularly under tropical conditions. To the layman, testliners might look exactly the same as kraftliners but on close inspection, testliners can be recognized through the presence of miniature black spots (printing ink) or other residues from the waste paper. Sometimes the testliner is made from high quality, selected waste, and dyed to give the appearance of virging kraftliner. Such materials might be denominated as 'Imitation Kraft', 'British Liner' etc. and often have excellent strength properties.

These values are direct functions of minimum liner weight requirements of the Uniform Freight Classification. By using testliners, substances must be increased to achieve equivalent bursting strength values. The corrugated paper between the facings of corrugated paperboard is called fluting or corrugating medium. The best quality fluting is made from the short hardwood fibres of deciduous trees by a special pulp cooking method. Such fluting is termed as semi-chemical and contains only a small percentage of clean, mill waste called kraft. A large part of the fluting used is manufactured from waste paper and is commonly called bagas medium. This is

[17] Vyas Ashok (2012), The Corrugator, A Bi-monthly Journal, July-Sept. 2012 p.89

substantially inferior in quality to semi-chemical fluting, unless it is manufactured according to the very latest, specialized technology, including treatment with chemicals etc.

Another very important raw material in corrugated board manufacture is the adhesive used to bond the papers together. Defective application of the adhesive is among the most frequent causes of the failure of corrugated boxes. Sodium silicate, which used to be the main bonding agent used in the corrugated industry, is today almost completely substituted by various forms of starch, mainly corn starch. Chemicals can be added to the adhesive to make it more resistant to moisture in tropical conditions.

b) Adhesives:

- Starch based adhesive are best suited for bonding Kraft paper.
- Sodium Silicate adhesive is not suitable and should be avoided.
- Carrier Starch is used for corrugation and in line lamination, while cooked starch is used for off line lamination.
- Synthetic adhesive is used for pasting manufacturers joint.

c) Stitching Wire

- There are four types of stitching wires used for manufacturers join pins
  - Ordinary
  - Rust Proof
  - Copper Plated
  - Brass

d) Inks

- Oil based inks.
- Polymer based inks.
- Water based inks.
- Inks for Offset printing.
- Inks for Flexo printing.
- Use of water based Flexo inks is increasing globally.

1.10.2 Types of Corrugated Paperboard:

There are four main types of corrugated paperboard:

1.10.2.1 Single-faced Board-

It composes of one flat facing or liner glued to a corrugated medium or fluting. This material is used only for wrapping purposes or as interior fitments/cushioning pads. Single-face corrugated board is not used for box production.

1.10.2.2 Singe-wall or Double-faced Board-

This is made out of two facings or liners, with one corrugated medium or fluting in the middle. More than 90% of all corrugated boxes are manufactured from this type of board.

1.10.2.3 Double-wall Board-

Made out of two facings, two corrugated mediums and an inner liner between the two mediums, i.e. a total of five paper layers. This grade is used for heavy applications, particularly in packaging for exports.

1.10.2.4 Triple-wall Board-

This grade has three corrugated mediums and a total of seven paper layers. Only a few manufacturers make this grade, which is used for very heavy industrial applications: semi-bulk commodity bins etc.

1.11 Types of Flutes[18]

There are also four main types of flute configuration for the undulations of the fluting in corrugated paperboard. These are designated by letters, A-flute, B-flute, C-flute and E-flute.

The most popular flute configuration is C-flute, which has replaced most of A-flute corrugated board since less fluting medium (approximately 15%) is required to make C-fluted board. A flute board gives the best top-to-bottom compression resistance, with approximately 15% less for C-flute and 25% less for B-flute. B-flute

[18] Ibid. p.93

board, on the other hand, has the best flat crush resistance (50% more than A-flute, 25% more than C-flute) and is used primarily for die-cut boxes, used for fruits and vegetables.

E-flute, which is a very thin grade, finds applications as a raw material for consumer units or display packages, often with a white, multi-coloured printed outer liner. The most common combination of flute types for double-wall corrugated board is B+C. A double-wall box, specified as BC would have the B flute towards the outside and C flute towards the inside of the box.

1.11.1 Closure of Corrugated Boxes-

Secure closure of corrugated boxes is of utmost importance and every effort should be made to accomplish it effectively. The closure should be at least as strong as the other parts of the box. Three basic closure methods are used for corrugated boxes:

1.11.1.1 Closing with Adhesive-

Gluing the flaps firmly together, both at the top and the bottom of the corrugated box, is probably the most effective method of closure strength-wise under the conditions prevailing in developing countries. It is labour-intensive, but the costs of raw materials are low. One disadvantage of gluing is that the boxes are difficult to open. Gluing also leaves an opening between the bottom and the top flaps of the box. If the contents have to be protected against dust, it is necessary to use an extra strip of tape to seal the box. Carrier regulations in the United States state that not less than 50% of the flap contact areas must be bonded by the adhesive. To increase the strength of the box it is, however, recommended to have full adhesive coverage of the flap contact areas and to use moisture resistant glue for this purpose.

1.11.1.2 Closing with Tape-

Various grades of adhesive tapes provide good versatility for closing all types of corrugated boxes. The main grades of tapes are:

a) Plain gummed paper tapes.

b) Reinforced gummed paper tapes.

c) Plastic tapes.

The first two categories have to be activated by moistening with water, a fairly difficult operation if a good result is to be achieved. Plain paper tapes must be of heavy substance and good quality Kraft paper grade. Plastic tapes, e.g. vinyl-based, are self-adhesive, very strong but also very expensive in material costs. Slotted type boxes can be closed either by two strips (usually reinforced or plastic tapes) or six strips of tape. United States carrier regulations include detailed strength specifications for the materials used in both methods. The paper tape used in six strips sealing must be not less than 2 inches/50 mm wide. Reinforced tapes should be used for two strips sealing, not less than 3 inches/75 mm wide and extending not less than $2^{1/2}$ inches/60mm over the box ends (in the United Kingdom: 2 inches/50mm). Corrugated box sealing with tapes provides good protection against contamination of the contents, tapes can be preprinted with advertising (easy to detect pilferage), the boxes are easy to open and reusability is facilitated. Quality requirements for the paper and difficulties in the proper application of the tapes are major disadvantages.

1.11.1.3 Closing with Staples or by Stitching-

Stapling utilizes preformed metal fasteners dispensed from magazine-fed equipment, whereas stitching forms a wire fastener from a coil of wire during the fastening process. In closing corrugated boxes, stitching is used only for the bottom part of the box, stapling can also be used to close the top part with the help of self-clinching stapling equipment. Carrier regulations in the United States require regular-sized stitches or staples to be placed on each side of the centre seam and along the end edges in areas where the outer flaps overlay the inner flaps, and spaced not more than $2^{1/2}$ inches/60 mm apart. Large-sized stapes (width $1^{1/2}$ inch/30 mm) may be used across the centre seam and along the end edges, spaced not more than 5 inches/127 mm apart.

Stapling or stitching is a relatively fast and inexpensive method of closing corrugated boxes. It is not much affected by climatic conditions, and no drying or setting time is required. However, it does not provide the same rigidity to the boxes as

gluing since the staples have a tendency to work themselves loose. Top closure requires good precision and good quality boxes. No protection is provided against contamination of the contents. The use of steel of plastic strapping should hence be mentioned, not as a closing method but as a reinforcement of the already closed corrugated box. Strapping can be combined with any of the abovementioned methods of box closure. Considering the conditions in developing countries, the best results would probably be achieved by closing the corrugated boxes with adhesive and afterwards using plastic strapping as reinforcement.

1.12 Economical Dimensions of Corrugated Boxes[19]

The most economical corrugated box style is 'Regular Slotted Container' (RSC) with regards to minimizing board utilization while maximizing the enclosed volume. For boxes with identical cubic volume, alteration of box shapes (relation between the length, breadth and height of the box), however, changes the amount of board required to make up the box. The prime reason for this is the different degrees of overlapping in the flap arrangements of the boxes. The most economical shape is achieved when the ratio of length: width: height equals to 2:1:2.

Since the cost of the raw materials (area of the board) stands for 70-80% of the total cost of a corrugated box, it is very important to arrange the proportions of the box in a way which is most economical in board usage. Very often, low and wide boxes are used because they are easier to pack. Taking, metal cans as an example; they could fairly easily be packed from the end of the box with considerable savings in board consumption as a result. Another example, which shows that there are numerous ways of arranging the shape of a box to achieve minimum board usage. In this case, 24 carton (11x4x15 cm) are grouped in different ways and the board usage (in square meters/corrugated box) is shown for the various arrangements. It will be noted that the consumption of the board can vary from 0.494m2 to 0.675m2, the latter having a board wastage factor of P = 36%.

In this context, it is worth mentioning that although present trends towards metrication favour counting the number of articles in a box in 10s, a better flexibility in choosing economical box dimensions is achieved by counts of 6,12,24 etc. It must

[19] Ibid. p.97

be appreciated, however, that a box can be economical in board usage but not necessarily in total costs, due to converting machinery limitations or the standard paper widths that are available. Another factor which, unfortunately, has to be considered is the effect on the stacking strength, which is lower for a box of economical proportions.

We may observe that the most important tests for corrugated fiberboard are the edge crush test and the bursting test. The other two, puncture test and flat crush test, cannot however, be disregarded. In fact, an appropriate balance between the principal corrugated board properties is necessary. Once the corrugated board has been converted into the final product, boxes, these can be submitted (with or without their contents) to various performance tests which give indications about the expected strength of the boxes under various handling conditions. Following are the most important performance tests:

1.13 Types of Test:

1.13.1 Compression Test-

A box, either empty or with its eventual interior fitments, is compressed between the plateaux of a large compression tester. The results can be reported as alternatively.

- Maximum load sustained (Kp or Ibs).
- Maximum load (kp) and deflection in (mm or inches) at failure.
- Maximum load within specified deflection.

The compression strength values recorded by this test method cannot be used as such to determine the actual stacking performance of a box, i.e. how much load it will safely take. The following additional factors must be taken into consideration. The increase in humidity between the laboratory atmosphere and the actual shipping atmosphere. It might be noted that with an increase in RH from 50% to 95%, the box compression strength will decrease by approximately 60%. The effect of storage time. After, say, 30 days storage, the boxes may have only about 80% of their original stacking strength. The stacking pattern or types of pallets used. Displacement of 2cm in stacking can result in a loss of compression strength of about 40%. Interlocking stacking of the boxes can give as much as 50% loss of stacking strength, and the use

of pallets with an open under deck, a loss of up to 65%. The residual strength factors can be mathematically combined by multiplication and the result shows that the box retains only 14% of its original, laboratory measured compression strength value. However, in this case, no account has been taken of the stacking support provided by the contents of the box.

1.13.2 Drop Test-

A box with its actual or simulated contents is dropped from a specified height and in predetermined position. A test cycle usually consists of a number of drops with the box in different positions. The results are recorded as visual observations. The drop test is very simple to carry out, even without equipment, and, whatever test cycle is used, will give valuable information about the strength and performance of the boxes.

1.13.3 Vibration Test-

This test provides an accelerated simulation of transportation vibration effects. A box, or a stack of boxes or even a full pallet-load of boxes, with normal or simulated contents is subjected to controlled vibrations on a special vibration table. This test is used to find out the expected damage by vibration during transport, the efficiency of the interior fitments and cushioning materials, the closures of the boxes etc. the equipment for the test is highly specialized and expensive.

1.14 Certification Schemes for Fibre board Boxes

In Europe and the United States, most fibreboard boxes are certified in compliance with existing standardized requirements. These requirements are usually specified by the rail or road freight organizations, by industry organizations or by standards institutes. The importance of the certification system to the box user is that once the optimum quality requirements for performance by the box to successfully ship the goods have been established, the user is then assured that the future supplies ordered to that specification would be of the same quality. Criteria for the quality control of the boxes delivered have thereby been established and tests can be carried

out to control that the quality specifications have been observed by the supplier. Most corrugated box manufacturers have, at least, some of the basic equipment for this purpose. Neutral testing with more elaborate equipment can be carried out by an independent testing laboratory at reasonable costs.

The bursting strength value is still the dominating factor in official box specifications, of which the most widely used is Rule 41 of the Uniform Freight Classification in the United States.

The minimum requirement for corrugated boxes is concerned with the specifications for rail transport. Equivalent requirements for road transport are contained in the U.S. National Motor Freight Classification (Rule 222). Both rules have been developed for domestic shipments, while in the United Kingdom different specifications have been established for export shipments. It should also be noted that boxes for fresh fruit and vegetables (except bananas, onion sets and papayas) are exempted and separate specifications have been laid down under item 41816 of the U.S. Uniform Freight Classification. There are no general specifications for corrugated boxes used in air or sea transport.

1.15 Performance of Corrugated Boxes in Tropical Climates

Although the corrugated box is the most widely used shipping container for all kinds of products, it has one definite drawback, its susceptibility to moisture in the air (Relative Humidity: RH). Paper is a very hygroscopic material and the lower the quality of the paper, the more moisture it absorbs. Consequently, the user of corrugated boxes cannot expect satisfactory performance out of the boxes unless they are made out of first-class paper raw materials, preferably even especially treated to be moisture-resistant, combined with waterproof adhesives and possibly even surface treated with wax or plastic to make them water repellent.

A particular difficulty in determining corrugated box quality is to relate laboratory test results to performance in the field under tropical conditions. Laboratory tests, in order to be reproducible, must be carried out under controlled atmospheric conditions (conditioning of the samples to be tested).

It is obviously far from the existing field conditions in the tropics. The Technical Association of the Pulp and Paper Industry of the United States (TAPPI) has, therefore, adapted three additional standard atmospheres for testing.

1.16 Emerging Trends in Packaging Industry[20]

The global packaging market stood at USD 799 billion (bn) in 2012 and is estimated to have reached USD 824 bn in 2013. On the other hand, the Indian packaging industry is estimated to be USD 27.6 bn in 2013 and is expected to grow to USD 43.7 bn by 2016. Indian packaging industry has been growing at 12% per annum in the last few years. India's per capita consumption of packaging is 4.3 Kg per person per annum, as against 42.0 Kg for Germany and 20.0 Kg for China. This offers immense opportunity to the units operating in the packaging industry. The Indian packaging industry is dominated by the unorganized sector. As per an estimate of Indian Institute of Packaging (IIP), there are roughly 22000 units operating in the packaging industry in India and nearly 85% of them are MSMEs. The contribution of the MSMEs to the total revenue of the industry is approx. 50%.

The Indian packaging industry is predominated by the rigid packaging, which constitutes approx. 80% of the total packaging demand. Rigid packaging is the oldest and most conventional form of packaging in India. Corrugated packaging is an important slug-segment of the rigid packaging accounting for the majority share in the Indian packaging industry. India is currently ranked 15th in the world for its paper and paperboard consumption. End-user wise, food packaging contributes the maximum share in the packaging industry

1.16.1 Corrugated Packaging[21]

The Indian corrugated packaging is presently worth USD 6.6 bn and has shown an annual growth of 12-14% in the last five years. While India accounts for 3-4% of total packaging supply of the world, almost 43% of the total volume of world-wide corrugated packaging is produced by India. This underscores the importance of

[20] A New Role Packed and Delivered- A Report by Onicra Credit Ageny of India, New Delhi, accessed on http://www.onicra.com/images/pdf/Publications/PackagingIndustryfinal.pdf

[21] Ibid

corrugated packaging in India. Corrugated packaging plays an important role in supply chain management when used as shipping containers. With the advancement of technology in manufacturing of corrugated boxes and printing on the same, use of corrugated boxes for display/ promotional packs, point of purchase packaging (POPs) and dispensers is going up. The total demand for paper in India is estimated to be 6 million tonnes, of which 40% is consumed by the packaging industry. There are over 4000 corrugated packaging units in India employing approx. 0.5 million population and converting about 2.4 mn ton of kraft paper into corrugated boxes. Most of these units are SMEs operating in remote locations near the units driving their demand. Due to the low level of technology being used by these units, they can be set up anywhere but suffer from over capacity, high manual operations, low productivity and do not meet the international standards.

1.16.2 Food Packaging[22]

Food packaging accounts for 48% of the total packaging industry, contributing the largest share in the industry. Moreover, the area is highly unexplored as the value addition to food in India is only 7% as compared to 23% in China, 45% in Philippines, and 188% in the UK. The food processing industry is growing at 6-7% and the retail sector is also expected to grow at 14- 15% per annum till 2020. The food packaging segment is expected to grow at 15-20% backed by surging demand from the nuclear family system, increasing young population and per capita income, a higher propensity to spend, health awareness and a higher acceptance of new products. The food packaging segment in India faces competition from China and Thailand, where the taxes and import duties are comparatively lower. India needs to depend upon imports for latest packing technology and packaging material of international standards. Higher taxes and import duties affect the cost competitiveness of the food packaging units in India.

1.17 Emerging Trends in Indian Packaging Industry[23]

[22] Ibid.
[23] Ibid

The packaging industry has evolved from 'packing' in its naive form to 'packaging' which supports the distribution and marketing functions for the packed product. Primitive packaging refers to wooden barrels, baskets of reeds, woven bags etc. Presently, with the advancement of technology, packaging can be of several types, executing several functions at the same time. Flexible packaging, resalable packaging, tamper-resistant packaging, Radio Frequency Identification (RFID) tags on packaging are a few examples of how the industry has evolved over the years.

1.17.1 Flexible Packaging[24]

Flexible packaging material market is approx. USD 671 mn in FY13. It includes custom designed film, foil and paper based laminate or coextruded structures for primary packaging of products in solid, liquid or powder form in consumer size packs. Rigid containers and pet bottles are being fast replaced by flexible packaging. The material being used is also changing rapidly. From paper to cellophane plastic wrappers to aluminium foil to metalized and coextruded foils: the change has been quite rapid and new features are being built into the packaging material to add value for its customers. Advancement in technology has led to the propagation of metalized film (laminate and co extrusion based) packaging material that combines the benefits of both metals and plastics. Apart from being more cost effective, it offers versatility in the packaging material with improved protection against light, water, moisture and gases thereby increasing the aroma and the shelf life of the products. The metallic base allows for high gloss and eye-catching aesthetic packaging. The metalized film production world-wide is 0.45 mn. ton per year and is expected to grow at 7-8% per annum, ultimately boxes are also required on large scale.

1.18 Demand Drivers[25]

1.18.1 **Growth in Retail**

Increased presence of global multinational companies has increased the demand in the processed food, beverages, cosmetics, consumer products, toiletries

[24] Ibid

[25] Ibid

and pharmaceutical space. The manufacturing units, especially the fast moving consumer goods (FMCG) manufacturers are exploring new markets through newer retail models. This in turn, has not only widened the markets but also increased the demand of packaging of the products.

1.18.2 Growth of Smaller Packaging

Emerging nuclear families, increasing number of working women, rising per capita income, and growing urbanization have lead to an increase in the demand of the daily use products in smaller packages. The growth in retail sector in India, especially driven by growth in rural segment and the lower income group has also pushed up the demand for smaller units of the products.

1.18.3 Changing Lifestyle

India has been witness to a lot of cultural change since globalization. Women are spending more time outside their home and people are having less time to cook and are trying newer cuisines. 'On the go' lifestyle, resulting from less time at the disposal of people and a change in the taste of the consumers has encouraged fast food and ready to cook food. People are buying more of branded products, which may be due to their being more health conscious and/ or trendy. Packaging plays an important role in creating and sustaining the brand equity. With a higher per capita income, the demand of certain products has also increased, such as personal hygiene products and convenience products.

1.19 Conclusion:

The packaging industry, especially corrugation packaging industry has grown at remarkable rate in the world and even in India. This industry has higher potential growth in the future. The consumption of packaging material is increasing as the economy is moving towards more commercialization. The various types of packaging materials have larger demand in India. Corrugated boxes are best for packaging all types of materials, since this does not create environmental problems. Emerging retailing industry also has led growth of corrugated packaging industry in India. There has been a significant growth in consumption of corrugated box in 'Processed Food

Industry', 'Fruits & Vegetables', 'Electronic Industry', 'Pharma Industry', 'Automobile Industry', 'Chemical Industry' and 'Consumer Durables'. The large and growing Indian middle class, along with the growth in organized Retail in the country, are driving demand in the packaging industry. Another factor, which has provided substantial stimulus to the packaging industry is, the rapid growth of exports, which requires superior packaging standards for the international market. With this, the need for adopting better packaging methods, materials and machinery to ensure quality, has become imperative for Indian players. Two specific segments can be identified for opportunities in packaging equipment in the Indian market. The Un-organized Sector represents the larger opportunity, given the increasing quality- consciousness of end customers. Therefore, the researcher has selected corrugated industry for the study. The corrugated factories have been located in and around Pune city, which is the study area of the researcher.

CHAPTER II

INDUSTRIAL DEVELOPMENT IN INDIA

2.1 Introduction:

Today, as we hear the words "industry" or "industrial system" or just think of them, we automatically recall to our minds a picture of huge mill or factory fitted with giant machines electrically and power operated covering vast tracts of land, having wide and huge expanse of buildings and employing hundreds of men. We also associate with the roar and rattling of machines, sky-high chimneys emitting thick clouds of smoke. However, even prior to the development of modern sophisticated industry, man was industrious. He was engaged in some industry, however crude and underdeveloped that may have been in comparison to modern industry. We defined man as a rational animal; but we may equally define him with full justification as 'an industrious animal'. Thus we find that the history of industry is as long as the history of industrial development into three periods; Ancient Industry, Medieval Industry, and Modern Industry. This division is done with a view to chronology and development[1].

2.2 **Ancient Period:**

In the ancient or primitive period of industry are included those works which were performed by man when he was neither literate nor civilized. In this period no systematic industry had developed. This main concern of man dusting these days was merely too provide for food and physical protection. The means, which were adopted by him to meet these ends, were symbolic of his industrial effort. For food the primitive man used to hunt animals and gather wild vegetables and fruits. For hunting he employed bow and arrow and certain instruments made by sharpening stone. All primitive weapons were made either of wood or stone. These weapons were symbolic of industrial development of that period. Besides, making fire by friction of stone or bamboos was industrial miracle of that time. For a pretty long time this state of affairs persisted[2].

[1] Sharma Rajendra (1997), Industrial Labour in India, Atlantic Publishers and Distributors, New Delhi, p 1
[2] Ibid

2.3 Medieval Period[3]:

In medieval period there was sufficient development in industry. In this period the signs of industry become quite visible in the efforts of man. A number of manfully operated machines were fabricated. Man also began using animal power to meet his ends. The signs of industrialization, production of goods in excess of consumption and stocking of these came in evidence at this time. The exchange of goods and division of labour also came into vogue. As a consequence of this, different industries started operating separately. For example, blacksmith, carpenter and weaver set up independent units. Thus, began the specialization of jobs. The artistic spirit of the artisans was awakened.

The medieval industrial age in the west wan be divided into three distinct industrial systems. This division of based on the nature of the industrial system. These industrial systems are:

a) Feudal System
b) Guild System
c) Domestic System.

2.3.1 Feudal System:

Under this system, the primary industry was agriculture. Few persons controlled vast tracts of lands each and they engaged and employed hundreds of workers to do the farming. This system was in vogue in Europe between 9th and 12th centuries. Under this system the owner of the land was called feudal lord and persons engaged by him were called serfs, the serfs were virtual slaves of the feudal lord. Besides agriculture, other important professions were dependent upon feudal lords.

Under the feudal system, the serfs were required to give all kinds of services to their respective lords. In case required, they had to wage war against the enemies of their lord. From 11th century onward, urban towns started coming up in Europe with urbanization feudal system got a setback. The labor or the working class now had an alternative to working as serfs. They could migrate to towns and find work there. As a result of urbanization, Guild system came into vogue.

[3] Ibid. p.2

2.3.2 Guild System:

The urbanization in Europe emancipated the serfs from their traditional slavery. Having emancipated themselves from serfdom under feudal lords, the worker started learning new trades and skills, as a result of specialization and proficiency in trades acquired by workers, centers of trade came up. Gradually this process gave rise to Guild system. In guild system, trade associations representing various trades came into being. These trade associations worked for the promotion and development of their respective trades. This association supervised the quality and quantity of goods being produced by the member of their association. They also fixed and regulated the prices of goods.

Under guild system there used to be two kinds of guild: the Merchant Guilds and Craft Guilds. The main task of the Merchant Guilds was to look after the interests of businessmen. They used to demand justice from government in a manner in which chambers of Commerce of today function. The Craft Guilds were association formed by craftsmen carrying on a particular craft. The Craft guilds worked for the promotion of the crafts and protection of the interests of craftsmen. The craft guilds used to arrange e weekly markets where craftsmen could sell their products. In Craft guilds, master craftsmen played crucial role, though less skilful Craftsmen were also given due share. They were helped to acquire proficiency in their skill. The master craftsmen used to belong to families of master craftsmen. The craftsmanship was supposed to be hereditary. In these days, the Craft guilds of Blacksmiths, Carpenters and Weavers were particularly prominent.

The guild system occupies a place of pride in the history of Industrial development. This system was important in maintaining social harmony and unity. Remarking about the merits of this system Raj Kohli says, "The builders of the great cathedrals of Europe (at the period) had achieved a untie of feeling and thought which the modern world has apparently lost"

The guild system lasted for a pretty long time, but gradually it declined. From 16^{th} Century there was a gradual decline and deterioration in this system. There were two chief causes for the decline of this system. The first cause was internal and the second was external. The first internal cause of the decline of the guild system was that its functions and the rights of its officials were not well defined. This gave rise to myriad conflicts. For example, the guild of goldsmiths was always warring with the guild of silversmiths. Moreover, there was gradual fragmentation of the guilds.

Originally, there was only one guild of cloth merchant. But soon many sub-guilds like association of weavers, tailors, embroiderers etc., were formed.

The second cause of the decline of the guild system was external. Under this system there was one group of traders who were manufacturers and the other was on group of traders who were manufacturers and the other was that of middlemen. This group of middle mean later began exploitation of the manufacturers. It acted in the manner and style of modern capitalist. The middlemen took over the control of all levers of production and arbitrarily used them for their own selfish ends. Generally they took over the control of raw material. The arbitrary acts of theses middlemen gave severe setback to the guild system.

Besides these two reasons, there were certain local and immediate caused of this decline. At this time America was discovered. The way to commerce and trade with east also opened. Due to this the trade and commerce was deeply affected. In the production sect of Christianity had greater dominance at this juncture. The rise of protestant religion factor also contributed its share in the decline of guilds. The rise of protestant religion spelt the rise of individualism and this, too, proved inimical to guild system, which was based on a sense of cooperation. In these days another factor which gave deathblow to guild system was the invention and use of big machine and introduction of sophisticated techniques of production.

2.3.3 Domestic System[4]

After the decline of guild system, domestic system came into vogue. This system was a kind of capitalism. As far as the method of production was concerned, it was not much different form that of guild system. However, under domestic system there was no place and no role for various guilds and trade associations. Under domestic system a head of family who normally was a master craftsman controlled the entire production and everything was under his personal ownership. The head of the family used to provide for the raw material and also the manufactured goods. All processes or stages of production were under his individual control and subversion. Under this system the craftsmen had not much freedom. The system is to be seen today in the form of cottage industries. It was again the role of middleman and the moneylender, which ruined the domestic system. The head of a trade in domestic

[4] Ibid. p.4

system required from time to time extra funds for the purchase of the raw material. This extra amount came from the moneylender and he usually exploited the opportunity to the fullest. Besides, mechanization of industry rendered this system obsolete and economically non-viable. The capitalistic by investing huge amount into industry and mechanizing it to the hilt completely ruined the domestic system. Thus, the domestic system came to an end and modern industry came into being.

2.4 **Modern Industry:**

Modern industry in India did not develops a continuation of the previous domestic or guild system as it did in the west and other social not had it much to do directly with the 'Caste Panchayats' country to what some writers has contended, modern industry in India represents in general as it does in other eastern countries a break with the traditional social economic institute of the paste, which hand they remained would have undoubtedly retarded its development. Modern industry in this country began about the 1850-60 decade when the first cotton and jute mills were opened and a railway line was inaugurated of Bihar and Bengal railway and road transportations experienced subsequently a considerable growth which greatly influences the economic and social life of the country[5].

The advent of railways was decisive for Indian economic development the chronic transport bottle need of Indian industry was broken, the way was they proved for the development of large-scale industries. It was no accident that the development of the jute and cotton the coal and iron and plantation industrial progressed slowly before 1850 and occurred in quick succession therefore, transport in the life blood of industry and without railways it lacked the arteries through which to flow[6].

During this period the British power had become consolidated in India and thereby attracted large number of foreign entrepreneurs, particularly from England and Scotland who had discover in India a source of cheap labour and raw materials. Cotton mills were opened during this period in Bombay and Ahmadabad, jutes mills proliferated on the Hooghly banks while woolen and lather factories become prominent in Kanpur. Mr. Justice Ranade said that, 'it was at this period and during

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[5] Gisbert P. (1971) Fundamental of Industrial Sociology, TATA McGraw Hill Publishing Company LTD. New Delhi, p.19

[6] Ibid

the first decade of the present century (or 20th century), that there was general tendency to make a greatly increased use of mechanical appliances everywhere[7]. The two world wars also accelerated the advance of Indian Industries. Iron and steels works started during the First World War while an industrial growth took place during the Second World War. The numbers of industries during the war increased by 3.475 and the paid up capital by Rs 100 cores[8].

In spite of this advance, the traditional policy of the British rulers was to use delaying tactics with regard to Indian industrial development. Some industries were fostered, especially jute manufacturers and railways, but on the whole, it was a sluggish growth. By 1900 the total mileage of railway tracks in India was 25,000, which by 1928 was increased to 40,000. But even this moderate accomplishment was due to military and strategic considerations especially in the northern and eastern frontiers. The idea behind this resistance to the industrial development of India was to prevent Indian goods from competing with British goods, though most of the new Indian industries were in British hands and run by British management and capital[9].

Nevertheless, due to the efforts of Jamshedji Tata and his successors, the pioneers of modern industrial development in India, in 1911 the Tata Iron and Steel Works were completed in what is now Jamshedpur, giving thereby an added impetus to Industry. But this was not accomplished without great difficulties and was also too short of what the country needed[10].

But it was during the First World War, that Britain realized how dearly it had to pay for this policy, when the Germans and their allies preventing British goods and resources from reaching India, and Indian raw materials from being sent to the metropolis cut the normal trade routes. The outcome of this was that the Indian continent was left to itself without the possibility of utilizing its own means with the consequent hardships to the population, danger to the commonwealth, and difficulties to the imperial army then operating in India. The reaction after the war against this state of affairs brought about spell of freedom and a comparative relaxation of controls. But the irony of the situation was that while the growth of industry, which between the two World Wars was taking place everywhere, could not be halted in

[7] Ibid p.20

[8] Ibid p.20

[9] Ibid p.21

[10] Ibid

India, the policy of restriction adhered to by the British Raj only succeeded in unnaturally retarding this development. Had better counsels prevailed and had Britain accepted India as a partner in industry, and not as a competitor, not only the history of India but that of Britain also, and probably of the whole world, would have been quite different from what it was especially for the developing countries of the East[11].

Yet another World War seemed to have been needed in order to make the ruling powers see things in their proper perspective; but the vision came too late. "It was not until the Second World War that were factories started in India for the manufacture of spinning ring frames and looms or even such simple items as pickers, bobbins, and starch, all of which are required by an industry which had been in operation since 1855"[12].

2.5 Industry and Independence:

Whatever encouragement was given industry during the war periods, the then ruling power had to contend with the difficulties created by the war itself, especially in the East. The result was that two years after the war, on 15 august 1947, the Indian tricolor, the symbol of freedom and independence, was a prelude to the only genuine industrial revolution which India has so far experienced and which was to leave its mark on the nation for many years to come, not only in economic and social fields, but also in the political and cultural spheres.

Without going into a description of the industrial growth during this period it may only be mentioned here that while the capacity of the traditional industries increased about 25 per cent in a period of five years ending in 1953, that of modern industries like motor, diesel engines, batteries, transformers, radios, etc, experienced a growth of over 100 per cent in the same period. Since then, other capacity and output have been increasing at a proportionate pace. Furthermore, the general indoor of industrial output in 1951 rose to 117.4 as compared with 100 in 1946; and in 1960-61 it experienced a further rise up to 194 taking the index for 1950-51 as 100. During this period a number of institutions and agencies like the Industrial Finance Corporation and the State Finance Corporation were established in order to help the growth of industry[13].

[11] Ibid. p.22
[12] Ibid
[13] Ibid p.23

One of the most important innovations in the industrial field after Independence has been the introduction of the Five Year Plans and the direct participation by the government in industry as expressed in the "Industrial Policy Resolution" of 1948. Since then the nation has been commutated to a mixed economy or a balance between the public and private sectors, though the balance seems at times to be upset in favour of the former. This dual approach to industry became more effective when in 1956 the "New Industrial Policy Resolution" was published. According to this, industries were divided into three categories A, B, and C. Under category A fall those industries, which only the government can handle. Some of these are atomic energy, electrical, iron and steel and others, Category B comprise those industries which, though still in private hands, may be progressively taken over by the state, as road and sea transportation, machine tools, aluminum, chemicals including plastics and fertilizers, Ferro alloys and certain types of mining. Category C comprises the remaining industries and is left to the private sector[14].

Whatever the theoretical implications of these provisions may be – Whether India is a welfare state, a social democracy or a socialist state-the fact remains that it is still a mixed economy in which the public and the private sectors have come to stay and work together, not without occasional difficulties and frictions. This state of affairs seems to be in consonance with the modern world trends where state intervention in the economy is taken for granted, while private enterprise, in a greater or lesser degree, still remains the most traditional and authentic expression of the direct participation of the citizens in the economic life in the country In fact, both types of industry are expected to share proportionately in the social and economic development of country.

2.6 Information and Technology (IT) Industry[15]:

Information Technology (IT) is the industry, which through the use of computers and other sporting equipment help in the spread of knowledge. The term information technology includes computer and communication technology includes computer and communication technology along with associated software.

[14] Ibid p.24

[15] 14. Datt Ruddar and Sundaram (2007), Indian Economy, S.Chand & Co., New Delhi. pp.657-660

Information technology for some time was used as synonymous to computers, but with the rapid advancement in various information delivery system such as Radio, TV, Telephone, Newspapers, fax and of course computer and computer networks information technology refers to the entire gamut of media and devices used to transmit and process information for use by various target groups in society, IT has, therefore been rightly termed as Information and Communication Revolution.

With advancement in information technology information is being regarded as the fourth factor of production, along with the land, labour and capital. Information has therefore, become an important and distinct input in production, thus along with three sector model of primary, secondary and tertiary industries, a fourth sector information related industries has emerged. Information is therefore used as a raw material of knowledge just as iron is a raw material for machinery thus, according to Law (2000)), 'the activities of generating, processing, transmitting, dissemination, sponging, archiving and retrieving information constitute information industry.' The activities of generating processing, transmitting, disseminating, strong, archiving and retrieving information constitute 'information industry.' The information industry has thus pervaded a wide range of industries, viz. manufacturing, education entertainment, defense, trade, communications, etc.

In the knowledge economy, the raw material that matters is intellectual rather than physical, Law, therefore states; 'the knowledge economy implies shift in the geographical center from raw material and capital equipment to information and knowledge, especially in education and research centers and man-made brain industries. The knowledge economy depicts the automation of labour intensive manufacturing and service activities as well as growth in new service industries such as health care, distance education, software production and multimedia entertainment.' The pervasive influence of information technology is so strong that there is no sphere of human life in which it is not able to make a rich for itself.

2.7 Structural Changes and Growth in India[16]:

Economic growth in post‐Independence India has certainly seen several turns and twists. Accordingly, several phases with distinctive features in terms of rates of growth and structural changes can be identified. It is, however, not very meaningful to highlight short‐term fluctuations in an analysis of the growth and structural changes of an economy over a long period of about six decades. At the same time, it is also of neither factually realistic nor analytically meaningful to divide the entire period just in two parts, pre and post‐reforms, as is often done in most of the recent studies and analysis of India's economic growth. The year 1991, when economic reforms were introduced, is seen as the sole turnings point, providing a break from the low growth to high growth and dividing the post‐Independence economic history into two clear phases: the pre‐reform 'dark' phase and the post reform 'bright' phase.

Such a simplistic description of India's economic experience can easily be questioned on the basis of historical facts. A major break in history of economic growth in India occurred soon after Independence. An economy which had virtually stagnated over the past half century, growing at about 0.5 per cent per annum, started growing at over three per cent from early 1950s. State directed economic planning; presently a much maligned initiative was the reason for this turning point. Growth rate averaged to 3.5 per cent euphemistically called the Hindu rate of growth, over the next three decades though it saw a deceleration in the later part of the period, 1965‐1981. The next break in terms of growth occurred in early 1980's, when growth rate of GDP accelerated from around 3 to 3.5 per cent in previous decades to between 5 and 6 per cent. In this respect, introduction of economic reform in early 1990's was not a 'break' as the growth rate in the post–reforms 1990's was not significantly higher than during 1980's. Growth rate, in fact, slowed down in the early years of 21st century, but significantly picked up after 2004. The period since 2004, even after accounting for slow down during financial crisis in 2008‐09 represents a distinctive phase of high growth in the post‐reforms period. Structural changes as

[16] 15. T.S. Papola (2012), Structural Changes in the Indian Economy: emerging patterns and implications, Working Paper 2012/02, Institute for Studies in Industrial Development, New Delhi

reflected in the changes in the shares of agriculture, industry and services have broadly followed the same time pattern as the changes in growth rate but the contents of change have varied from period to period. No doubt, the share of agriculture has continued to consistently decline over the past six decades: from 57 per cent in 1950 – 51 to 40 per cent in 1980 – 81 to 24 per cent in 1995 – 96, to about 16 per cent in 2009 – 10. Industry and services have both increased their share, but at different pace and in different periods. Accordingly, their relative contribution to the growth of and importance in aggregate GDP has varied over different periods. On the basis of the observed patterns of growth and structural changes, economic growth in post-Independence India can be divided into the following four phases, each with its distinguishing features.

First Phase - Independence to Mid – 1960s:

This period saw a significant acceleration in the growth rate over the past decades marked by a high growth of industry, and a significant structural change with a large increase in the share of non – agricultural sector, especially of the industry in the national output.

Second Phase - Mid – 1960's to 1980:

This period was marked by a slower growth of GDP, accompanied by a deceleration in the growth of industry, a slower pace of structural shift from agriculture to non – agriculture and a very small increase in the share of industry.

Third Phase - 1980 to early 1990s:

This period saw a sharp acceleration in growth rate, mainly contributed by services. Structural changes were also swift, with a large decline in the share of agriculture, but very little increase in the share of industry – services picking up the major share of the shift.

Fourth Phase - Easy 1990's Onwards:

Growth continued at similar rate as 1980's, but declined during 2000 – 2004. Structural changes continued at an accelerated pace with share of agriculture sharply declining and services emerging as the major sector and with very small increase in

the share of industry. Within this phase, period 2005‑10 has seen a sharp acceleration in growth rate, despite a slowdown in 2008‑09. Share of agriculture has declined from around 20 to 16 per cent, that of services has increased from 54 to 59 per cent and that of industry has stagnated. Thus in the first three decades, rate of economic growth followed that of the industrial sector. Since 1980's it has been primarily services led. The share of industry has remained at almost the same level (around 25 per cent) since 1987‑88. Within industry, share of manufacturing has been constant at 15 per cent; construction has increased its share mainly at the cost of mining. Contribution of manufacturing to growth of non‑agriculture GDP was estimated to be 24 per cent during 1950‑51 to 1979‑80 and only 18 per cent during 1979‑80 to 2007‑08. Construction has seen a small decline in its contribution from 10 to 9 per cent. Industry including construction saw a decline in its contribution from 40 per cent in earlier period to 31 per cent in the letter.

Acceleration in the growth of services was led by transport and communication and financial services since 1980: but trade, also joined the fast growing group in the later part of the period, 1995‑96/2007‑08. In community, social and personal services, public administration and defence saw some decline but other services a sharp acceleration in growth rate. Overall, transport and communication has seen a large jump in their share, trade and financial services some increase and community, social and personal services a slight decline in their shares during 1993‑94/2009‑10. It may be noted that these changes coincided with the increasing importance of the organised private sector and declining importance of the public sector which had contributed to the faster growth of services in 1980's.

2.8 Micro, Small and Medium Enterprises in India[17]:

Micro, Small and Medium Enterprises (MSME) sector has emerged as a highly vibrant and dynamic sector of the Indian economy over the last five decades. MSMEs not only play crucial role in providing large employment opportunities at comparatively lower capital cost than large industries but also help in industrialization

[17] Government of India (2014), Annual Report (2013-14), Published by Ministry of Micro, Small and Medium enterprises, New Delhi available on http://msme.gov.in/WriteReadData/DocumentFile/ANNUALREPORT-MSME-2013-14P.pdf

of rural & backward areas, thereby, reducing regional imbalances, assuring more equitable distribution of national income and wealth. MSMEs are complementary to large industries as ancillary units and this sector contributes enormously to the socioeconomic development of the country.

Khadi is the proud legacy of our national freedom movement and the father of the nation. Khadi and Village Industries (KVI) are two national heritages of India. One of the most significant aspects of KVI in Indian economy is that it creates employment at a very low per capita investment. The KVI Sector not only serves the basic needs of processed goods of the vast rural sector of the country, but also provides sustainable employment to rural artisans. KVI today represent an exquisite, heritage product, which is 'ethnic' as well as 'ethical'. The Sector has a potentially strong clientele among the middle and upper echelons of the society

Performance of Micro, Small & Medium Enterprises (MSME) sector is assessed by conduct of periodic All India Census of the Sector. The latest census conducted was Fourth All India Census of MSME. The Census was conducted with reference year 2006- 07, wherein the data was collected till 2009 and results published in 2011-12. Fourth All India Census of MSME is the first census conducted post implementation of the Micro, Small and Medium Enterprises Development (MSMED) Act, 2006. Prior to implementation of MSMED Act, 2006, the sector was defined as per the provision of Industrial Development and Regulation Act, 1951 as Small Scale Industries (SSI) sector and its constituent, tiny and auxiliary units as per periodic revision of criteria for defining such units. The Third All India Census of SSI was conducted with coverage and concepts as prevailing during 2001-02. The scope and coverage of the MSME sector were broadened significantly under the MSMED Act, 2006, which recognised the concept of "enterprise" and to include both manufacturing and services sector, besides defining the medium enterprises under the MSME sector. Thus, the entire non-agricultural sector of the economy was brought under the coverage of MSME sector subject to the revised criteria prescribed for defining Micro, Small and Medium Enterprises separately for manufacturing and services sectors.

The census adopted different methodology for Registered and Unregistered Sectors. While complete enumeration of enterprises was adopted in the Registered Sector, sample survey was resorted to in the Unregistered Sector. However, activities under wholesale/ retail trade, legal, educational & social services, hotel & restaurants,

transports and storage & warehousing (except cold storage) were excluded from the coverage of definition

2.8.1 Definition[18]:

Small Scale Industrial Unit (SSI):

An industrial undertaking in which the investment in fixed assets in plant & machinery, whether held on ownership terms, or on lease, or by hire purchase, does not exceed Rs.100 lakh as on 31-03-2001 is to be treated as a Small Scale Industrial Unit.

Micro, Small and Medium Enterprises (MSME):

MSME Sector consists of any enterprise, whether proprietorship, Hindu undivided family, association of persons, cooperative society, partnership or undertaking or any other legal entity, by whatever name called, engaged in production of goods pertaining to any industry specified in the first schedule of Industry Development & Regulation Act, 1951 and other enterprises engaged in production and rendering services, subject to limiting factor of investment in plant and machinery and equipments respectively as noted below:

For manufacturing sector, an enterprise is classified as:

a) Micro enterprise, if investment in plant and machinery does not exceed twenty five lakh rupees;
b) Small enterprise, if investment in plant and machinery is more than twenty five lakh rupees but does not exceed five crore rupees; or
c) Medium enterprise, if investment in plant and machinery is more than five crores rupees but does not exceed ten crores rupees;

In case, enterprise is engaged in providing or rendering of services, it is classified as:

a) Micro enterprise, if investment in equipment does not exceed ten lakh rupees;
b) Small enterprise, if investment in equipment is more than ten lakh rupees but does not exceed two crores rupees;

The definition over the years has been changed by the Government of India.

[18] Ibid

2.9 Factors Affecting Growth of Packaging Industry in India:

In the recent times, the packaging industry in India is growing fast, especially after the globalization and economic reforms. The government of India introduced the structural changes, which brought the positive economic impact. The industrial growth has reached to remarkable position. In the similar position, the packaging industry in India is also growing. In this regard, Indo-Italian Chamber of Commerce & Industry (2008)[19] has published one report, where the report explores the factors affecting the growth of packaging industry in India. The report explains as below.

2.10.1 Urbanization:

Modern technology is now an integral part of nation's society today with high-end package usage increasing rapidly. As consumerism is rising, rural India is also slowly changing into more of an urban society. The liberalization of the Indian economy, coupled with globalisation and the influx of the multi-nationals, has improved the quality of all types of primary and secondary packaging. Also industrialization and expected emergence of the organized retail industry is fuelling the growth of packaging industry.

2.10.2 Increasing Health Consciousness

As people are becoming more health conscious, there is a growing trend towards well packed, branded products rather than the loose and unpackaged formats. Today even a common man is conscious about the food intake he consumes in day-to-day life.

2.10.3 Low Purchasing Power resulting in Purchase of Small Packets

India being a growing country, purchasing power capacity of Indian consumers is lower; the consumer goods come in small, affordable packages. Apart from the normal products packed in flexible packaging, the use of flexible in India includes some novel applications not usually seen in the developed world. Products

[19] Indo-Italian Chamber of Commerce & Industry (2008), Report on Packaging Industry in India (2008), Indo-Italian Chamber of Commerce and Industry Publication, Mumbai April 2008.http://www.agora.mfa.gr/agora/images/docs/radC6117Packaging%20Industry%20of%20India.pdf)

like toothpaste, toothpowder, and fairness creams in laminated pouches are highly innovative and are not used elsewhere. Another typical example of such applications is tobacco and betel nut-based intoxicants and mouth fresheners catering to unique Indian taste.

2.10.4 Indian Economy Experiencing Good Growth Prospects

The Indian economy is growing at a promising rate, with growth of outputs in agriculture, industry and tertiary sectors. Overall economic growth has proved to be beneficial for the consumer goods market, with more and more products becoming affordable to a larger section of the population.

2.10.5 Changing Food Habits amongst Indians

Changing lifestyles and lesser time to spend in kitchens are resulting in more incidence of eating away from homes resulting in explosive growth of restaurants and fast food outlets all over the country. Indians are trying out newer cuisines and also purchasing similar food items for their homes. Therefore, the review period has seen new products like pasta, soups, and noodles being launched in India, fuelling the growth of packaging industry in India.

2.10.6 Personal health consciousness amongst Indians:

With growing awareness towards contagious diseases like AIDS and other STDs, awareness towards usage of contraceptives and disposables syringes have increased the demand for packaging required for the same.

2.10.7 Rural Marketing Pushing Demand for Sachets:

India comprises of a big rural market and there has been growing focus on rural marketing, whereby manufacturers are introducing low-priced goods in smaller pack sizes. Low priced sachets have proved to be extremely popular in smaller towns and villages, where people do not prefer to buy larger packs due to financial constraints.

2.11 Industrial Policies in India[20]:

After the Independence, the government of India had various challenges to lead the nation towards the development. Agriculture and Industry, these two sectors were equally important for the nation. The government of India declared various policies for the development of industries. The researcher has briefed here some of the industrial policies.

2.11.1 Industrial Policy Resolution (1948):

After independence this was the first policy resolution declared and adopted, this policy aimed at promoting a rapid increase in the stranded of living of the people in the country by optimum exploitation of the available resource in the country and to provide greater employment potential this policy was more or less based on the importance of government role and the state dominate participation in the field of Industrial development. The role of private sector was also recognized and this sector received a share in the industrial organization. The role of private sector was also recognized and this sector received a share in the industrial organization. The industries were classified under four pats namely,

a) State monopoly Industries.
b) Basic and key industries of national importance.
c) Private sector industries subject to Governmental control and lastly.
d) Completely private sector industries.

2.11.2 The Industrial Policy (1956)

The first five-year plan started in April 1951 came to an end in 1956. The "Directive Principles" enunciated by the congress laid stress on a new policy for the country and that was a 'socialistic pattern of society. All these changes add developments necessitated for a new policy that came in to operation from 30th April 1956. The main objectives of the policy are as below;

a) To accelerate the rate of economic growth.
b) To expand public sector developing heavy industries.
c) To create more employment opportunity.

[20] Narayan B.N. (1997); Industrial Economics, Anmol Publication, New Delhi pp. 239-251

d) To raise the living standards of the people.
e) To improve the working conditions of the labour class.
f) To bridge the economic gap between the rich and the poor.
g) To remove disparities in wealth and incomes
h) To expand cottage, village, agro-based and small scale industries and provide greater infrastructure.
i) To remove regional imbalance by improving backward areas etc.

2.11.3 The Industrial Policy Resolutions (1977):

The 1977 policy resolution laid more emphasis on the small scale and village sectors to eliminate the distortions impairing the economy. The objective of the policy could be summarized as fallow;

a) The small scale sector providing self employment to be encouraged. The tiny sector with an investment of Rs 1 lakh in equipment situated in towns and Rs 10 lakhs in ancillaries were to be classified separately.
b) Basic industries, capital goods industries and high-tech industries were to be in large seal section.
c) The large business houses, which have grown disproportionately compared to the resources generated by them, internally were to be monitored. The policy was against monolithic supremacy of the large business houses. The policy insisted upon these units to relay on their own resources rather than one the financial institution.
d) The policy emphasized on invoking the provisions of the MRTP act at curbs the monopolistic tendencies and concentration of economic power.
e) Further, the policy stressed on professionalism of management rather than family-owned enterprises.
f) The policy for the public sector was in appreciation of their effort to produce essential consumer goods rather than always concentration in the production of importance and strategic goods.

2.11.4 The Industrial Policy Statement (1980):

The policy resolution was announced by the congress Government, which came to power, certain socio-economic objectives were enshrined in this policy statement, the main objective were as follows;

a) Capacity utilization of resources to increases production received priority.
b) Removal of distortions to achieve regional blatancy was considered highly imperative;
c) The promotion and development of agro-based industries to receive priority;
d) The export promotion programmed and import substitution sectors to receive high encouragement.
e) To educate consumers against low quality products and high process. The policy statement emphasized on the equitable distribution of investments bathes in the urban and rural areas;
f) The policy recognized the importance and implementation of professionalism in the public sector to achieve the targeted growth development of management cadres in areas of operation finance, marketing and information system have to recite
g) The policy statement realized the need to develop backward areas and proposed to set up a few nucleus plants in each backward district to develop small scale and ancillary units through the up gradation of technology skill.
h) It was decided to build up buffer stocks of essential raw materials needed but small scale units and as well as decentralizing the market process for these products.
i) In the case of sick units, it was proposed to identify them well in advance and take necessary steps either to merge them with large scale units wherever possible or to find out early remedial measure to avoid it based on the principle "prevention is better than cure" The policy statement emphasized on implementation of 'Dispersal of industries principle" avoid concentration of industries in the urban and metropolitan areas, as they would breed socioeconomic problem and bring about ecological imbalance.

2.11.5 The Industrial Policy Resolution (1991):

With the new Government assuming power on 24th July 1991, the policy statements underwent a fundamental departure from the earlier statements. The scrapping of Industrial Licensing and Registration Policies; end to monopoly law, opening door to foreign investment and collaborations; classification of the role of public and private sectors; promotion of Indian Entrepreneurship to augment productivity and employment; higher investment to R&D to bring about a change in

the pattern of production for Indian manufacturing units; inducing competitiveness in industries to help the common man emphasizing the need to run public sector undertakings (PSUs) on commercial basis; enforcing labor-management sound relationships; linking the inhuman economy with the Global Market and providing incentives to develop backward areas are some of major issue given prominence in the policy statement.

In order to achieve the above proposals and objectives, it become necessary for the government to initiate certain drastic measures in the direction of Industrial Licensing; Foreign Investment; Monopolies and Restrictive Trade Practice Act, Memorandum of Understanding; Foreign Technology Agreements; policy toward public sector and removal of constraint and restraints in the process of production and exports.

Thus, the 1991 policy resolution comprises of various measures to augment Industrial Productivity; Industrial Entrepreneurs opening the door of the economy for international investors, extension of liberalization policy and reforms; programmers to step up production standardization of the quality of products; export promotion; standardization of the quality of products export promotions; import cuts and substitution generation of employment potential; bridging the economic gap between the haves and have-note poverty eradication; improvement in the standards of living of the people and bridging the gap between supply and demand etc.

Since mid 1991, the economic liberalization programmers have attracted international investors form East and West in various productivity programmes. It is a great historic attempt made by the Government for India's participation in the global economy. India should no longer be a parasite in the economic front. If economic democracy has to succeed to make the country self-reliant, self-sufficient and self-generation a staunch policy of economic liberalism would be absolutely essential. In this direction, the 1991 policy is a sure palliative measure, the 51 percent equality participation is a remarkable step, but it would be necessary to keep a close vigilance in its operation, India has to shake-off its traditional outlook and swim with the current an appraisal.

The economic package released and the concept of economic liberalization is most welcome. The various memorandum founder-standing and collaborations that have entered into would throw abundant light on the engines of Indian economy to march abreast of times, when advanced and highly development nations are flying in

silver arrow planes India cannot travel in a bullock-cart age. The policy of economic isolationism has no relevance in the space age. The sick industrial units have to be amalgamating with the other progressive units.

In spite of these merits and tremendous advantages, the policy decision suffers from certain limitations; political stability security, solidarity safety and integrity are essential for the implementation of reforms, in total. But the present political picture portrays a dismal look. The various scams, corrupt practices bribery at all level which are not only economic but social evils have to be totally eliminated and uprooted otherwise, there is great danger for the economics of county, "corruption has become of late a way of life" endangering the economic and social fabrication of the country, the liberalization programmed could be miss-used but the industrial magnets and influential politicians. Under the liberalization programs the private sectors as assumed greater role; new project in private sector are being set up either under M.O.U (Memorandum of Understanding) or with foreign assistance and collaboration. Power generation, petroleum refining and petrol-chemicals, Telecommunication equipment industry; transport development are some of the important units in the private sector, they have received approval. Even the public sector has been made viable efficient and revamped, in view of the top-management being too costly, the public sector units are asked to reduce their expenditure in the direction attempts are being made to co-ordinate both fiscal and monetary policies to achieve growth with stability.

In this direction, the new policy has provided ample positive service to reduce the gestation period, even the bureaucracy has been made to realize the importance of speed industrialization to increase productivity, employment and to fill up the gap between supply and demand. If liberalization policy has to achieve the predetermination objectives and targets, it is absolutely necessary to remove further all constraints, restraints and more deregulations.

2.12 Foreign Direct Investment in India:

The Government of India introduced the structural adjustments in 1991, under which number of policies have been brought out. They are also stated as new economic reforms. The economic reforms have been introduced in number of sectors, which have been evaluated by many experts. The reforms have brought an expansion

of economic activities in India. The New Economic Reforms have number of good results; it also has brought number of adverse effects in economy.

Bilgrami S.A.R (2002)[21] has argued about the impact of new economic reforms on Indian economy as below-

"The share of the merchandise trade (export & imports) in GDP has increased by more than 4 per cent from 15.5 per cent in 1990-91 to 19.98 in 1995-96. Foreign direct investment which was almost negligible before 1991 has not become more than 1 billion dollar per year. The stock of foreign exchange reserves has increased from less than 2 million dollars in 1991 to about 20 million dollars in 1995-96. India's FDI was 68 million dollars in 1991-92, which reached to 1314 million dollars in 95-96." The post-reform period has brought number of positive and negative changes. This paper deals with the inflow of foreign direct investment after 1991.

In the post-Independence period, Indian industries have developed with number of limitations, one of that is, technical limitation. The policy of the Government towards the foreign investment was rigid. The protection was given to Indian industries, hence the foreign investment was allowed with number of restrictions. As the globalization came in India, the rigidity of foreign investment policy has been reduced to greater extent. Except exceptional cases, in large number of industries, the foreign investment has been allowed freely. The flexible policy of the government of India has attracted the foreign investment. Foreign Direct Investment (FDI) has been most important and crucial factor in the economic growth of India, especially after the globalization. The free entry policy is attracting the FDI inflow in India. Along with the FDI, the modern technology is also entering in India. After the globalization, the technological improvement has promoted the economic growth. The inflow of FDI also has increased the employment opportunities and the standard of living in India. The significance of FDI was realized by the Government and hence the liberal policy was adopted. Therefore, the FDI plays a central role in the economic growth, especially in case of India. Present paper gives a trend analysis to the inflow of Foreign Direct Investment with reference to India.

[21] Bilgrami S.A.R (2002), 'Towards Globalisation of Indian Economy: Opportunities & challenges" In Bajpai, Chaubey et.al (2002), 'Post Reforms Leading Issues of Indian Economy', Atlantic Publishers & Distributors, New Delhi. Vol. I, pp.19-20.

In terms of actual inflow of FDI in India, after 1991, the position seems to be improving. In the year 1991, the total inflow of FDI was Rs. 3,534 Millions, which increased to Rs. 18,619 Millions in the year 1993. This increase was around 525 per cent. The inflow further increased to Rs. 132,692 millions in the year 1998 and Rs.161, 344 millions in the year 2001. The attractive policy of the government and the expanding the market in India has encouraged the inflow. However, after 2001, the inflow of FDI, compared to earlier year has decreased to some extent. i.e. in the year 2003, the FDI was Rs. 95,640 million, whereas, in the year 2005, it was Rs. 94, 814 million. There have been ups and downs in the actual inflow of FDI. These slumps are occasional and determined by the economic situation in a domestic country. Except these negligible fluctuation in the inflow of FDI, the trend of FDI in India show positive situation. The total inflow from the year 1991 to 2005 was Rs. 1332,489 millions[22].

According to the Annual Report of Ministry of Commerce and Industry (2014)[23] , the trend of FDI in the recent period is highly positive. According to the report "Foreign Direct Investment (FDI) flows to India stood at US$ 22.2 billion during April-December 2012, which is 22.1 per cent lower than US$ 28.5 billion during April-December 2011. Up to December 2012, net FII (Foreign Institutional Investments) flows amounted to at US$ 16.0 billion (US$ 2.7 billion during the corresponding period of 2011-12). FII flows in recent months witnessed improvement, reflecting the impact of various reform measures announced by the Government".

The industry-wise classification of total inflow of FDI (from 1991 to 2002) shows that, the highest FDI was in the electrical equipment and software industries (Rs. 110908 millions), which shares 10.6 per cent of the total FDI. The second highest FDI was in transportation industry (Rs. 98994 millions), which shares 9.4 per cent of the total. The Telecommunication was at third place by sharing 9.4 per cent of the total or Rs. 98763 millions. Other important sectors are 'service sector' (FDI Rs. 89762 millions), Fuel Sector (Rs. 65938 millions), Chemicals (Rs. 53993 millions)

[22] Gupta S.P. (1998), 'Post Reforms India: Emerging Trends', published by Allied Publishers, New Delhi. pp. 34-37

[23] Ministry of Commerce and Industry –Annual Report (2013-14), Published by Government of India, available on http://commerce.nic.in/publications/pdf/anualreport_chapter2-2012-13.pdf

etc. The inflow of FDI could be seen in 45 sectors. The lowest inflow of FDI can be seen in Soaps, Cosmetics and Toilet Preparations (Rs. 2417 million). The trend analysis shows that, the inflow of FDI in India has been increasing and important. This has promoted the industrial growth in India. It is true that, the inflow depends on the profitability in the industry; however, the government policies are equally important. Ultimately, the economic growth of a particular industry can be influenced by the inflow of FDI. The Software Industry, Telecommunications and Transportation industry, are growing fast, which has contributed much more to the economic growth of India[24].

The inflow of FDI has benefited Indian economy to a greater extent. The industrial growth or economic growth in selective industries is a result of FDI. These industries have created more employment opportunities. This also leads the regional development. 'Delhi' 'Maharashtra', 'Karnataka', 'TamilNadu', 'Andhra Pradesh' etc. have benefited tremendously. Therefore, the FDI inflow must be encouraged. The Government of India is doing this. However, very recently, the fluctuations in the economy are increasing. The global crisis has been more serious in the present period. As a whole, inclusive growth is not possible by FDI, since the structural arrangements in India is typical. Even today, majority of Indian population lives in rural area, which is away from the orbit of constructive development. There are also some segments of the society, which can be stated as weaker sections, also are away from such development. Therefore, it can be stated that, along with FDI, the role of public sector is most important.

2.13 Conclusion:

The Indian economy has moved through the globalization and economic reforms, which has brought the promotion of industries, especially Information Technology industry. Many other factors are responsible for the promotion of packaging industries. As a whole, the packaging industries have greater opportunities in the future.

[24] Ibid pp.43-44

CHAPTER III

RESEARCH METHODOLOGY

3.1 Introduction:

Industrial development in India has been promoted by both private and public sector. Government of India has introduced number of industrial policy to promote and encourage the industrial sector. As a result of it, today Indian industries have reached to a good position. Basic industries, manufacturing industries, processing industries, small scale industries, cottage industries and many other types of industries are being promoted by the government. There are also some industries which are depending on main industries. Small scale industries are providing spare parts and packaging materials to main industries.

Modern industry is characterized by the factory system whose main features are; spatial concentration of the productive process, application of mechanical power, and accumulation of wealth with a developed market mechanism. This was upheld by an individualistic and capitalistic ideology in which self-interest and individual values were encouraged and it brought about a rise in the standard of life, progress in literacy and education, and insistence on democratic ideals and practice. In India, where the system of guilds or serene also existed, early industry was much developed during the middle ages, and some of its manufactured products, especially fine textiles, were highly appreciated in Europe. But in later times its flourishing arts and crafts could not compete with the new machine-made products introduced by the British whose cotton industry had developed owing largely to the high tariffs raised against Indian goods[1].

3.2 Important Definitions and Concepts:

Since the study is based on one new emerging industry i.e. corrugation industry, the researcher has given related concepts and definitions as below.

[1]Gisbert (1971) Fundamental of Industrial Sociology, TATA McGRAW HILL Publishing Company LTD. New Delhi. pp.19-24

a) Grammage(gm/m. sq. meter):

Weight in gram per sq. meter. Conditionedgrammage is the grammage obtained in a standardized climate. Drygrammage is the grammage of absolutely dry paper.

b) Moisture Content (%):

The loss in weight (%) of a sample when dried to constant weight under specified conditions.

c) Bursting Strength : kg/cm. sq

The maximum pressure, applied at a right angle, that the paper can withstand under well specified conditions.

d) Ring Crush Test RCT kg

The maximum load a strip of paper bent in a ring form can stand when it is edgewise compressed.

3.2.1 Packaging Industry[2]:

Packaging is generally seen as a good barometer of economic development and improvements in life-style. The overall global trend showing that packaging industry is growing at higher rate. The primary packaging manufacturing industries composed of four competing material sectors each with a different set of operating conditions, i.e. paper/board, plastics, glass and metals. Within this make-up there are sub-divisions, i.e. corrugated board, cartons, rigid plastics, flexible plastics, steel and aluminium as well as a combination of one, two or even three of these sub-divisions.

The nature of packaging manufacturing industry is changing irrevocably due to the changing customer base, and increasing customer and legislative demands. The challenge of the enlarged industry cannot be ignored, both in terms of market growth

[2]http://www.packagingfedn.co.uk/images/reports/mainreport.pdf

and the potential to attract product manufacturers. This is most effectively done by maintaining an up-to-date knowledge and analysis of competing operations and the changing customer base. The packaging industry in the present time is most essential, since all the products need to be packed some or other material.

3.2.1 The purposes of packaging and package labels[3]:

Packaging is the technology of enclosing or protecting products for distribution, storage, sale, and use. Packaging also refers to the process of design, evaluation, and production of packages. Packaging can be described as a coordinated system of preparing goods for transport, warehousing, logistics, sale, and end use. Packaging contains, protects, preserves, transports, informs, and sells.In many countries it is fully integrated into government, business, institutional, industrial, and personal use.

a) **Physical protection** – The objects enclosed in the package may require protection from, among other things, mechanical shock, vibration, electrostatic discharge, compression, temperature.
b) **Barrier protection** – A barrier from oxygen, water, vapor, dust, etc., is often required. The controlled atmospheres are also maintained in some food packages. Keeping the contents clean, fresh, sterile and safe for the intended shelf life is a primary function. A barrier is also implemented in cases where segregation of two materials, prior to end use is required, as in case of special paints, glues, medical fluids etc. At consumer end, the packaging barrier is broken or measured amounts of material removed for mixing and subsequent end use.
c) **Containment or agglomeration** – Small objects are typically grouped together in one package for reasons of efficiency. For example, a single box of 1000 pencils requires less physical handling than 1000 single pencils. Liquids, powders and granular materials need containment.
d) **Information transmission** – Packages and labels communicate how to use, transport, recycle or dispose of the package or product. With pharmaceuticals,

[3]http://en.wikipedia.org/wiki/Packaging_and_labeling

food, medical and chemical products, some types of information are required by governments. Some packages and labels also are used for track and trace purposes. Most items include their serial and lot numbers on the packaging, and in the case of food products, medicine, and some chemicals the packaging often contains an expiry/best before date, usually in a shorthand form. Packages may indicate their material with a symbol.

e) **Marketing** – The packaging and labels can be used by marketers to encourage potential buyers to purchase the product. Package graphic design and physical design have been important and constantly evolving phenomenon for several decades. Marketing communication and graphic design are applied to the surface of the package. Most packaging is designed to reflect the brand's message and identity.

3.2.2 Corrugation Industry[4]:

Corrugated fiberboard is a paper-based material consisting of a fluted corrugated sheet and one or two flat linerboards. It is made on "flute lamination machines" or "corrugators" and is used in the manufacture of shipping containers and corrugated boxes. Corrugated fiberboard is sometimes called corrugated cardboard or corrugated paper. The corrugated paper can be used for manufacturing the boxes, which can be use later for packaging various materials. The corrugated box factories are increasing over the years. The aggregate corrugated factories are called corrugated industries.

3.2.3 Micro, Small and Medium Scale Industries[5]:

The definition of micro, small and medium scale industry is changing over the years. Recently, the Government of India has passed an Act in the year 2006 to promote the Micro, Small and Medium Enterprises in India. The Reserve Bank of India has given clear idea about the meaning MSME in India. The Government of India has enacted the Micro, Small and Medium Enterprises Development (MSMED)

[4]http://en.wikipedia.org/wiki/Corrugated_fiberboard

[5]http://www.rbi.org.in/scripts/FAQView.aspx?Id=84

Act, 2006 in terms of which the definition of micro, small and medium enterprises is as under:

(a) Enterprises Engaged in Production or Processing:

The Act has given clear guidelines for those enterprises which are engaged in the manufacture or production, processing or preservation of goods as specified below:

i) A micro enterprise is an enterprise where investment in plant and machinery does not exceed Rs. 25 lakh;

ii) A small enterprise is an enterprise where the investment in plant and machinery is more than Rs. 25 lakh but does not exceed Rs. 5 crore; and

iii) A medium enterprise is an enterprise where the investment in plant and machinery is more than Rs.5 crore but does not exceed Rs.10 crore.

(b) Enterprises Engages in Services

The Act also has given clear guidelines for such enterprises, which are engaged in providing or rendering of services and whose investment in equipment (original cost) excluding land and building and furniture, fittings and other items not directly related to the service rendered or as may be notified under the MSMED Act, 2006 are specified below.

i) A micro enterprise is an enterprise where the investment in equipment does not exceed Rs. 10 lakh;

ii) A small enterprise is an enterprise where the investment in equipment is more than Rs.10 lakh but does not exceed Rs. 2 crore; and

iii) A medium enterprise is an enterprise where the investment in equipment is more than Rs. 2 crore but does not exceed Rs. 5 crore.

Further the Act in association with the Reserve Bank of India, has guided the public sector banks to promote these enterprises. Public Sector banks have been advised to open at least one specialized branch in each district. The banks have been permitted to categorize their MSME general banking branches having 60% or more of their advances to MSME sector, as specialized MSME branches for providing better service to this sector as a whole. As per the policy package announced by the

Government of India for stepping up credit to MSME sector, the public sector banks will ensure specialized MSME branches in identified clusters/centres with preponderance of small enterprises to enable the entrepreneurs to have easy access to the bank credit and to equip bank personnel to develop requisite expertise. Though their core competence will be utilized for extending finance and other services to MSME sector, they will have operational flexibility to extend finance/render other services to other sectors/borrowers. The banks have been advised to put in place loan policies governing extension of credit facilities for the MSE sector duly approved by their Board of Directors. Banks have, however, been advised to sanction limits after proper appraisal of the genuine working capital requirements of the borrowers keeping in mind their business cycle and short term credit requirement.

The Ministry of MSME, Government of India and SIDBI set up the Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE) with a view to facilitate flow of credit to the MSE sector without the need for collaterals/ third party guarantees. The main objective of the scheme is that the lender should give importance to project viability and secure the credit facility purely on the primary security of the assets financed. The Credit Guarantee scheme (CGS) seeks to reassure the lender that, in the event of a MSE unit, which availed collateral- free credit facilities, fails to discharge its liabilities to the lender, the Guarantee Trust would make good the loss incurred by the lender up to 85 per cent of the outstanding amount in default.

The CGTMSE would provide cover for credit facility up to Rs. 100 lakh which have been extended by lending institutions without any collateral security and /or third party guarantees. A guarantee and annual service fee is charged by the CGTMSE to avail of the guarantee cover. Presently the guarantee fee and annual service charges are to be borne by the borrower. With a view to facilitating credit flow to the MSME sector and enhancing the comfort-level of the lending institutions, the credit rating of MSME units done by reputed credit rating agencies should be encouraged. Banks are advised to consider these ratings as per availability and wherever appropriate structure their rates of interest depending on the ratings assigned to the borrowing SME units.

3.3 Statement of Research Problem:

The Indian economy is growing with the growth various industries. As the manufacturing industries have greater potential to grow, there are other alternative industries which also have potential to grow. One of the most innovative and challenging industry is packaging industry. The packaging industry and its market is growing at remarkable rate.

"The packaging market in India seems set for the next level of growth. Strong favourable demographics aside, factors such as increasing disposable income levels, rising consumer awareness and demand for processed food, and the multinational giants taking rapid strides in the food, beverages, cosmetics & toiletries and pharmaceuticals space, are expected to be the key drivers of this growth story. These factors are forcing both packaging suppliers and end-user industry to shift from bulk packaging to retail, and unit-level and small-sized packaging. In addition, exploding organized retail growth and newly relaxed FDI investment norms in retail and other sectors, are well for packaging market in India"[6].

"Indian packaging industry is highly fragmented with a large number of small scale companies and a few large integrated players. According to one estimate, there are more than 22,000 registered packaging companies in India, more than 85 percent of which are small scale companies"[7]. "Indian packaging industry is valued at about US $ 13 billion (2012-13). The industry is expected to grow at 15 per cent (CAGR). India accounts only 2 to 3 per cent of global packaging market."[8]

Corrugated factories are major part of packaging industry. There has been increasing number of corrugated factories in India. This trend has promoted the packaging industry in India. According to a Report on Industry Review (2011), the increasing and expanding retail industry has raised the consumption of corrugated

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[6]Aranca Report (2012), The Assocham Packaging Summit, accessed http://www.aranca.com/downloads/special-reports/The-Aranca-Report-Packaging-Industry-A-Review.pdf

[7] Ibid

[8]4. Indian Packaging: changing Dynamics of Packaging Industry, A Report by Indian Brand Foundation http://www.ibef.org/download/Flexible_Packaging060112.pdf

boxes. The growth of the retailing industry has led to the growth of packaging industry, especially the corrugated industry in India. Most of the corrugated box plants are small and medium sized and have been located near the customers[9].

The industry is converting about 2 million tons of Kraft paper into corrugated boxes. Factories are spreadout in all parts of India, even in the remote industrially backward areas. This present scenario is already being challenged by the sweeping changes that are beginning to take shape. More and more in-line automatic plants are being set up, as corrugated box makers gear up to meet the new demands for high precision boxes with attractive graphics and large integrated production capacities"[10].

At present maximum products can be effectively packed in corrugated box. From small, fragile & delicate products like crockery, medicines, cosmetics & large products like washing machine, T.V, refrigerators to perishables like fruits & vegetable almost all products can be effectively & economically packed in corrugated boxes. Now a day corrugated boxes are required everywhere. Millions of tones of agricultural & industrial products are packed in cost effective & sturdy boxes for the purpose of transportation from factory to market. This industry also helps to increase the marketability & durability of agricultural product. Indirectly corrugated factories have helped in development of Agricultural industry.

Though these factories have provided huge employment and helps to development of Agro-Industries, there are many economic problems like scarcity of skilled labour, investment level and its returns and other related economics problems. In this study an attempt has been made to find out the economical and other problems of Corrugation factories and solution for the same.

3.4 Objectives of the Study:

The researcher has kept following objectives for the study.

i) To study the present status of Corrugation factories.

[9]A Report on Industry Review (2011), by The Federation of Corrugated Box Manufacturers (FCBM) http://www.fcbm.org/industry_overview.php

[10]A Report on Industry Review (2011), by The Federation of Corrugated Box Manufacturers (FCBM) http://www.fcbm.org/industry_overview.php

ii) To study the organizational structure of Corrugation factories.
iii) To study the labour problems of Corrugation factories.
iv) To find out economical problems of Corrugation factories.
v) To provide the solutions to the problems of Corrugation factories.

3.5 Importance of the Study:

The packaging industry is growing fastly at the same time it helps to economic development of Nation. Following points state the importance of the study.

i) This study will help to find out present status of corrugation factories.
ii) Corrugated factories have produced large employment opportunities.
iii) This study will help to find out economic problems of corrugated factories.
iv) This study will provide solutions to the economic problems of corrugated industry.

Corrugated packaging industry has provided huge employment and helps to development of trade. The researcher did not find any study on the development and problems of corrugated industry. Therefore, this study will help to know present status and problems of corrugated packaging industry.

3.6Hypothesis:

i) The financial strength regarding capital investment in corrugated industries is not satisfactory
ii) The corrugation industries have greater potential to grow
iii) The corrugation industry facing economical problems.

3.7 Methodology:

This research is based on primary data however secondary data will also be used for the research. The primary data has been collected through questionnaires. Extensive field survey has been conducted along with it, interviews & free discussion with selected respondents also has been conducted. In order to conduct the research, references will be taken from important Journals, Magazines, Materials, Periodicals, Reports, Booklets, News papers and through internet also. Secondary data has been

collected from 'Western India Corrugated Box Manufacturers Association', 'Indian Institute Of Packaging', and 'Federation of Corrugated Box Manufacturers of India', 'Asian Corrugated Case Association' etc. These are the Associations of Packaging Industry, which has published various information and data related to the packaging industry.

3.7.1 Universe of the Study and Sample Size

The researcher has selected Pune city and sub-urban area of Pune city on the basis of purposive sampling. At the pilot study, there are 300 corrugated packaging factories/units in the selected region. For the purpose of the study these are classified accordingly to the size and capital investment. Out of total industries (300 units) only 5 industries are large scale units (1.6 per cent of the total units). Hence the researcher has selected only small and medium size corrugated factories by neglecting the large units. Considering this classification, the researcher has used disproportionate sampling and has selected 30 per cent from small size and 15 per cent from medium size factories. Altogether, the researcher has selected 20 per cent of the total universe on the basis of systematic random sampling. Since the production method, machinery and labour size in each classified category is same; the researcher has treated these factories as homogeneous. Therefore, selected samples represent the whole universe. The sample size can be given as below (table 2.1)

Table No. 2.1

Sample Size

Sr. No.	Size of Unit	Total Universe	SelectedSample size	Percentage
1	Small size	100	30	30
2	Medium size	195	30	15.38
3	Large size	005	00 (00)	00
	Total	**300**	**60**	**20**

3.8 Data Collection and Analysis:

The collection of data is based on the primary source. The field work has been conducted by using questionnaire. Besides that, interviews also have been conducted. The Collected data has been analyses by different statistical methods like, Average, Mean, Mode, Median and Correlation.

3.9 Limitations of the Study:

The researcher has selected corrugation factories in and around Pune city. The exercise of collecting the data and analysis is incomplete without considering the limitations. The researcher has given following limitations of the study.

3.9.1 This research is more related to the problems of corrugation factories in the selected region. Therefore, other problems which were not in the focus of research have been neglected.

3.9.2 The research is based on the primary data, hence the information provided by the respondents has been assumed as true.

3.9.3 The research is restricted to Pune region only

3.9.4 Automatic plants have not been considered for the study

3.9.5 This study has considered the information of the five years.

3.10 Contribution of the Research to the Society:

This research is based on the corrugation factories and their problems. The researcher found that such research has not been done so far. Therefore, this research can give a contribution to the society and the field of literature as below-

3.10.1 This study will help to solve the problems of corrugated factories.

3.10.2 From the Government side, this study will be helpful for policy framing for the promotion of packaging industry in India.

3.10.3 This study will be helpful for the corrugation factories in the matter of pricing and costing.

3.10.4 This study will help to researcher for further study.

3.11 Chapter Scheme:

The whole thesis has been divided into following chapter scheme.

Chapter 1- This chapter is titled as the Introduction to Packaging Industry in India. This chapter explores the history of Packaging Industry, types of Packaging Industry and manufacturing process of Corrugated Boxes.

Chapter 2- This chapter is titled as Industrial Development in India. This chapter explores the general industrial development in India, which includes industries in ancient period, industries in modern period, Information and Technology industry, structural changes in industries in India etc.

Chapter 3- This chapter is titled as Research Methodology. This chapter explains the statement of research problem, objectives, hypothesis, sampling and methodology.

Chapter 4- This chapter is titled as Pune Profile: An Overview. This chapter includes socio-economic history, geographic location, general demographic profile, agriculture, industry and education.

Chapter 5- This chapter is titled as Review of Literature and Conceptual Framework. This chapter gives extensive review of literature and the conceptual framework to the research topic.

Chapter 6- This chapter is based on data analysis. This chapter has been analysed using questionnaire. The analysis has been carried with various variables.

Chapter 7- This chapter is titled as Findings and Conclusion.

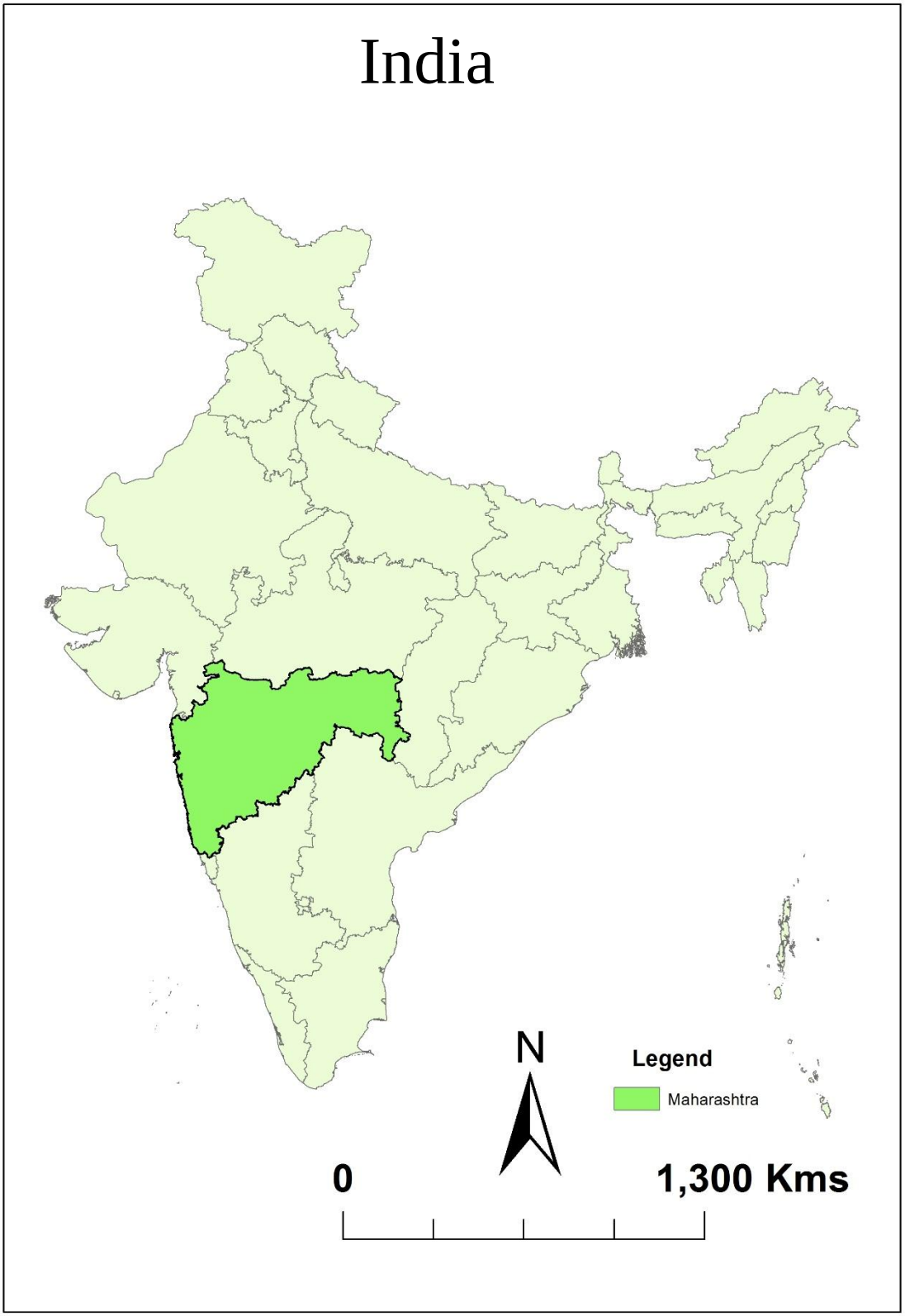
Chapter 8- This chapter explores the Recommendations

The researcher also has attached appendices after bibliography.

Appendix One- Questionnaire

Appendix Two- Selected Photographs of Corrugated Factories

Appendix Three- Costing, Quality and Maintenance Model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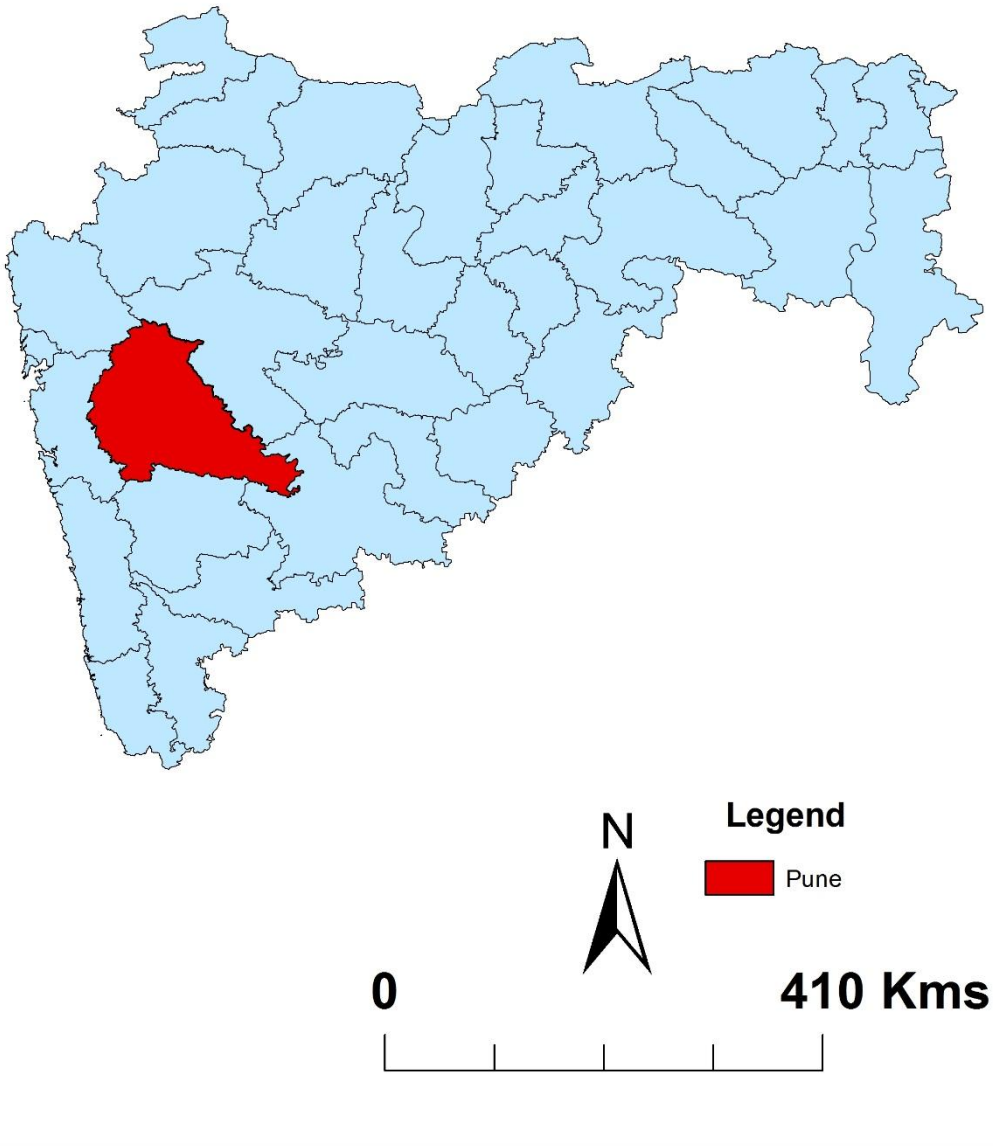
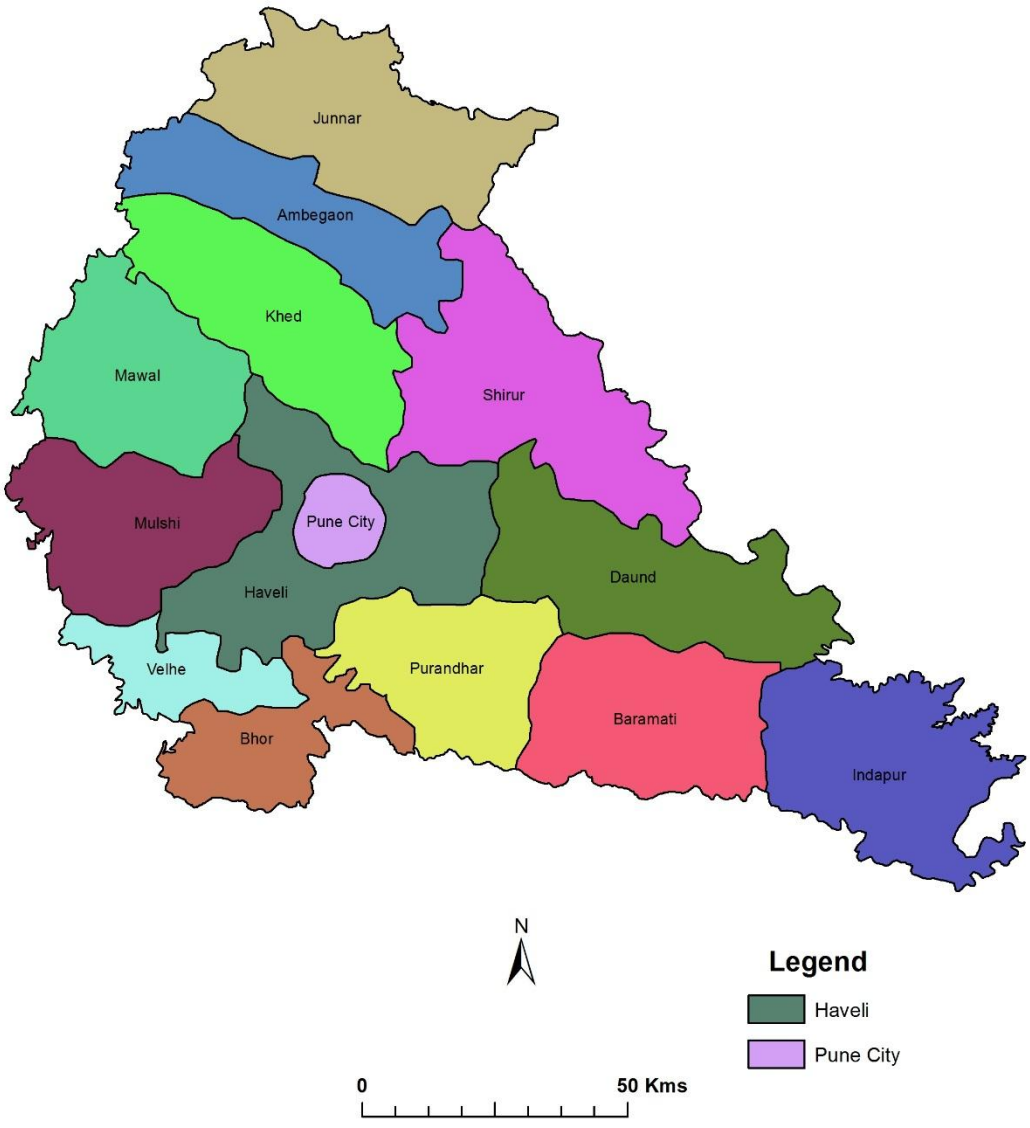


Pune District



CHAPTER IV

PUNE PROFILE: AN OVERVIEW

4.1 Introduction:

In order to understand the selected region profile, the researcher has given here the general setup of Pune city and nearby region. Pune city is located in the state of Maharashtra. Maharashtra is one of the 28 states that constitute the Union of India. It lies on the western coast of the Indian peninsula, almost in the centre of the country.

The State of Maharashtra can be divided into four physical regions –

(a) The coastal region (Konkan)

(b) The Sahyadri Mountains

(c) The plateau region and

(d) The Satpura Mountains and the Tapi-Purna Valley[1].

Pune lies in the plateau region.

The population of Maharashtra was 11,23,72,972 in 2011. The urban population increased from 28.22% in 1961 to 42.43% in 2001, thus making Maharashtra the second most urbanised state in India. (GoM 2010: 18). The literacy rates for males and females was 89.82% and 75.48%, thus giving an overall literacy rate of 82.91% in 2011[1].

Maharashtra's Gross State Domestic Product (GSDP) in 2009-10 at constant (2004- 05) prices was Rs. 7,01,550 crores, an increase of 8.7% over the previous year. The Gross State Domestic Product at current prices in 2009-10 was Rs. 9,01,330 cr. and the Net State Domestic Product at current prices was Rs. 8,17,891 cr. The per capita income of the state at current prices was Rs. 74,027 in 2009-10, the second highest among all states after Haryana. Maharashtra's contribution to the national economy is high. It contributed to 9.4% of the total population but accounted for nearly 25% of the gross value produced in India's industrial sector and 14.7% of India's Gross Domestic Product in 2009-10. The state has achieved high levels of industrialisation, demonstrated by the fact that the secondary and tertiary sectors provided 89.5% and agriculture and allied activities 10.5% of Maharashtra's GSDP in 2009-10 as compared to the national average of 65.4% contribution from the secondary and tertiary sectors[2].

[1] censusindia.gov.in-chapter6.pdf

[2] Government of Maharashtra (2011): *Economic Survey of Maharashtra 2010-11, p.20*

The state is divided into 6 divisions for administrative convenience. These divisions are further divided unto 35 districts and 355 tahsils. According to the 2001 Census, there were 378 urban centres in the state and 43,711 villages. Local Government Institutions (LGIs) play an important role in development at the local level in Maharashtra. They are classified into urban and rural, each having its own financial resources and its own responsibilities. There were 28,637 Local Government Institutions functioning in the state during 2009-10, of which there were 23 Municipal Corporations[3].

4.2 Socio-Economic History of Pune City:

The exact date of the establishment of Pune is not known, but its existence dates from ancient times. In Sanskrit references it is mentioned as Punyapur. It was also known as Punnaka (150 AD) and later as Poorna Nagar[4]. The earliest historical records in which there is a reference to Pune are two copper plates dating from the 8th century A.D., which show that the Rashtrakuta dynasty was then ruling over this area, then known as Punyavishaya orm Punakvishaya and the city itself is referred to as Punakawadi (DCOM 2007a :4). There is a theory that the original name of the city may have been Punyapur because it stood near the confluence of the Mutha and Mula rivers, since such places were regarded as holy. It is generally now agreed that the modern variant 'Pune' came into use as early at the 13th century when the small settlement was named Kasba Pune by its Arab commandant. Pune seems, in the beginning, to have been the headquarters of a region (vishaya) which was neither densely populated nor rich in agricultural resources. The location of the town seems to have been determined by the site of the ford on the Mutha River and its proximity to the fort of Kondana (later renamed as Sinhagad)[5].

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[3] Directorate of Census Operations, Maharashtra 2007: *Maharashtra Administrative Atlas,* Census of India 2001, Mumbai, p. 30

[4] Palande, P S (1981): *The Fiscal System and Problems of Municipal Corporations - A Case Study of the Finances of the Pune Municipal Corporation,* Ph.D. Thesis submitted to the Pune University, Pune, p.23

[5] Gadgil, D R (1952): *Poona - A Socio-Economic Survey Part II*, Publication No.25, Gokhale Institute of Politics and Economics, Pune, p.1

For the next eight hundred years, several different rulers ruled over this area which was consequently subjected to almost continuous warfare. During one such conflict in 1631, Pune was completely destroyed. Around the same time there was a severe drought in this area and the population moved away. In 1636, this area was given to Shahaji Bhosale by the then ruler of Bijapur and in 1637, his deputy Dadoji Konddev resettled the city which at that time consisted of four peths, the original nucleus called Kasba Peth and three new ones, Shaniwar, Somwar and Raviwar. Agriculture again started, trade and commerce also developed and soon Pune became the centre of the emerging Maratha Kingdom. Shivaji started his efforts at building an independent State from Pune around 1656 and the city remained a part of the Maratha Kingdom until 1818[6].

The economic life of Pune was not much developed till the Peshwa rule. The Peshwas, who were the administrators of the Maratha Empire, made Pune their capital. Naturally, there was a spurt in both economic activities and in the population. Trade was the major economic activity, especially trade in all kinds of luxury goods. However, the prosperity and growth of the city received a major setback with the fall of the Peshwas in 1818 when Pune came under British rule. By the 1840s, the city slowly revived with the establishment of the Cantonment, construction of a railway line and post office and the establishment of several schools and colleges such as the Deccan College and the Science College (presently College of Engineering) in 1865 and Fergusson College in 1885, making the city a centre for education. Most importantly, the first local government of the city, the Poona Municipal Council was established in 1858[7].

Till the end of the 19th century Pune was an important centre for education and also the centre of the freedom movement and of social reform due to the presence of Lokmanya Tilak and other reformers. During the early 20th century, the area of the city expanded considerably and some industries started, the first of which was Kirloskar Oil Engines Ltd. in 1946. Soon after independence, in 1950, the Pune Municipal Corporation was established as were several national level organisations like the National Chemical Laboratory and the Pune University. From the 1950s there

[6] Mangudkar, M.P. (1960): *Pune Nagarsanstha Shatabdi Grantha,* Pune Municipal Corporation, Pune, pp.23-24

[7] Gadgil, D R (1945) op.cit. pp. 16-18

was a rapid growth of industries, especially along the Pune- Mumbai Road. In 1962, industrial estates were set up by the Maharashtra Industrial Development Corporation (MIDC) at Bhosari, Pimpri and Chinchwad. Pune changed from an educational centre to an industrial hub with various kinds of industries locating in and around the city.

Pune has always been at the forefront of cultural activities. Several newspapers and magazines are being published from the pre-independence period and there are many excellent libraries. A large number of authors, musicians and other artists and several cultural organisations have enriched the city. Several Pune-based industrialists such as Kirloskar, Garware, Bajaj, etc., have spread their industrial empires throughout the world from this city. The people, institutions and industries in Pune have contributed towards the development of the country and hence Pune has achieved an important place in the economic development of India[8].

The area around Pune city is mainly agrarian. Therefore, Pune city is regarded as one of the most important market places for the trade of agricultural produce. The city is also considered an authentic market for the trade in food grains, clothes, leather goods, gold and silver etc., not only for the urban residents but also for the customers from the surrounding semi-urban area.

4.3 Pune District: Geographical Location

The city of Pune is located on the western margin of the Deccan Plateau at 18° 31' north latitude and 73° 51¢ east longitude, about 160 kms south-east of Mumbai. It lies on the leeward side of the Sahyadri range, 1850 feet above sea level. As seen in Map No. 3, the city lies around the banks of and the confluence of two rivers, the Mula and Mutha, which after joining are known as the Mula-Mutha. Two other rivers, the Pavana and the Indrayani flow through the north eastern outskirts of the Pune urban area. All these rivers are tributaries of the Bhima River. The city lies on an extensive plain, surrounded by hills on the east and south, from 1900 to 2300 feet high. The highest of these hills is the Sinhagad-Bhuleshwar range, which includes the

[8] Mahajan SG (2000): *Pune City : Its History, Growth and Development (750 to 1998 AD),* Mahajan Prakashan, Pune, p.34

Sinhagad Fort. The Sinhagad-Katraj-Dive Ghat range is the southern boundary of the urban area[9].

The climate of the city is mild. Average temperatures range between 11º C and 44º C. The southwest monsoons bring rain to this area between June and October. The average rainfall in Pune during this period varied between 661 mm. and 669 mm. per year. The variation in the rainfall can be observed, with rainfall much above the average in 1991, 2005 and 2006, and drought in 2000 and 2001[10].

Pune district is located in central-western Maharashtra. It is triangular in shape with its base along the 'Sahyadri' Mountains that run from north to south along its western boundary and its apex in its southeast corner. It is located between 17º 54' and 19º 24' North latitude and between 73º 19' and 75º 10' East longitude. It occupies an area of 15,643 sq. kms. on the western edge of the Deccan Plateau[11].

4.4 Population:

The very small growth in the population between 1901 and 1911 was due to five epidemics of plague in which 30,000 people died. The population of the Pune Municipal Corporation area showed a marginal fall in the 1931 census, but started growing steadily from 1931 onwards. With growth in the population of the two Cantonments as well, the population of Pune City as a whole grew continuously. During the 1940s, the population registered the highest growth rate so far both because there were no health problems and also due to the employment created by the establishment of several government offices, industries, research and educational institutions and defence establishments, attracting a large inflow of population from all parts of the country. Another important reason was the influx of refugees from Punjab and Sind provinces after the partition in 1947. Lastly, seven adjoining villages

[9] Gadgil, D R (1945): *Poona - A Socio-Economic Survey - Part I*, Publication No.12, Gokhale Institute of Politics and Economics, Pune, p.1

[10] Government of Maharashtra (2007): *Economic Survey of Maharashtra 2006- 2007,* Directorate of Economics and Statistics, Planning Department, Government of Maharashtra, Mumbai.

[11] Ibid, pp 4-10.

and Pune Suburban Municipal Committee were merged with the Pune city at the time of the formation of the Pune Municipal Corporation in 1950[12].

The Census of India has explored the population strength in various decades. The total population of Pune city in 1951 was 4.88 lac which finally increased to 31.24 lac in the year 2011. The overall increase in the population of the city has been a result of industrialization and urbanization. (See Table No. 4.1)

Table No. 4.1

Population Structure in Pune City

Census Year	Total Population (in Lac)	Total Decadal Change
1951	4.88	N.A.
1961	6.06,	1.18
1971	8.56	2.50
1981	12.03	3.47
1991	16.91	4.88
2001	25.38	8.47
2011	31.24	5.86

Source: Census of India 2001 and 2011

The population of Pune city as per Census 2001 is close to 25 lakhs. In the last 50 years, the city's population has grown by more than five times. The growth in population testifies to the vibrancy of its economic activity. India has a very young population with a median population age of 24 years; about 65% of the total population is less than 35 years old. Pune is also reflective of this demographic characteristic with the median age being closer to the national level. But, 62 percent of the total population is under the age of 30 years. In Pune, the 25-34 age group forms a larger proportion of the total population compared to that prevailing at the national level. It is estimated that about 50 percent of the population increase is on account of in-migration. This probably explains Pune's relatively larger share of

[12] Mangudkar M. P. (1960), op.cit. p. 31

population in the 25-34 age groups. The economic activity on the outskirts of the city, particularly in the Pimpri- Chinchwad region, has a direct impact on the city of Pune[13].

From the 1960s to the 1980s, growth of population can be mainly attributed to the rapid growth of industry in and around Pune. Even though many industrial units were located in Bhosari and Pimpri-Chinchwad, their employees chose to live in Pune city, thus contributing to a steady rise in population at over 35% per decade[14]. The fast growth of population after 1991 was primarily due to the even faster growth in the economy. The rapid expansion of the Information Technology industry and other service sector organizations and tremendous growth in the small scale industrial units caused large scale in-migration. During the period 1981 to 1991 about 3.1 lakh people migrated to the city, and this figure went up to 7.4 lakhs between 1991 and 2001. Migration accounted for about 13-20% of the population of the city. It was observed that about 50% of the growth in population was due to migration. It may be observed that between 1981 and 2001, the population in the two Cantonment areas has shown some decline, but this has been more than compensated by the growth of population in the PMC area, leading to overall growth in the population of the city, which has crossed 3 million in 2011[15].

The density of population as per the Census 2001 was 5,903 individuals per Sq. km. in the Pune Municipal Corporation area. The number of households within PMC limits was 555,771 at the time of the 2001 census. The 2001 Census estimated that the literacy rate of the population in Pune was 77%. The literacy rate for females was 72.2% and for males it was a little higher at 81.4% (ibid: 656). In 2011, the overall literacy rate for Pune was 82.07%, with 84.96% males and 79.00% females being literate (census2011.co.in a). The Pune Municipal Corporation has estimated that 3% of the population is directly or indirectly dependent on agriculture and 97% of the population is engaged in professional or business activities. Out of the working population, about 23% (2.25 lakh) individuals are employed in the Information Technology industry[16].

[13] Census of India, 2001 and 2011 (available on www.censusindia.com)

[14] Ibid p. 78

[15] Ibid

[16] Ibid

The area of the city continued to grow with the inclusion of more & more surrounding areas from time to time. In the post independence period the city experienced explosive growth as did the surrounding urban area. There was a large growth in the area of the city when the Corporation was formed in 1950 with the merging of the Poona Municipal Committee and the Poona Suburban Municipal Committee. By 1962, the area of the city had increased to 139.70 sq. kms. In 1983, the area was 146.11 sq. kms. The next large expansion of the limits of the city took place in 1997 with the inclusion of 38 fringe villages in the area of the Corporation. Consequently the area under the Corporation increased to 368.89 sq. kms. However, in 2001, fifteen villages were removed from the Corporation and the area came down to 243.84 sq. kms which has remained unchanged till the present[17].

In 2011, the population of the district was 9,426,959, a growth of 30.34% over 2001. The population density was 603 persons per sq. km. Literacy was 87.19% in 2011, with 92.72% males and 81.13% females being literate. Rural population was 39.11% and urban population was 60.89% in 2011[18].

4.4.1 Population Projection in Pune City[19]:

For the last four decades, the decadal growth rate in population has been in excess of 40%. It is projected that the population of Pune city will reach 56.57 lakhs by the time of the 2031 census. As of 2005, it is estimated that the total population is around 29.46 lakhs This implies that the population density for Pune will be over 23,000 per square kilometers by the year 2031compared to just over 12,000 in 2005.This may not look far-fetched as about 90% of the population is below the age of 50 and the city has a very young population with the median age being close to 24 years. A combination of the population pyramid tending to take the shape of a pillar and a large proportion of the current younger generation expected to start families within the next decade and half will probably result in the population figure reaching the projected level.

[17] Ibid pp. 6-7

[18] (census2011.co.in).

[19] Gokhale Report (2009-10), Demographic Projection for Pune Municipal Corporation, 2002-2027

4.5 Agriculture and Crops:

Wheat, rice, gram, jowar, bajra, sugarcane, groundnuts, chillies, pulses, vegetables, fruits and flowers are the major crops. Both rabi and kharif crops are grown since several parts of the district are well irrigated. Pune is one of the most industrialised districts of Maharashtra. Extensive industrialisation has been made possible because of the availability of road, rail and air transport. The important large-scale industries here are sugar, automobiles, packaging, pharmaceuticals, engineering goods, etc. Agricultural tools, pumps, plastic, electronics, etc. are the important small-scale industries. There are also several establishments of the central government that manufacture arms and ammunition[20].

4.6 Industries:

During the early twentieth century some industries started, the first of which was 'Kirloskar Oils Engines Ltd' in 1946. Several Pune based industrialists such as 'Kirloskar', 'Garware', 'Bajaj', 'Tata' etc. have spread their industrial empires throughout the world from this city. The process of industrialisation continued at a fast pace up to the 1980s. Most of the industries established during this period were manufacturing industries, with a concentration of engineering industry. From the 1990s, there was a fast growth of the Information Technology industry, which is largely non-polluting. The setting up of the IT Park at Hinjewadi in 1999 gave a fillip to the growth of the IT sector in Pune. At present, the industry in Pune is dominated by IT companies and the services sector which includes large numbers of doctors, lawyers, chartered accountants, tax consultants, etc.

Pune has now become a major industrial centre, with a number of heavy engineering industries such as the motor vehicle manufacturing plants for buses, cars and two-wheelers located in and around the city. Industries have located mainly in the direction of the Pune- Mumbai highway. This has not only enabled better transport of the manufactured goods to other parts of the country, but has also helped to avoid congestion in the centre of the city. The growth in the number of industries and in their turnover in Pune district between 1985 and 2007. Although there was a

[20] Directorate of Census Operations, Maharashtra (2007): *Maharashtra Administrative Atlas,* Census of India 2001, Mumbai. p.15

continuous growth in the number of industries (except in the early 1990s), rapid growth took place after the recession of 1997 - 2002 was over. During the recession, many large units cut workforce and reduced working hours, forcing many Small and Medium Enterprises (SMEs) to shut down. When the recovery started from 2002 onwards, the larger units stepped up production to meet the growing global demand and this had a definite multiplier effect on the SME growth. The investments made by the large manufacturers have grown at least four times between 2000 and 2007. The number of industrial units, their turnover and employment grew after 2002 as a result of this expansion[21].

The location pattern of these industrial units showed that over 12% of these industries are located within Pune city and over 70% units are located around the city in all directions, including Pimpri-Chinchwad and further along the Bombay- Pune road, Chakan, Hadapsar, Pirangut, etc.. The MCCIA report has observed that although a large number of industries are located outside the city, a majority of the employees live in the Pune Municipal Corporation area which has better amenities. Therefore, there is great demand for transport services (i.e., roads and vehicles) for both goods and passenger transport[22].

The IT and BT (Biotechnology) industries have emerged as the new driving force of the economy and have significantly grown by almost 26 times, from a turnover of Rs.250 crore to Rs.6,500 crore, between 2000 and 2008. The IT sector from Pune contributes to about 10% of national software exports. With over 600 IT companies and about 50 medium and 50 big BPO centres, besides many smaller ones, the IT sector, which is labour intensive like the SME sector, has generated a large number of new jobs, attracting people from all over the country, thus contributing to growth of population[23].

Most of the industries within Pune City limits fall in the category of engineering and allied activities. There were 12 large/medium industrial units and 876 small units in the PMC area in 2010. The city of Pune is an important a trading centre because of good communication, banking and other necessary facilities. The city has

[21] MCCIA (2008): *Profile and Analysis of Pune Manufacturing Inc., an Intelligence Report on the Growth of Pune Industries,* Mahratta Chamber of Commerce, Industries and Agriculture, Pune, p.128

[22] Ibid p.140

[23] Ibid p.27

good road and rail links to the rest of the country which has facilitated the growth of trading activities[24].

The Maharashtra Industrial Development Corporation (MIDC) has a strong presence in the district with large industrial estates at Bhosari, Pimpri Chinchwad, Baramati, Jejuri, Ranjangaon and Kurkumbh. In December 2008, there were 3785 factories under Factories Act, 1948, employing 2,05,002 workers[25].

4.7 Transportation:

The transport system in Pune is based on the broad principles laid down by the National Urban Transport Policy, such as: a) to accept that the majority of the citizens live in the central part of the city and to plan the transport system for their benefit; b) to make the city one of the best to live in and to make it an engine of growth in the 21st century and c) to develop the city in such a way that it supports the social and economic development taking place there.

The main objective of the transport policy is to provide the growing population with safe, economical, comfortable, reliable and standardized travel facilities for all their needs such as work, education, entertainment, etc.

Pune District is an important centre for education and health facilities. There are 911 bank branches throughout the district. Up to March 2009, 1792 villages had been electrified. The district administration implements various welfare schemes, especially for the tribal population. At the end of 2008, there were 311 kms of railway tracks and one airport in the district. The state government, Zilla Parishad, and local governments provide roads and maintain them. The total road length in the district at the end of 2005 was 13,949 kms, consisting of 397 kms of national highways, 1324 kms of state highways, 2948 kms of major district roads, 2582 kms of other district roads, 6698 kms of rural roads[26].

4.8 Administrative Setup:

Pune City is the district headquarters of Pune district. It is also a fully urban tahsil of Pune district. In Pune city, the statutory urban local bodies are the Pune

[24] Ibid. p.23

[25] Ibid p.11

[26] Ibid p.12

Municipal Corporation, Pune Cantonment and Khadki Cantonment. For administrative purposes the city is divided into 4 zones and 14 administrative divisions. The population of Pune city according to the 2011 census is 31,15, 431 and that of Pune Metropolitan Region is 50,49,968. The rapid growth in the population of Pune city area, which includes the Khadki Cantonment Board, the Pune Cantonment Board and Pune Municipal Corporation areas[27].

Pune is one of the 35 districts in the state of Maharashtra. The 2001 Census shows 1866 villages and 25 towns in the district. For administrative purposes the district is divided into 5 sub-divisions of Pune, Maval, Baramati, Junnar and Bhor. The 14 tahsils in the district are grouped into these 5 sub-divisions. The city of Pune is the headquarters of the Pune District[28].

4.9 Education:

Pune has been an important centre for education known as 'Oxford of East'. There are various reputed educational centre like Savitribai Phule Pune University, CA, CS, ICWA, Engineering, Medical, Computer, IT and so on. Besides these, there have been various deemed universities established in Pune. These educational institutes have been running various courses. There have been many excellent and update libraries established in Pune.

4.10 Conclusion:

This chapter explains the general setup of Pune city and region, which shows that the region is having good educational, economical and infrastructural position. The region is educational hub as well as industrial hub. The migration of labour from all parts of India is taking place in this region. Therefore, the availability of labour force is sufficient. The corrugated box industry is also located in Pune city and around the city. The industry is getting all the infrastructural benefits.

[27] (census2011.co.in a)

[28] Directorate of Census Operations, Maharashtra (2007): *Maharashtra Administrative Atlas,* Census of India 2001, Mumbai. P.6

CHAPTER V

REVIEW OF LITERATURE AND CONCEPTUAL FRAMEWORK

5.1 Introduction:

The packaging industry is new emerging area for research. The researcher did not find any research at university level (for Ph.D. or M.Phil.). Therefore, this research topic is very much new. However, the researcher found some reports on the packaging industry in general. In order to understand the general review of the topic, the selected reviews of reports have been given.

Das R. P. and Nath Vikas (2006)[1] have studied on "Green Packaging Practices of selected Indian Industries - An Empirical Study". This study is based on the data collected through a field survey. The study revealed that cardboard packaging followed by polythene packaging has emerged to be top most priority of the industries studied as far as packaging materials are concerned. The combination of the two got wider acceptance due to better durability being provided by the two packaging materials when used together. Majority of the Indian organizations do not consider the negative impact of packaging on environment. The study reveals that not much work is being done by business units in the field of green packaging.

Gupta Sunil (2006)[2] also has studied the packaging of Pharma products. The study concludes that even the Pharmaceutical products prescribed by doctors have a great influence of packaging and labeling on their prescribing behaviour. Packaging and labeling is an effective tool of marketing and helps the company establish its

[1] Das R P and Nath Vikas (2006). Green Packaging Practices of Selected Indian Industries- An Empirical Study, *Amity Management Analyst*, Vol. 1, No. 1, pp. 97-108.

[2] Gupta Sunil (2006). Impact of Package Appearance of Pharma Products on Customer, *International Journal of Management Science*, Vol. 2 No. 1, pp. 43-57

brand identity, brand recall and creates brand image which in turn helps the marketer in long run. One of the interesting issue which has revealed from the study is that the prices of the drugs are also the critical factor in prescribing any drug so it's very important to note that the cost of packaging and labeling of the drugs should not be so high that it diverts the prescription but the importance of packaging cannot be ruled out.

Srinivas Macha, Satya Narayan B, Pallavi Rao and Others (2012)[3] have studieds the Indian Packaging Industry, where the authors have gives the Indian companies and global trend of packaging industry. The Metal packaging, Glass Packaging, Paper Packaging and other forms of packaging are considered. The authors have opined that, Indian packaging industry is growing at alarming rate and has got great potential in the future. The authors have quoted that, "According to a 2011 analysis by Blaige & Company, more than half of the packaging sector's top 50 companies as of 2001, have undergone elimination or a change in the ownership. Additionally, on average, 20 percent of surviving companies have used M&A as a strategy, raising the total percentage of companies substantially involved in M&A activity to about 70 percent over the past decade. That signifies hectic activity in the sector over the past decade and the effects are evident. In the glass bottle segment for instance, from a highly fragmented industry in the 1980s, the industry now constitutes three major global players controlling nearly 90 percent of the industry. Top players have been consolidating the industry through aggressive acquisitions and divestitures. Indeed, in a survey of 279 leading global packaging industry executives, the research

[3] *Srinivas Macha, Satya Narayan B, Pallavi Rao and Others (2012), "Packaging Industry: A Review", An Aranca Report prepared for Assocham Summit 2012, (on http://www.aranca.com/downloads/special-reports/The-Aranca-Report-Packaging-Industry-A-Review.pdf)*

firm Canadean reported that the executives expect increased levels of consolidation, with 55 percent of respondents anticipating that there will be either a 'significant increase' or an 'increase' in merger and acquisition (M&A)". This report highlights the global trends in packaging industry considering major players operating at global level. This report does not explain the problems of corrugated industry.

Pearson Keith (2013)[4] has studied the market statistics and future trends in packaging industry. The author has considered the global market regarding the packaging industry. The author has opined that, western countries have giant share in packaging industry. The author quotes that, "the health of the packaging industry is linked to that of the world economy as a whole. However, reliant upon upstream industries for their raw materials, packaging converters have to cope with fluctuations in raw material prices, dependent upon levels of supply and demand. In a climate of low overall inflation, rising prices for raw materials (particularly plastic resin) have put something of a squeeze on converters. Downward pressure on prices is being exerted by brand owners and retailers alike – exacerbated by moves towards consolidation at all levels of the supply chain. In addition, moves towards central purchasing by packaging buyers have also impacted upon packaging margins. The growing use of ecommerce and reverse auctions has made the whole business of materials sourcing (especially in commodity areas) much simpler, promoting cost efficiency for users of consumables. These pressures are very much useful to the mature markets in Western Europe, Japan and North America, and have led in some instances to near zero growth in packaging consumption in the developed world. However, even here there remain opportunities for growth driven by increasing

[4] Pearson Keith (2013), "Market Statistics and Future Trends in Global Packaging", World Packaging Organization, New York
(on www.worldpackaging.org/i4a/doclibrary/getfile.cfm?doc_id=7)

consumption of packaged rather than unpackaged food as well as general growth across a range of consumer goods areas. At the same time, rapid growth in packaging usage in the fast-growing economies of Asia and also eastern Europe has presented new opportunities for packaging suppliers, although the inherent risks of a high degree of exposure to emerging markets must be taken into account, especially given the experience of markets in South America during recent years". The author has thrown any light on Indian packaging industry. The corrugated industry is not a part of this report. Therefore, this research would be an addition to the field of literature.

The Noble Printing Press (2013)[5] also has prepared a report on packaging industry in India. The report highlights all types of packaging industry in India. The report describes the packaging industry in brief. The reports also has highlighted the corrugated packaging industry. The reports quotes as "A flourishing organised retail have raised the expectations that consumption of corrugated packaging will begin to expand again as the number and volume of goods packaged in corrugated increases. MNCs are demanding corrugated boxes of international standards and the pattern of buying the packaging is changing. Prices of corrugated sheet and converted boxes have remained low due to the over-capacity, manual operations and low productivity. Besides, transport constraints and high freight costs have meant that small to medium sized corrugated box plants are located near the customers. The over 4,000 corrugated board and sheet plants are highly labor intensive, employing over half a million people – both directly and indirectly. The industry is converting about 2 million tons of Kraft paper into corrugated boxes. Factories are spread out in all parts of India, even in the remote industrially backward areas. This present scenario is already being

[5] Report on Packaging Industry in India (2013),
on http://www.nobleprinting.com/pdf/report_on_packaging_industry_in_india.pdf

challenged by the sweeping changes that are beginning to take shape. More and more in-line automatic plants are being set up, as corrugated box makers gear up to meet the new demands for high precision boxes with attractive graphics and large integrated production capacities. Inline Automatic Board and Box making plants will ease out the present semi automatic production processes". This report to some extent describes the corrugated industry in India. But the report does not describe the micro level factories and their problems.

Indian Brand Equity Foundation (2013)[6] has studied the Indian packaging industry and have a report on "Flexible Packaging: Changing Dynamics of Packaging Market". The report highlights in brief the growing market of packaging products. The report has concluded that, the potential growth of Indian packaging industry is high and hence need to plan. According to the report, the Indian packaging industry is becoming technological oriented in the recent years to get a share in the global market. However, the Indian packaging industry is highly fragmented and is being operated by small operated at large.

Mehta A.S. (2013)[7] has studied the Indian paper industry in sustainability and growth approach. According to the author the paper industry is growing at alarming rate with taking care of sustainability. The challenge of growth v/s environment could be seen in paper industry. However, in the recent years the sustainability of environment is maintained by the paper industry.

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[6] Indian Brand Equity Foundation (2013), A Report on "Flexible Packaging: Changing Dynamics of Packaging Market"
(available on http://www.ibef.org/download/Flexible_Packaging060112.pdf)

[7] Mehta A.S. (2013), Indian Paper Industry: Sustainability and Growth, Paper Mart- A Bimonthly Journal, April-May, 2013, Vol. 14, No.1, pp.8-11

Sharma Anant (2012)[8] has explained the corrugated paper industry with automation. According to the author the automation of corrugated industry would bring high rate of profit. For this the author has referred the neighbouring countries as 'Sri Lanka' and 'China'. According to the author, these neighbouring countries have captured the global market in the recent time. Hence, the author suggests promoting the automation in the corrugated paper industry.

The researcher has gone through various university libraries and found that, there is no research on corrugated paper industry. The researcher found only the articles and reports, which has thrown light on overall industry. The corrugated paper industry is not specifically studied. Therefore, the research topic "Economic Problems of Corrugated Industry" is new and would bring contribution to the field of literature.

5.2 Conceptual Framework:

The study of corrugated industry is a part of packaging industry. Therefore, the relevant concepts regarding industrial economics have been given here. The intention of the researcher is to give the conceptual framework to the research topic.

The core of any economic activity, whether it is consumption or production or anything else, is to strive for the maximum possible efficiency. The term 'efficiency' or 'performance' being so important is to be defined and understood properly[9]. The

[8] Sharma Anant (2012), There is a Money in Glue, The Corrugator, Bimonthly Journal, July-September, 2012, FCBM, Bangalore pp.

[9] Barthwal R.R. (2000) (2nd edition), Industrial Economics, New Age International (P) Ltd, New Delhi p. 12

productive efficiency has been defined by Farell M.J.(1957)[10] in terms of two main components: technical efficiency and factor price efficiency.

The emphasis on the productive efficiency in business is only a partial requirement. In practice, a firm may look for something more than merely minimum cost of production. A broader concept that takes care of productive efficiency as well as other things is the economic efficiency which may also be called 'business efficiency' from the firm's point of view [11]. In the case of an individual consumer, we may take it as utility maximization and similarly, in the context of firm, it is to be interpreted as maximization of the goal or objective chosen by it. The goal of the firm may be either:

i. profit maximization;
ii. sales maximization;
iii. maximization of the growth rate;
iv. maximization of the value of the firm;
v. earning some satisfactory level of profit;
vi. survival in the business for long period; or any combination of them[12].

Cyert and March (1963)[13] analyzed the process of the goals formation, coalition formation and decision-making in the firm through bargaining, inducement and side payments etc. They listed five goals in an arbitrary order which according to

[10] Farell M.J. (1957), The Measurement of Productive Efficiency, J.R.S.S., Publication p. 352, cited in Barthwal R.R. (2000) op.cit. p.12

[11] Amely L.R. (1969), The efficiency of Business Enterprises, George Allen and Unwin, London

[12] Barthwal R.R. (2000) op.cit. p.15

[13] Cyert Richard and March James (1963), A Behavioural Theory of the Firm, Prentice-Hall Publication, London

them represent the main operational objectives of the organization and which must be satisfied. The goals are-

i. production goal;
ii. inventory goal;
iii. sales goal;
iv. market share goal;
v. profit goal.

The innovation is most important part in the determination of profitability of a firm. Innovation promotes the technology which further promotes cost reduction at considerable rate. The firm gets technological benefits from innovation. Schon D.A. (1967)[14] has pointed out that, "any tool or technique, any product or process, any physical equipment or method of doing or making, by which human capability is extended". Whereas, Schumpeter J.A (1947)[15] has stated that, "by exploiting an invention or more generally, an untried technological possibility, by opening up a new source of supply of materials or a new outlet for products by reorganizing an industry, and so on".

The efficiency and the size of the firm are most related in terms of costing. "It has been frequently argued that larger firms in an industry are more efficient than the smaller ones. If this is not so, then why does a firm aspire to be large and larger; and if this is so, then how do smaller and larger firm exist together in the same industry?"[16]. Logically, the size of the firm should be 'optimum'. In this regards,

[14] Schon D.A. (1967), Technology and Change, Oxford University Press, London p.1

[15] Schumpeter J.A. (1947), Capitalism, Socialism and Democracy, Unwin University Books, London p.132

[16] Barthwal R.R. (2000), op.cit. p.154

Robinson E.A.G. (1958)[17] has argued that, "by 'optimum firm' we mean a firm operating at that scale at which is existing conditions of techniques and organizing capacity it has the lowest average cost of production per unit, when all those costs which must be covered in the long are included". However, there are different obstacles in determining the optimum size of firm. The author also opined that, there is a relation between optimum firm size and profitability.

The growth of firm depends on various factors. Some authors have opined in their own views. In this regard Downie J (1958)[18], Penrose E. (1959)[19] and Morris Robin (1964)[20] have given their thoughts.

Downie J (1958) was mainly concerned with analyzing the way in which alternative forms of market structure and conventions governing business behavior, which he calls as 'rules of the game', affect the dispersion of efficiency between firms and the rate of technical progress. His theory of the growth of the firm is a by-product of this analysis. According to him, in an industry, which he defined as a group of firms having similarity of technical process, there will be a dispersion of efficiency across the firms. The technological superiority of a firm is established as a result of its past innovations which are patented or kept secret by it, and the accumulated skill or experience gained by the firm in its activities. Finally the author argues that, the

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[17] Robinson E.A.G. (1958), The Structure of Competitive Industry, p.1 Cited in Barthwal R.R. (2000) op.cit.

[18] Downie J. (1958), The Competitive Process, Duckworth Publication, London, ch.8

[19] Penrose E. (1959), The Theory of the Growth of the Firm, Blackwell Publisher, London, pp.20-29

[20] Marris Robin (1964), The Economic Theory of Managerial Capitalism, Mac Millan Publisher, London ch.2

means of growth are capacity of production and customers. To expand capacity, finance is needed which may be raised either internally or externally. In both the situation the access to finance depends on the rate of profit.

Penrose E. (1959) has stated different approach over the growth of the firm. According to her, a desire to increase total long-run profits is the goal for the firm. To achieve this objective, the firm continues to make investment as long as it gets positive return from that. Penrose considers the firm as a pool of productive resources organized within an administrative framework. Therefore, it is deliberate and conscious choice of the management.

Marris Robin (1964) has given theory, which is applicable to a corporate firm owned by shareholders but controlled by managers, shareholders. The return of shareholders' investment is realized in the form dividend and capital gains throughout the life of the firm. Higher the expectation of the earnings by shareholders from a firm, greater will be its value in stock market and vice-versa.

Thus many authors have explored the relationship between the profit and growth, profitability and innovation, profitability and market structure etc. The researcher has extracted relevant theoretical framework applicable to the research topic.

5.3 Conclusion:

The researcher was gone through various sources of data and found no research on packaging industry, especially corrugation industry. Even the researcher did not find any research based books on packaging industry. However, there are number of reports and surveys on overall packaging industry. The researcher has gone through the literature review of selected reports and articles on packaging industry

and corrugation industry. Finally found that, there is no research on corrugation industry as per the knowledge of researcher. Therefore, the research topic selected for doctor of philosophy is new and likely to have contribution in the field of packaging industry.

The researcher also has gone through selected conceptual framework, where the profitability, size of the firm, innovation and pricing are very relevant factors. The researcher has used this framework to give an idea of existed structure of market in the corrugation industry.

CHAPTER VI
DATA ANALYSIS

6.1 Introduction:

Corrugated factories are major part of packaging industry. There has been increasing number of corrugated factories in India. This trend has promoted the packaging industry in India. The progress of Indian economy and a rapid expansion of organized retail industry have raised the expectations that consumption of corrugated packaging will begin to expand again as the number and volume of goods packaged in corrugated increases. Indian corrugation industries have grown in tremendous rate. The Multinational Corporations are also demanding corrugated boxes of international standards and the pattern of buying the packaging is changing. Besides, transport constraints and high freight costs have meant that small to medium sized corrugated box plants are located near the customers. The corrugated factories or plants are highly labour-intensive. Factories are spread out in all parts of India, even in the remote industrially backward areas.

The corrugated factories also have been existed or located in Pune city and around 'Pune' city. The factories are playing important role in providing packaging materials to various industries. The researcher has selected Pune city and sub-urban area of Pune city on the basis of purposive sampling. At the pilot study, there are 300 corrugated packaging factories/units in the selected region. For the purpose of the study these are classified accordingly to the size and capital investment. Out of total industries (300 units) only 5 industries are large scale units 1.6 per cent of the total units) Hence, the researcher has selected only small and medium size corrugated factories by neglecting the large units. Considering this classification, the researcher has used disproportionate sampling and has selected 30 per cent from small size and 15.38 per cent from medium size factories. Altogether, the researcher has selected 20 per cent of the total universe on the basis of systematic random sampling. Since the production method, machinery and labour size in each classified category is same; the researcher has treated these factories as homogeneous. Therefore, selected samples represent the whole universe.

In general, this is the study of selected corrugated factories and the researcher has given analysis to the economic problems of corrugated industry. The proprietors

and the workers have main role in the process of production. The researcher had dealt with selected variables to explore the overall position of corrugated industry in Pune region. This region has been hub for the location of packaging industries, especially for corrugated factories. Therefore, the researcher has selected this. The proprietors' point of view and workers' point of view both are important in the operation of factory. However, the researcher has considered proprietors' point of view and the position of corrugated factory. The workers' side is not considered in the analysis, since the objective of the study is to explore the economic problems of corrugated factories. The present study has analyzed the corrugation factories in the selected region with respect various economic indicators. The economic variables as the type of firm, absenteeism and various economic problems of corrugated factories as technological problem, competition problem, workers' problem, marketing problem, raw material problem, how to decide cost etc. The whole analysis is as follows.

6.2 Data Analysis:

The researcher has considered various variables in the analyses. The main objective of the study is to draw the economic problems of corrugation industry with respect to selected factories. Therefore, selected variables have been used to explore the overall picture of corrugation industry located in the selected area. The researcher has given data analysis with selected variables as below.

6.2.1 Educational Position of Proprietors:

The role of proprietors in the industry is very important. The vital role played by the proprietors brings the industry or factory to a viable position. Therefore, the researcher has given an analysis to the educational background of proprietors of corrugation factories. Education is the main factor to promote the human resource development. The educational position among the proprietors of corrugation factories is satisfactory.

Table No. 6.1 and Chart No. 6.1 explains the educational position of proprietors. Out of 60 proprietors, 54 proprietors (90 per cent) were graduate, which shows that educational background of the proprietors was rich. Among these, majority of them (38 proprietors) were commerce graduates. Remaining 6 proprietors (10 per

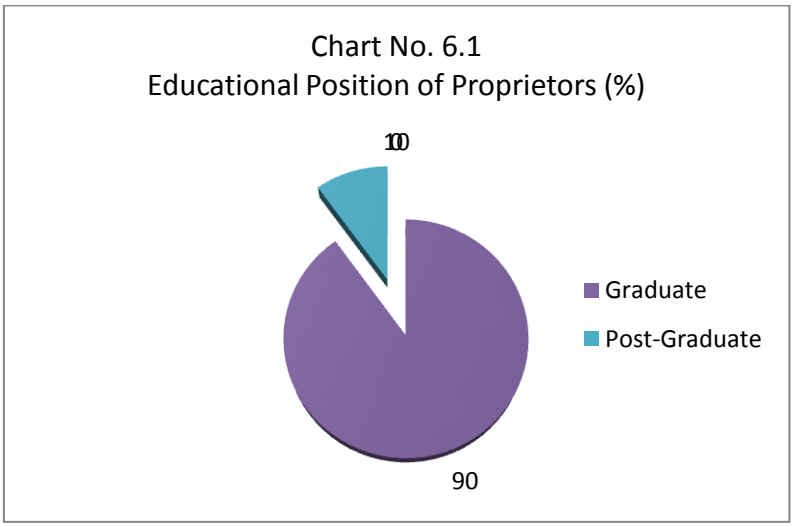
cent) were post-graduate. Out of them, 4 proprietors were holding a degree of 'Post-Graduate Diploma in Business Management' (PGDBM). This shows that, corrugation industry proprietors had high educational background. Since, the corrugation industry is more challenging and needs proper technical training; the proprietor must have educationally better position. The educational background has helped the proprietors to understand the production process, pricing methods and marketing methods. The corrugation industry is newly established in the industrial field and hence the corrugation factories in the selected area also have been established before 13 years (on an average). This new phase of time and industry has attracted educated people in the industry.

Table No. 6.1

Educational Position of Proprietors

Educational Level	No. of Proprietors	% of Total
S.S.C.	00	00
H.S.C.	00	00
Graduate	54	90
Post-Graduate	06	10
Total	60	100

Source: Field Survey



6.2.2 Age Structure of Proprietors of Corrugation Factories:

The age structure of a group helps to explain the level of productivity and application of innovation in an industry. The age structure of proprietors of corrugation factories indicates that, majority of them fall at the middle of the life age. Table 6.2 and Chart 6.2 gave the age structure of proprietors. Out of selected proprietors, 3 proprietors (5 per cent of the total) are falling in the age between 20 to 25 years. These proprietors have established their factories recently. 12 proprietors (20 per cent of the total) are of age between 26 to 30 years. This means, 15 proprietors (25 per cent of the total) are between the ages of 20 to 30 years. For the proprietorship, this age is considered as young. The expansions of market and challenges in the industry have attracted these young proprietors in the corrugation factory field.

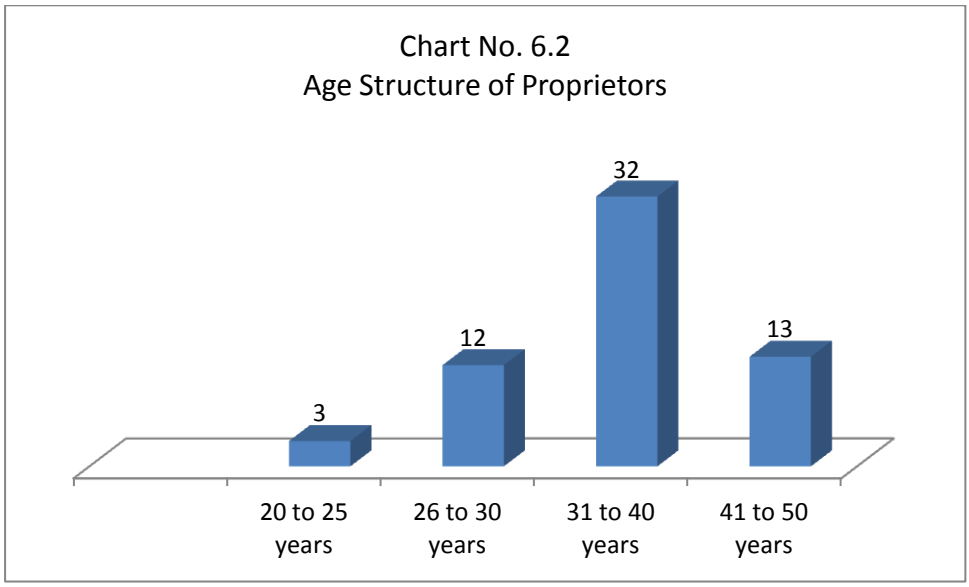
Majority of the selected proprietors, i.e. 32 of the proprietors (53 per cent of the total) are between the ages of 31 to 40 years. This can be stated as the middle age of the life. Most of the factories established before 10 years are from this age structure. As a whole, large majority of the proprietors i.e. 47 proprietors (or 78 per cent of the proprietors) are between the ages of 20 to 40 years. Remaining 13 proprietors (22 per cent of the total) are falling between the ages of 41 to 50 years. None of the proprietors were above the 51 years. This age structure is helpful for the application of innovation in corrugation factories.

Table No. 6.2

Age Structure of Proprietors

Age Category	No. of Proprietors	% of Total
20 to 25 years	03	05
26 to 30 years	12	20
31 to 40 years	32	53
41 to 50 years	13	22
Total	60	100

Source: Field Survey



6.2.3 Gender Structure of Proprietors:

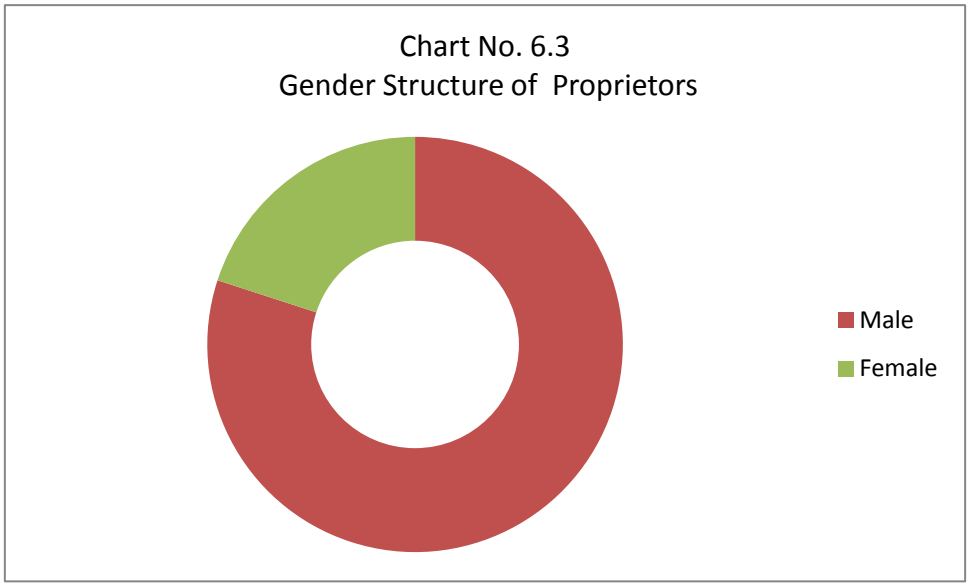
Gender structure in the economy is more traditional, especially in Indian economy. Indian society is male dominant hence this domination can be stressed in almost all sectors of economy. Even in case of industrial sector, this could be seen. In the corrugation factories, the gender structure of the proprietors is similar to this trend. However, there is a hope for the females in the recent time. Table No. 6.3 and Chart No. 6.3 have showed this structure clearly. Out of the selected proprietors, 48 proprietors (80 per cent of the total) are males whereas, 12 proprietors (20 per cent of the total) are females. This gender structure shows that, there is an insignificant share of females in the proprietors of corrugation factories. However, the practice is something different. The factories had been registered in the name of females, whereas these factories were being operated by the males (or husbands). This practice of gender structure again supports the traditional structure of Indian society.

Table No. 6.3

Gender Structure of Proprietors

Gender	No. of Proprietors	% of Total
Male	48	80
Female	12	20
Total	60	100

Source: Field Survey



6.2.4 Membership Structure of Proprietors:

The membership of parent associations is also an effective factor in the promotion of market and industry. There are various associations operating at district, state and national level. These associations help the corrugation factories in case of technical and market matters. Therefore, the selected corrugation factories have become member of these associations. Table No. 6.4 and Chart No. 6.4 have explored the membership structure of the proprietors of corrugation factories. At the regional level (Pune District), there is anassociation named 'Pune Deccan Division' (PDD). All the selected proprietors (100 per cent of the proprietors) are the member of this association. The association operates at Pune regional level; therefore all the proprietors have accepted the membership. Some of the proprietors also have become the member of other parent association along with the 'PDD'. 48 proprietors (80 per cent of the total) are member of two associations, namely 'Pune Deccan Division' and 'WICMA'. 38 proprietors (63 per cent of the total) are the members of three parent associations namely, ''Pune Deccan Division' (PDD), 'Western India Corrugated Box Manufacturers Association' (WICMA) and 'Indian Institute of Packaging' (IIP). Whereas 32 proprietors (53 per cent of the total) are the members of four associations namely, '''Pune Deccan Division' (PDD), 'Western India Corrugated Box Manufacturers Association' (WICMA), 'Indian Institute of Packaging' (IIP) and 'Federation of Corrugated Box Manufacturers' (FCBM). These associations are playing role of guide to corrugation factories for the promotion of their business. Some of the associations are publishing journals on corrugation industry, which is giving them market information. Some of the associations also arrange annual discussion on corrugation industries. These discussions are held in the conferences. Hence, these associations are most important for the proprietors of corrugated factories.

Table No. 6.4

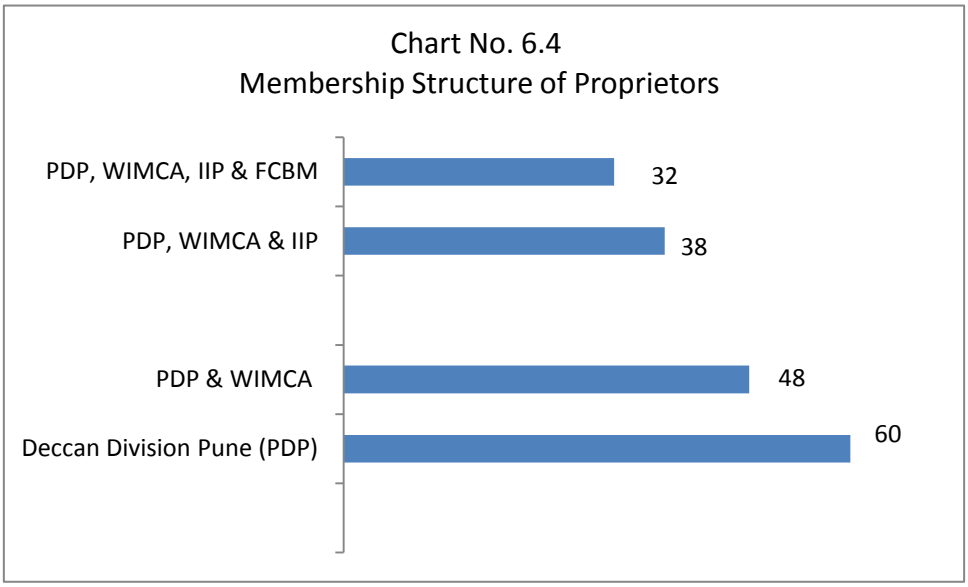
Membership Structure of Proprietors

Name of Parent Factories	No. of Proprietors	% (to total in each)
Pune Deccan Division (PDD)	60	100
PDD& WICMA	48	80
PDD, WICMA & IIP	38	63
PDD, WICMA, IIP & FCBM	32	53

Source: Field Survey

Chart No. 6.4

Membership Structure of Proprietors



6.2.5 Type of Business of Corrugation Factories:

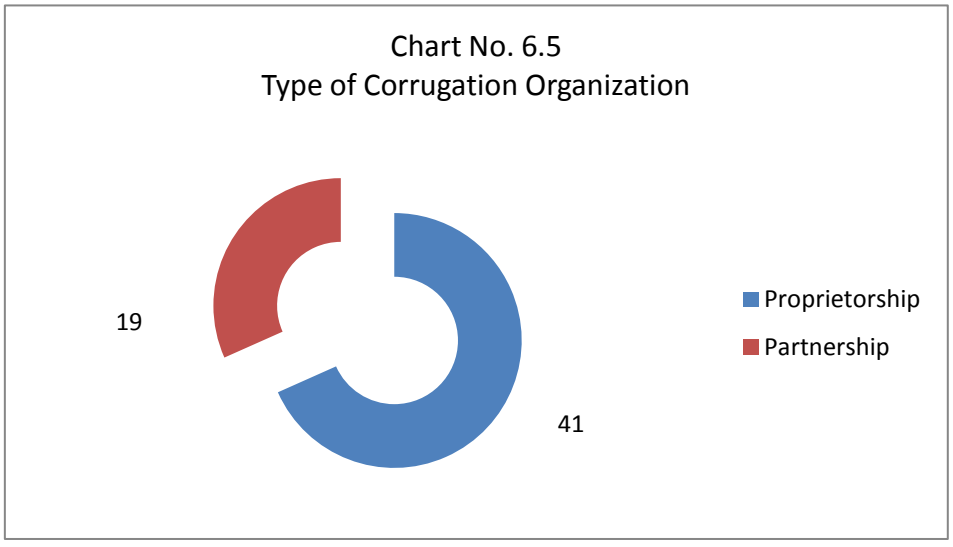
The researcher also has analyzedthe type of business of corrugation factories in the selected region.Table No. 6.5 and Chart No. 6.5 indicates that, the majority of the corrugation factories (41 corrugation factories or 68 per cent of the total) are 'proprietorship' firm. These firms are being operated by single owner. The 'proprietorship' firm is most popular in the small and medium scale operators. Whereas remaining 19 factories (32 per cent of the totals) are 'partnership' firm. None of the factory was either private limited or public limited company. This shows that, the corrugation factories are being operated at local level with its limited focus.

Table No. 6.5

Type of Business of Corrugation Factories

Category of Firm	No. of Corrugation Firm	% of Total
Proprietorship	41	68
Partnership	19	32
Private Ltd.	00	00
Public Ltd.	00	00
Total	60	100

Source: Field Survey



6.2.6 Nature of Corrugation Factories:

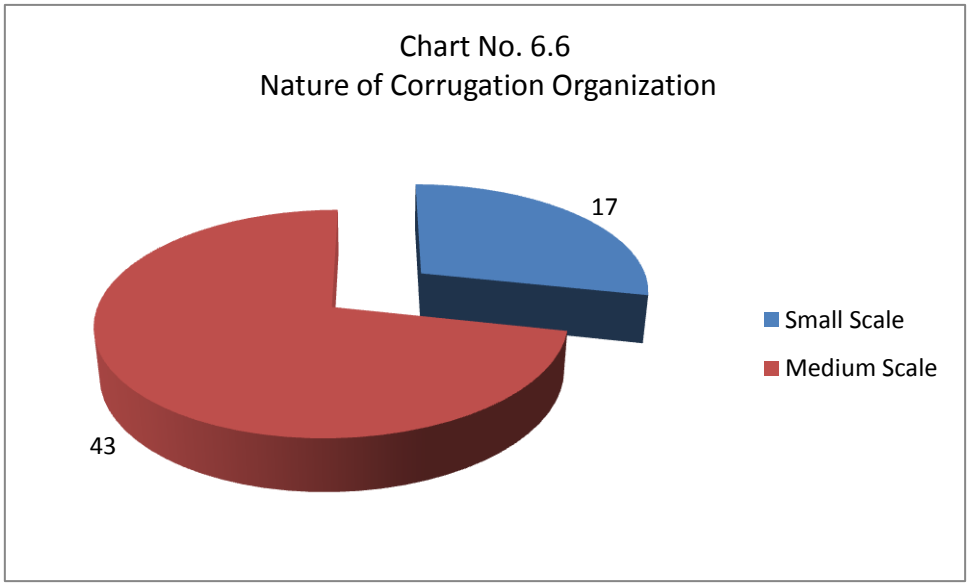
The packaging industry is growing in India and in many regions of India. Various reports have pointed out the growth of packaging industry. However, these reports also have pointed out that packaging industry is being operatedby small and medium operators. The researcher also found similar trend in the selected region. Table No. 6.6 and Chart No. 6.6 indicates that 43 operators or corrugated factories (72 per cent of the total) are registered and working as medium scale industries. Whereas remaining 17 proprietors (28 per cent) have registered their factories as small scale industries. This is nothing but, all the corrugated factories are registered as small and medium scale operators.

Table No. 6.6

Nature of Corrugation Factories

Nature of Corrugated Firms	No. of Corrugation Firms	% of Total
Small Scale	17	28
Medium Scale	43	72
Total	60	100

Source: Field Survey



6.2.7 Structure of Workers in Corrugation Factories:

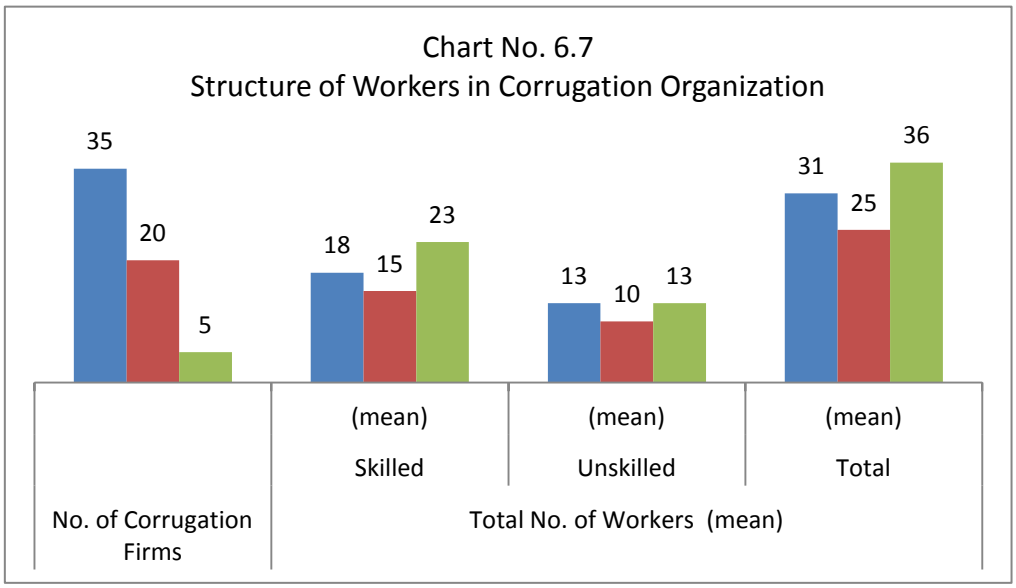
The workers are most important part of production process in every factory. The education and skill of workers determine the profitability of an industry or factory. The workers required for various industries are essentially should have technical skill. The corrugate factories in selected region are equally important and similar in this case. However, there is requirement of unskilled workers also. The unskilled worker means lack of technical training. Table No. 6.7 and Chart 6.7 has explained this. Altogether the average size of workers in selected corrugated factory is 29. Minimum number of actual workers was 25 whereas maximum number of workers was 36. Out of selected corrugated factories, 35 corrugated factories had on an average 31 workers, 20 corrugated factories had 25 workers and remaining 5 factories had 36 workers. The workers had technically skilled and unskilled qualities. On average, among the total workers around 70 per cent of the workers were skilled. This shows that, there was requirement of technical skilled workers. In case of medium scale corrugated factories (5 factories), the size of skilled workers (23 workers) was greater than unskilled worker (13 workers). In case of other corrugated factories also the skilled workers were higher as compared to the unskilled workers.

Table No. 6.7

Structure of Workers in Corrugation Factories

No. of Corrugation Firms	Total No. of Workers (mean)		
	Skilled (mean)	Unskilled (mean)	Total (mean)
35	18	13	31
20	15	10	25
05	23	13	36

Source: Field Survey



6.2.8 Occupational Position of Workers in Corrugation Factories:

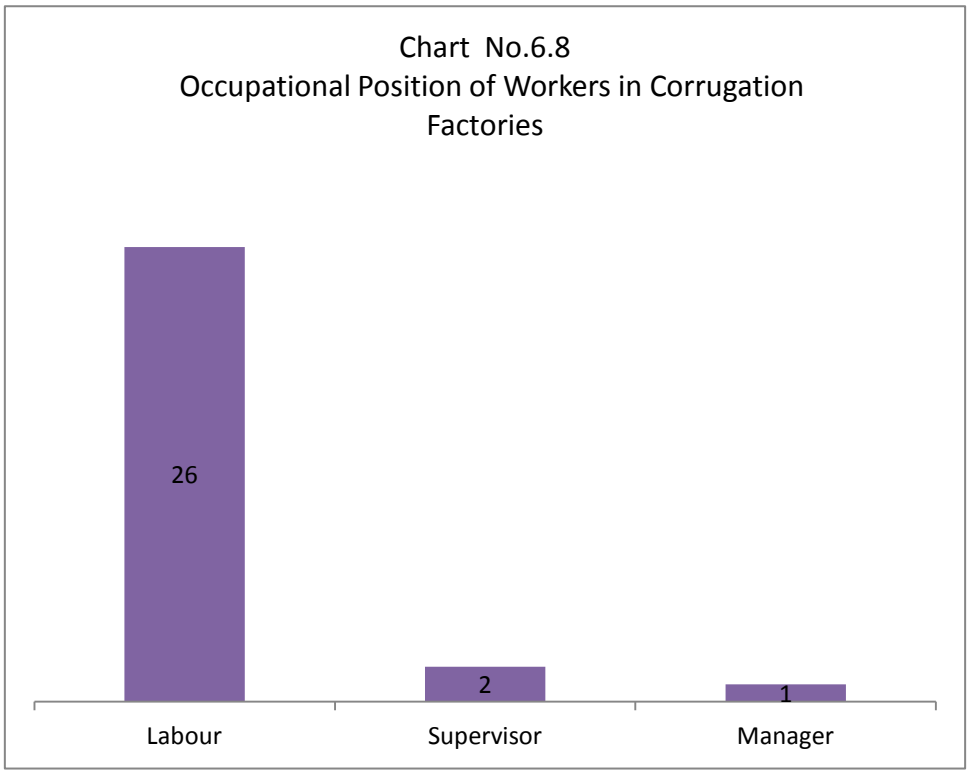
The occupational position of the workers depends on their education and skill. The occupational status also determines the wage level. The occupational segregation in an industry is natural and obvious. The workers in the selected corrugated factories had various occupational positions. Table No. 6.8 and Chart No. 6.8 indicate that the occupational level in the corrugation factories was very simple. Since the size of firm was small and medium, the occupational level was simple. There was no complex segregation of occupations. The occupational positions were divided into three categories. They were- 'labour occupation', 'supervisor occupation' and 'manager occupation'. Majority of the workforce was belonging to labour force. On average 26 workers was belonging to labour occupation, whereas on average 2 workers were belonging to supervisor occupation. There was only one manager in single firm. The manager was appointed in that firm, where the annual turnover of corrugation business was comparatively higher. In case of rest of all the corrugated factories, the job of manager was being done by the owner himself. These firms cannot afford to appoint the manager since the size of the firm is small. This shows that, as the firm size is bigger the occupational specialization would be more. The corrugation factories were being operated at small size and limited market, which kept the occupational structure simple.

Table No. 6.8

Occupational Position of Workers in Corrugation Factories

Occupational Level	No. of Workers (mean)
Labour	26
Supervisor	02
Manager	01

Source: Field Survey



6.2.9 Nature of Shifts in Corrugation Factories:

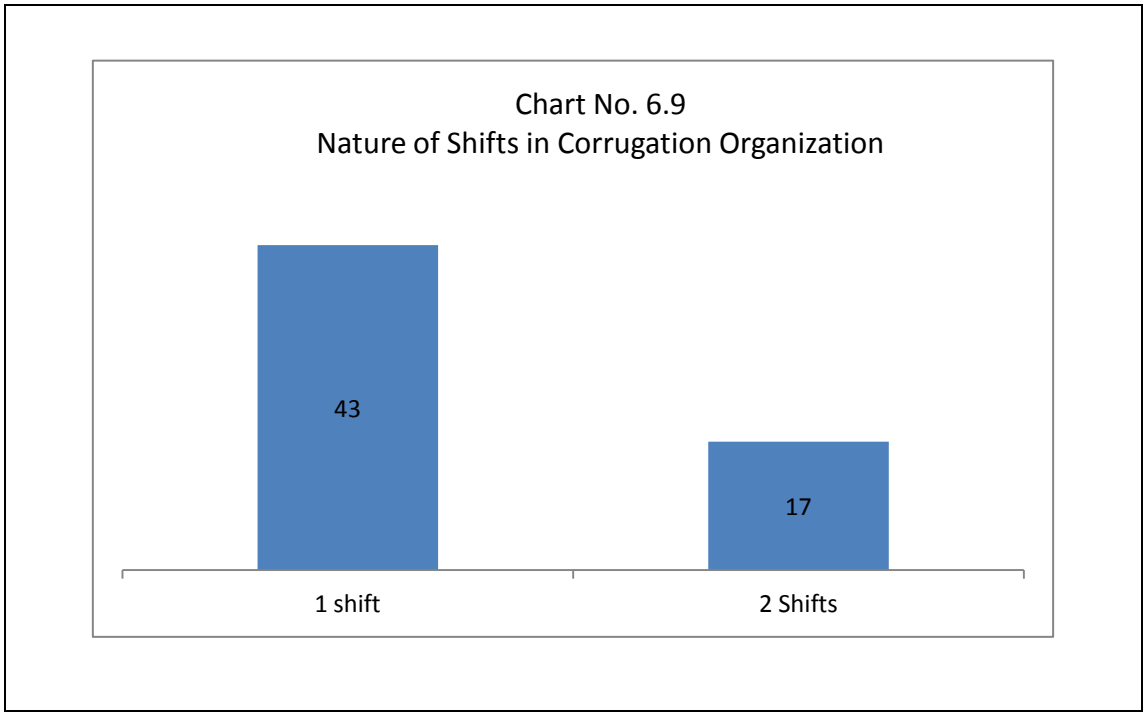
The industries are being operated in various shifts depends on the demand and production level of the products. The need of the increase in the production level may increase the shifts of production. Generally, three shifts could be seen in most of the large industries. In case of small and medium industries three shifts are rare, since the production capacity is limited. Table No. 6.9 and Chart No. 6.9 indicates that nature of shifts in selected corrugated factories were limited. Large number of factories (43 factories or 72 per cent of the total) were being operated with single shift. This was because the production capacity of these factories was limited and the market captured by these factories was also limited. The production process was being carried out as the demand for corrugated boxes. Therefore, the whole production process could be managed with single shift. However, there were some factories where production process was being carried out with the help of two shifts. 17 corrugated factories (28 per cent of the total) were having two shifts for the production. These factories were accepting two shift production works during selected period, especially during the increase in demand. Besides that, the availability of workers also determines the number of shifts. Throughout the year, the two shifts could not be found. This was again the production level had a capacity and the market structure was also limited. Therefore, the corrugation factories were carrying the production process very carefully. There were using maximum available resources.

Table No. 6.9

Nature of Shifts in Corrugation Factories

No. of Shifts	No. of Corrugation Firms	% of Total
1 shift	43	72
2 Shifts	17	28
Total	60	100

Source: Field Survey



6.2.10 Capital Investment Position in Corrugation Factories:

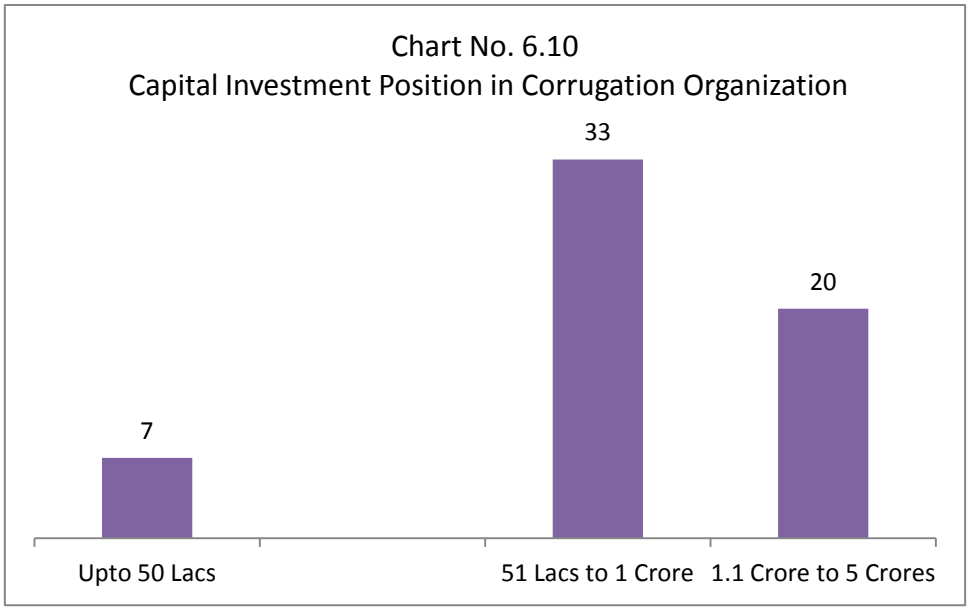
The establishment of every industry needs a capital investment. Capital investment is most essential part in the operation of business. The larger capital investment leads to larger size of industry. The machinery and land are most important factors of capital investment. The small and medium industries also need huge capital investment in the present era. Table No. 6.10 and Chart No. 6.10 indicates that, the capital investment level in the corrugation factories was higher. The minimum capital investment (on an average) in corrugation factories was Rs. 50 Lakh and the maximum capital investment was Rs. 5 crores. This trend shows that the amount of capital investment required even in the small and medium industries was higher. The cost of machinery and cost of land both have increased in the recent period, which led the higher capital investment. Out of selected corrugated factories, 7 factories (12 per cent of the total) had a capital investment of Rs. 50 Lakh, whereas the majority of the factories (33 factories or 55 per cent of the total) had a capital investment between Rs. 51 Lakh to Rs. 1 Crore. Remaining 20 corrugated factories (33 per cent of the total) had a capital investment between Rs. 1.1 Crore to Rs. 5 Crores. The medium scale firms had large capital investment since the machinery used in these factories was advanced and costly.

Table No. 6.10

Capital Investment Position in Corrugation Factories

Capital Investment Level	No. of Corrugation Firms	% of Total
Upto 50 Lakh	07	12
51 Lakh to 1 Crore	33	55
1.1 Crore to 5 Crores	20	33
Total	60	100

Source: Field Survey



6.2.11 Capital Growth in Corrugation Factories:

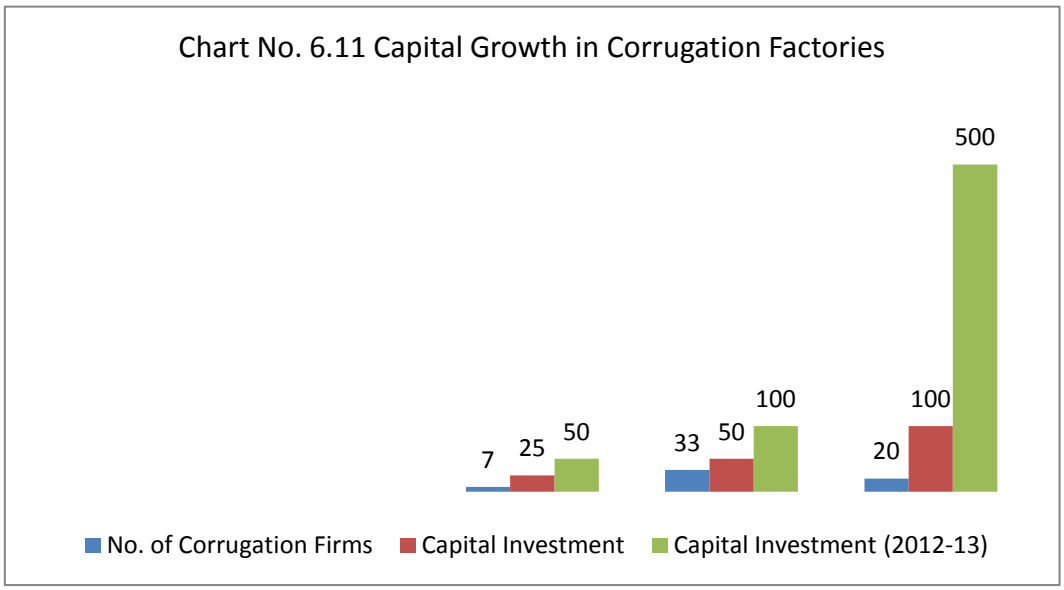
The researcher also has compared the capital growth over two periods of time. The initial capital investment in the industry was low and as the expansion of market takes place the investment level increases. Every industry does the continuous investment in the business, if that business is more profitable. Table No. 6.11 and Chart No. 6.11 indicates similar trend. The capital investment growth in the selected corrugated factories has increased over the years. Compared to capital investment in the year 2009-10, the year 2012-13 shows remarkable increase in the actual capital investment in the factories. 7 corrugated factories (12 per cent of the total) had a capital investment of Rs. 25 Lakh in the year 2009-10, which increased to Rs. 50 Lakh in the year 2012-13. This is double to earlier investment. The capital investment growth took place since the factories were getting good amount of returns. 33 corrugated factories (55 per cent of the total) had a capital of Rs. 50 lakh in the year 2009-10, which increased to 100 Lakh in the year 2012-13, whereas remaining 20 corrugated factories (33 per cent of the total) had a capital investment of Rs. 100 lakhs in the year 2009-10 which increased to Rs. 500 lakhs in the year 2012-13. The growth of capital investment in almost all corrugated factories was remarkable. Within three years, the investment growth was double. This was because of the expansion of market for packaging industry. The demand for corrugated boxes increased tremendously and to meet this increased demand most of the corrugated factories went for purchase of new modern machinery. This led to increase in the growth of capital investment over the years.

Table No. 6.11

Capital Growth in Corrugation Factories

No. of Corrugation Firms	Capital Investment (2009-10) (in Lakh)	Capital Investment (2012-13) (in Lakh)
07	25	50
33	50	100
20	100	500

Source: Field Survey



6.2.12 Loan Structure in Corrugation Factories:

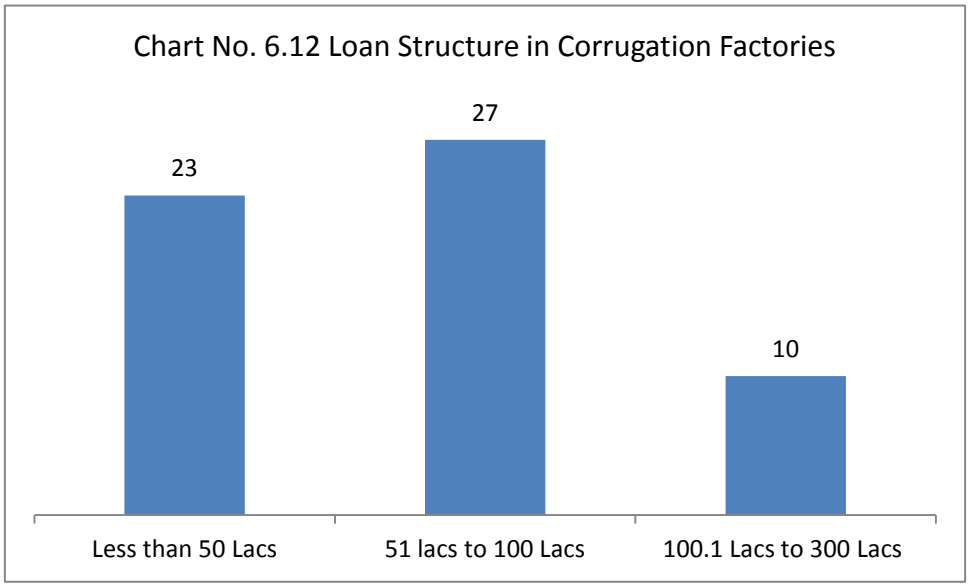
The general trend in the industrial sector is that, the business activities are being operated with the help of bank loan. The central government and state government policies have encouraged the banks to extend the financial help to entrepreneurs. The establishment of any industrial unit needs huge capital investment, which is always raised through bank loan. This trend could be seen even in the selected corrugated factories. Table No. 6.12 and Chart No. 6.12 have shown this trend. All the selected corrugated factories were being operated on the basis of bank loan. The amount of loan was higher and mostly used for the capital investment. This table indicates the loan position in the year 2012-13. Out of selected corrugated factories, 23 factories (38 per cent of the total) had raised loan of Rs. 50 Lakh and less than this amount. On an average, Rs. 37 Lakh amount was raised by these factories. Majority of the factory (27 factories or 45 per cent of the total) had a bank loan amount between Rs. 50.1 Lakh to Rs. 100 Lakh. and remaining 10 factories (17 per cent of the total) had a bank loan amount between Rs. 100.1 Lakh to Rs. 300 Lakhs. (This is nothing but Rs. 1.1 Crores to Rs. 3 Crores). The trend of raising the loan for factory or industry is most common in India. The corrugated factories were being operated with the help of bank loan. This gives the importance of banking sector in the promotion of industries, especially the corrugation industries.

Table No. 6.12

Loan Structure in Corrugation Factories

Loan Amount	No. of Corrugation Firms	% of Total
Less than 50 Lacs	23	38
51 Lacs to 1 Crores	27	45
1.1 Crores to 3 Crores	10	17
Total	60	100

Source: Field Survey



6.2.13 Profits and Reserves in Corrugation Factories:

The private sector is established to earn the profit. The main motive of the private firm is to earn the profit. The existence of the private firm depends on the rate of profit. Without profit private firm cannot survive for longer time. Therefore, the researcher has considered this variable as most important. Along with this, the reserve fund is also important. The private firm always keeps reserve fund per year, which can be used later for the replacement of machines or for the innovation in packaging. The corrugated factories in the selected region also have operating for the profit and keeping reserve fund. Table No. 6.13 and Chart No. 6.13 have explored this variable very clearly. Out of selected corrugated factories, 12 factories (20 per cent of the total) were earning Rs. 6 Lakh per annum as the profit, which was good for the development of corrugated factory. Majority of the corrugated factories (38 factories or 63 per cent of the total) were earning Rs. 10 lakh per annum. Whereas 7 factories (12 per cent of the total) and 3 factories (5 per cent of the total) were earning annually Rs. 13 Lakh and Rs. 15 Lakh, respectively. The rate of profit in the corrugated factories was higher. All the selected factories were earning profit in the corrugation business. The business operation and market structure was more challenging but the this was resulting into high rate of profit. Therefore, the corrugation industries are expanding as the expansion of market takes place.

The selected corrugation factories also keep the reserve fund from its profit. This fund is very essential during the crisis or for the innovation. All the selected factories had reserve fund. The amount of reserve fund was depending on the amount of profit. The higher profit was leading to a higher reserve funds. 12 factories (20 per cent of the total) had a reserve fund of Rs. 2 Lakh per annum. The reserve fund was kept for the innovative purposes, which was like boost for the corrugation factory. Majority of the corrugated factories (38 factories or 63 per cent of the total) had a reserve fund Rs. 3 lakh per annum. Whereas 7 factories (12 per cent of the total) and 3 factories (5 per cent of the total) had a reserve fund of Rs. 4 Lakh and Rs. 6 Lakh, respectively. Thus the position of profit and reserve fund in the selected corrugation factories was attractive and encouraging. This ultimately led the increasing rate of capital investment. The annual growth of capital investment in the corrugation factories was higher. This was because the rate of profit in these factories was higher.

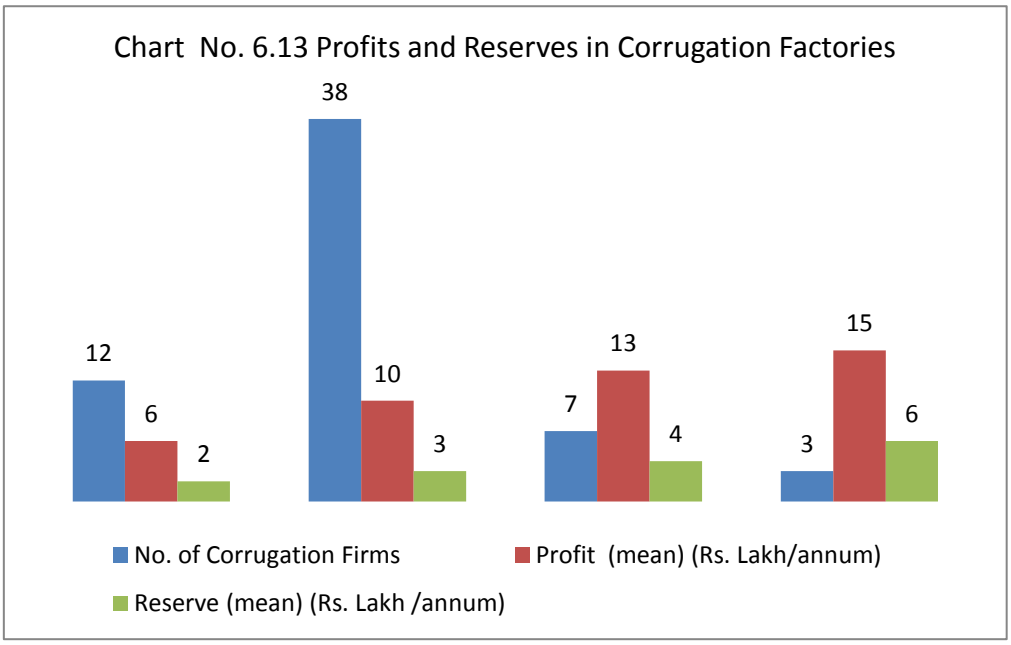
The profit earning process is most essential factor for any business, which could be seen in the corrugation factories.

Table No. 6.13

Profits and Reserves in Corrugation Factories

No. of Corrugation Firms	Profit (mean) (Rs. Lac/annum)	Reserve (mean) (Rs. Lac/annum)
12	6	2
38	10	3
07	13	4
03	15	6

Source: Field Survey



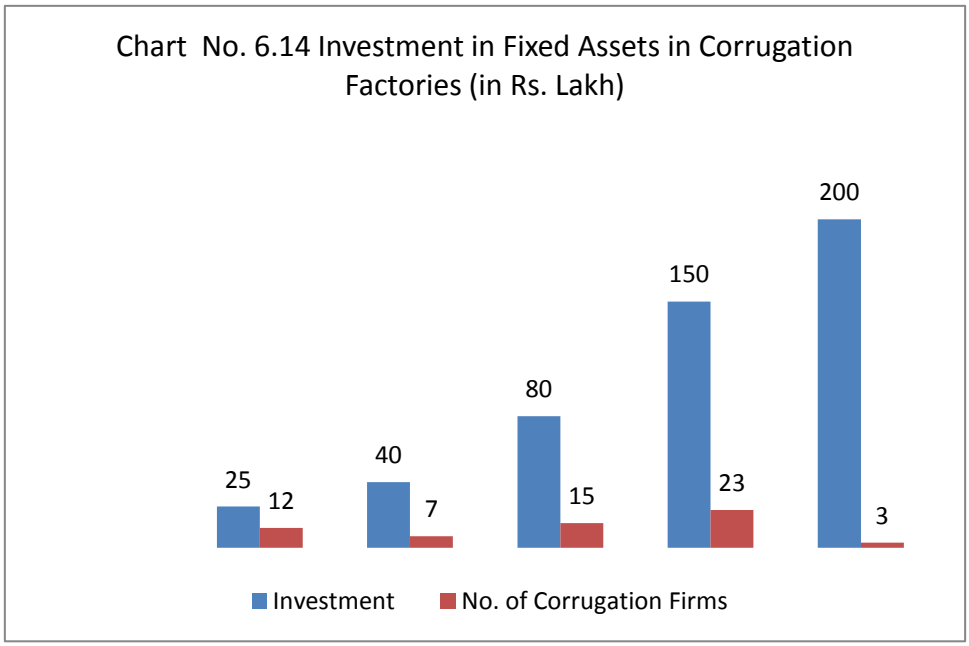
6.2.14 Investment in Fixed Assets in Corrugation Factories:

The overall investment can be generally divided into two as the- the investment in fixed assets and the investment in variable assets. The fixed assets include mainly the machinery, land and building. The investment in the fixed assets is most important in the process of production. The modern machinery can reduce the cost of production and ultimately can lead to higher rate of profit. Table No. 6.14 and Chart No. 6.14 have indicated the trend of investment in fixed assets in the corrugation factories. Out of selected corrugation factories 12 factories (20 per cent of the total) had invested Rs. 20 Lakh in the fixed assets in their factories. This investment was in the year 2012-13. Therefore, the researcher has assumed this year as the point of given period for the research. The machinery and building cost has increased over the years, which pushed up the amount of fixed investment. This higher trend of investment in fixed assets could be seen remaining all corrugated factories. 7 corrugated factories (12 per cent of the total) had an investment of Rs. 40 Lakh, 15 corrugated factories (25 per cent of the total) had an investment of Rs. 80 Lakh and 23 corrugated factories (38 per cent of the total) had an investment of Rs. 150 Lakh. The investment in fixed assets in selected factories shows that advance machinery leads higher investment. The researcher also found 3 corrugated factories (5 per cent of the total) had a highest investment of Rs. 200 Lakh or 2 Crores in the fixed assets. The overall trend of investment in fixed assets shows that, the corrugated factories had invested high amount in the fixed assets. The sizes of the corrugated factories were small and medium but the amount of investment was comparatively higher. This may be one reason that all the proprietors had raised a bank loan.

Table No. 6.14Investment in Fixed Assets in Corrugation Factories

Investment (in Lakhs)	No. of Corrugation Firms	% of Total
25	12	20
40	07	12
80	15	25
150	23	38
200	03	5
Total	60	100

Source: Field Survey



6.2.15 Purchase of Raw Materials in Corrugation Factories:

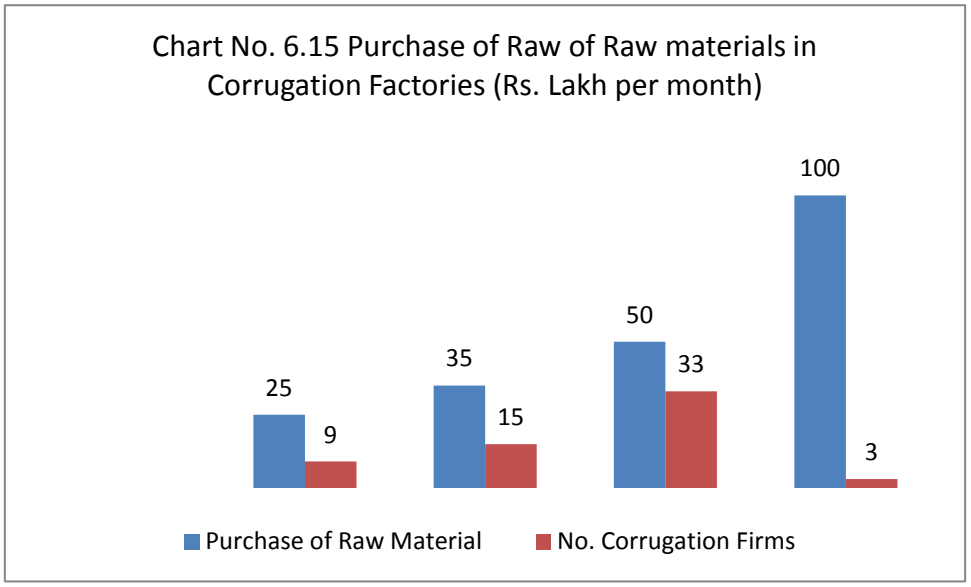
The industry needs raw materials to carry the process of production. The corrugation industry also needs the raw materials to produce corrugated boxes. The raw materials include paper, colour, ink etc. The main raw material is the paper. The corrugated factories were spending large amount of production cost on the purchase of raw materials. Table No. 6.15 and Chart No. 6.15 indicates that the cost of raw materials in the corrugation industries was higher. Out of the selected corrugated factories, 9 factories (15 per cent of the total) were spending Rs. 25 Lakh per six months on the purchase of raw materials. 15 factories (25 per cent of the total) were spending Rs. 35 lakh per six months raw materials. Majority of the corrugated factories (33 factories or 55 per cent of the total) had spent Rs. 50 Lakh per six months on the purchase of raw materials. The relatively larger sized corrugated factories were spending highest amount on the raw materials. 3 corrugated factories (5 per cent of the total) were spending Rs. 100 Lakh (or Rs. 1 Crores) per six months on the raw materials. Thus the cost of production including the raw materials was much higher; however the rate of returns was also higher. This kept the proprietors in investing higher amount in the corrugation factories.

Table No. 6.15

Purchase of Raw of Raw materials in Corrugation Factories (per six month)

Purchase of Raw Material (in Rs. Lakh)	No. Corrugation Firms	% of Total
25	09	15
35	15	25
50	33	55
100	03	05
Total	60	100

Source: Field Survey



6.2.16 Technology Level in Corrugation Factories:

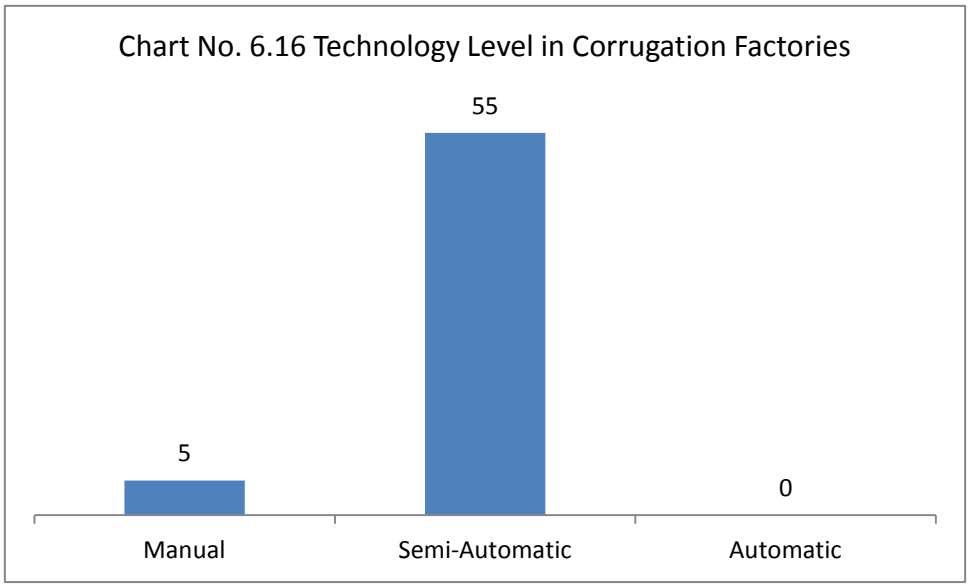
The industrial status can be determined on the basis of technological level of it. The technology used in the industry is responsible for the production capacity and cost per unit. The technology level can be divided into three- manual, semi-automatic and automatic technology. Table No. 6.16 and Chart No. 6.16 indicates this level. Among the selected corrugated factories, the large majority of the corrugated factories (55 corrugated factories or 92 per cent of the total) had semi-automatic type technology. The semi-automatic technology was including advance machinery of high cost. Only 5 corrugated factories (8 per cent of the total) had manual technology. Although this could be stated as manual technology, there was also use of machinery. But the machines were based on manual labour. The use of manual labour on machines was higher. None of the corrugated factory from the selected area had automatic technology. The researcher had a pilot survey in the city of Pune and around Pune before taking the field survey. The researcher found that there were only 5 corrugated factories (out of total 300 corrugated factories), where automatic technology was used. These factories could be stated as the large factories. However, the focus of the researcher was towards small and medium sized corrugated factories, which were large at numbers. The researcher has neglected the large scale corrugated factories, since their number was negligible. Except these neglected corrugated factories, all the corrugated factories selected for the study were categorized as small and medium. The researcher found in these factories either manual technology or semi-automatic technology level.

Table No. 6.16

Technology Level in Corrugation Factories

Technology Level	No. of Corrugation Factories	**%** of Total
Manual	05	08
Semi-Automatic	55	92
Automatic	00	00
Total	60	100

Source: Field Survey



6.2.17 Marketing Method in Corrugation Factories:

The marketing of the products is the most essential segment in the business of any industry. The sale of products depends on the marketing skill and strategy. In the modern time, many large firms have been spending major part of their income on the marketing. The efficient marketing strategy would lead to increase in sale, which ultimately determines the success of the industry. In case of corrugation industry also similar trend could be seen, especially in the large scale production. However, in case of the selected corrugation factories from Pune region, the marketing strategy was different than what it was going in the other industries. The production process carried out in one or two shifts in the corrugation factories leads to large production of corrugated boxes. Besides the large production, the corrugation factories did not adopt new marketing strategy. Table No. 6.17 and Chart No. 6.17 indicates this method of marketing in the selected corrugation factories. Majority of the selected corrugated factories (53 factories or 88 per cent of the total) had an independent marketing method. This means, these factories were arranging the marketing method from their own. The proprietors were handling the job of marketing. This was because, these factories could not afford to appoint the marketing specialists and there was no need

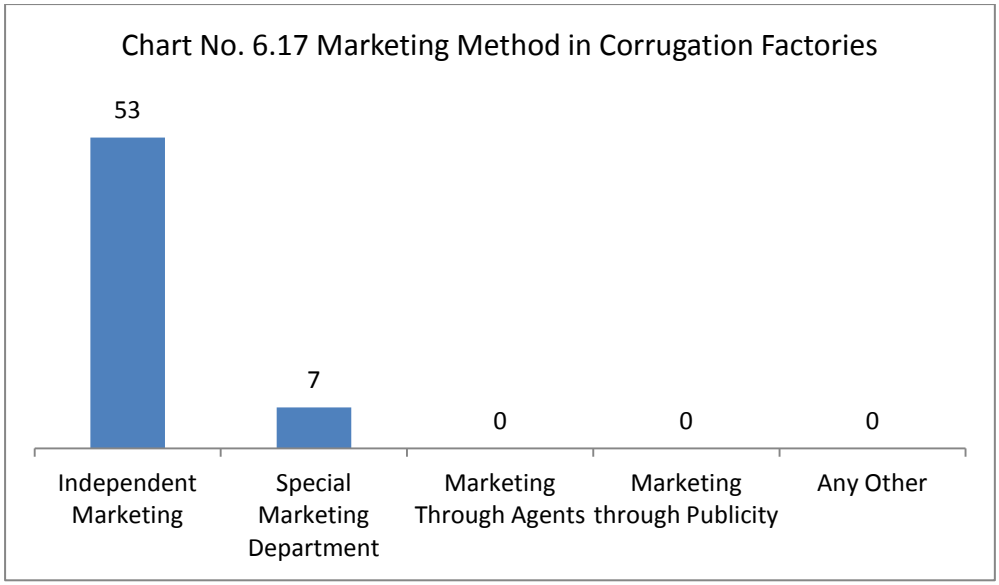
too. The productions of the corrugated boxes were carried out on the basis of demand made by the party. The production according to the demand, this policy was adopted by large number of selected corrugated factories. Therefore, there was no question of trained marketing strategy. However, 7 corrugated factories (12 per cent of the total) had special marketing department, through which marketing of products was being done. The job of this department was to promote the sales by bringing the demand for it. But this marketing department was consisting hardly one or two marketing specialists. This means, the corrugated factories were producing the corrugated boxes as the requirement of the market. Therefore, there was no question of extra production. None of the corrugated factory from the selected factories had adopted advertising method of marketing.

Table No. 6.17

Marketing Method in Corrugation Factories

Marketing Method	No. of Corrugation Firms	% of Total
Independent Marketing	53	88
Special Marketing Department	07	12
Marketing Through Agents	00	00
Marketing through Publicity	00	00
Any Other	00	00
Total	60	100

Source: Field Survey



6.2.18 Method of obtaining Customers in Corrugation Factories:

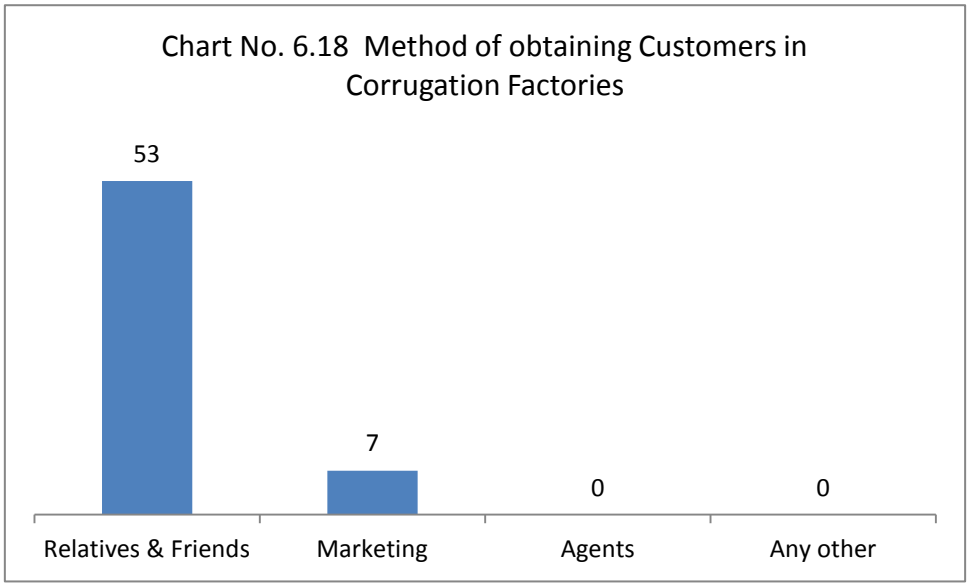
Marketing strategy is carried out to increase the sale and profit. The industry or business does such marketing strategy. But the selected corrugation factories did not adopt special trained marketing strategy, because there was no need to adopt this strategy. The customers of these corrugated factories were obtained through personal relations. Table No. 6.18 and Chart No. 6.18 indicates this method of obtaining customers. Large majority of the selected corrugated factories (53 factories or 88 per cent of the total) had obtained their customers through their friends and relatives. This means that, the relatives and friends were operating various industries and business, where there was need of packaging materials. The proprietors of the corrugated factories had good relation with their relatives and friends; hence they could establish business relationship with them. The selected corrugated factories were producing corrugated boxes for various industries owned by the relatives and friends around Pune region. This was the major reason, why the proprietors of corrugated factories did not need trained marketing personnel. However, there were 7 corrugated factories (12 per cent of the total) were obtaining the customers through marketing method.

Table No. 6.18

Method of obtaining Customers in Corrugation Factories

Method of Obtaining Customer	No. of Corrugation Firms	% of Total
Relatives & Friends	53	88
Marketing	07	12
Agents	00	00
Any other	00	00
Total	60	100

Source: Field Survey



6.2 19 Purchase Order Level in Corrugation Factories:

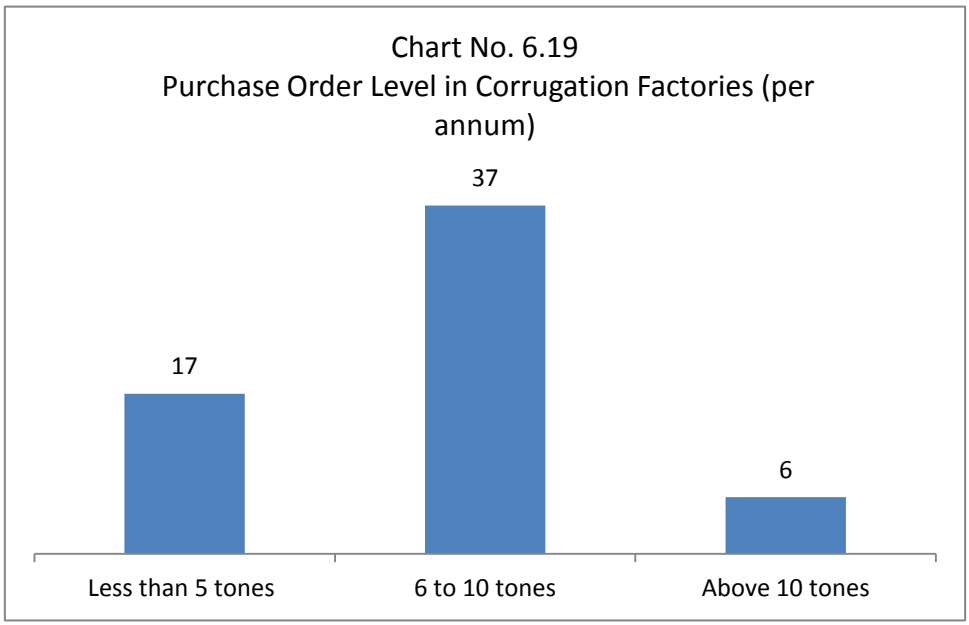
The industry requires continuous purchase order for its survival. The purchase order helps to carry the production process, which brings the financial transaction. In case of selected corrugated factories, the purchase order was in limited size. Table No. 6.19 and Chart No. 6.19 indicates that, the purchase order level in the selected corrugation factories varies from 5 tons to 15 tons at a time. Out of the selected corrugated factories 17 factories (28 per cent of the total) had a purchase order of 5 tons at a time. This was the lowest purchase order compared to the orders of other factories. Majority of the corrugated factories (37 factories or 62 per cent of the total) had a purchase order between 6 tons to 10 tons, whereas 6 corrugated factories (10 per cent of the total) had a purchase order of more than 10 tons at a time. The researcher found two factories, which had highest purchasing order of 15 tons at a time.

Table No. 6.19

Purchase Order Level in Corrugation Factories (per annum)

Purchase Order	No. of Corrugation Firms	% of Total
Less than 5 tons	17	28
6 to 10 tons	37	62
Above 10 tons	06	10
Total	60	100

Source: Field Survey



6.2.20 Stock of Paper in Godown in Corrugation Factories:

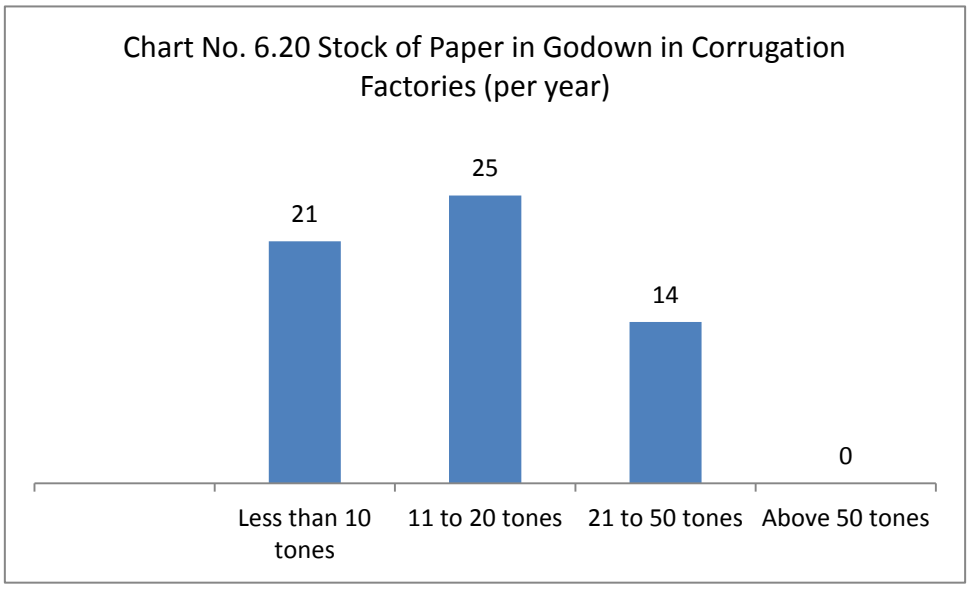
The corrugation industry needs continuous supply of raw material, especially paper. The production process in the corrugation industry takes place as the purchase order or demand for corrugated boxes. Therefore, every corrugated factory keeps stock of paper raw material in their godown. Table No. 6.20 and Chart No. 6.20 indicates the stock of paper kept by various corrugated factories. Out of selected corrugated factories 21 factories (35 per cent of the total) had a stock of less than 10 tons of paper per year. This was the average stock of paper kept in godown of corrugated factories. 25 corrugated (42 per cent of the total) had a stock of paper between 11 tons to 20 tons per year and remaining 14 factories (23 per cent of the total) had a stock of paper between 21 tons to 50 tons. None of the factory had a stock of paper more than 50 tons. This much huge stock of paper was not necessary for them. The stock of paper based on the order was kept in the godown. The change in the demand order was changing the stock of paper. The general trend shows that, the practice of keeping the stock of paper in godown was seen in all the corrugated factories. The stock of paper was essential to keep regular supply of corrugated boxes to their customer.

Table No. 6.20

Stock of Paper in Godown in Corrugation Factories (per year)

Stock of Paper	No. of Corrugation Firms (mean)	% of Total
Less than 10 tons	21	35
11 to 20 tons	25	42
21 to 50 tons	14	23
Above 50 tons	00	00
Total	60	100

Source: Field Survey



6.2.21 Wage Structure in Corrugation Factories:

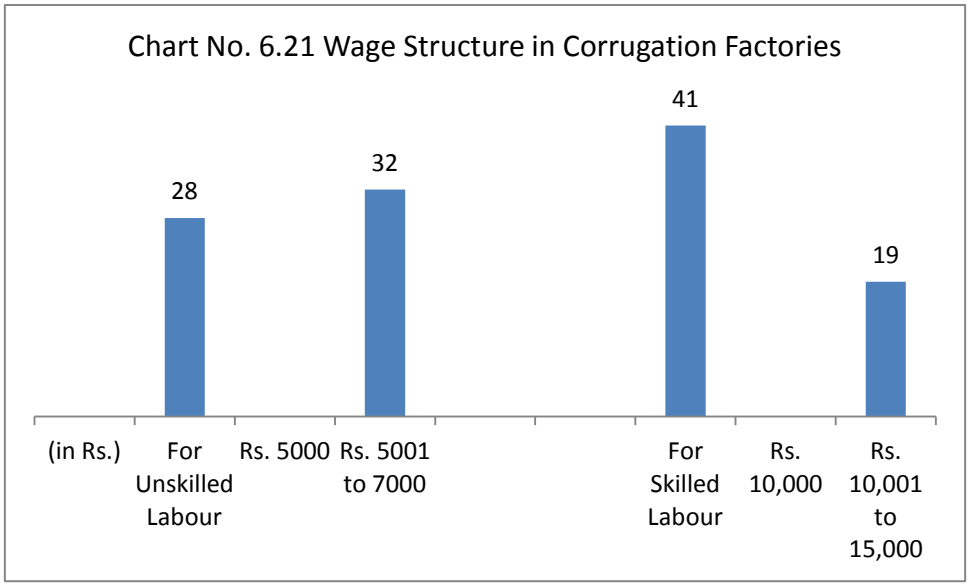
Wage factor is most influencing factor on the production cost of an industry. Wage shares large part of the production cost. Generally, the wage level depends on the technical skill and an education of a worker. Wage level and technical skill was directly proportional to each other. Table No. 6.21 and Chart No. 6.21 have given wage structure in the selected corrugated factories. The wage level was different for skilled and unskilled labour. Unskilled labours were paid comparatively less than skilled labour in corrugated factories, which was obvious. In case of unskilled labour, 28 corrugated factories (46 per cent of the total) were paying Rs. 5000 per month as wage. 32 corrugated factories (54 per cent of the total) were giving a wage between Rs. 5001 to 7000 per month. This means on an average, the unskilled workers were getting a wage of Rs. 6000 per month. The situation was comparatively better for skilled labour. Out of selected corrugated factories, majority of the corrugated factories (41 factories or 68 per cent of the total) were paying Rs. 10,000 per month as a wage to every worker. There were some skilled workers who were getting even better than this wage. 19 corrugated factories (32 per cent of the total) were paying a wage between Rs. 10,001 to Rs. 15,000 per month for every worker. On an average, the skilled worker of corrugated factory was getting Rs. 12,500 per month. As compared to the present condition of workers and wage in other industry, this wage level was lower.

Table No. 6.21

Wage Structure in Corrugation Factories

Wage Level (in Rs./month)	No. of Corrugation Firms	% of Total
For Unskilled Labour Rs. 5000	28	46
Rs. 5001 to 7000	32	54
Total	**60**	**100**
For Skilled Labour Rs. 10,000	41	68
Rs. 10,001 to 15,000	19	32
Total	**60**	**100**

Source: Field Survey



6.2.22 Wage Level Problem in Corrugation Factories:

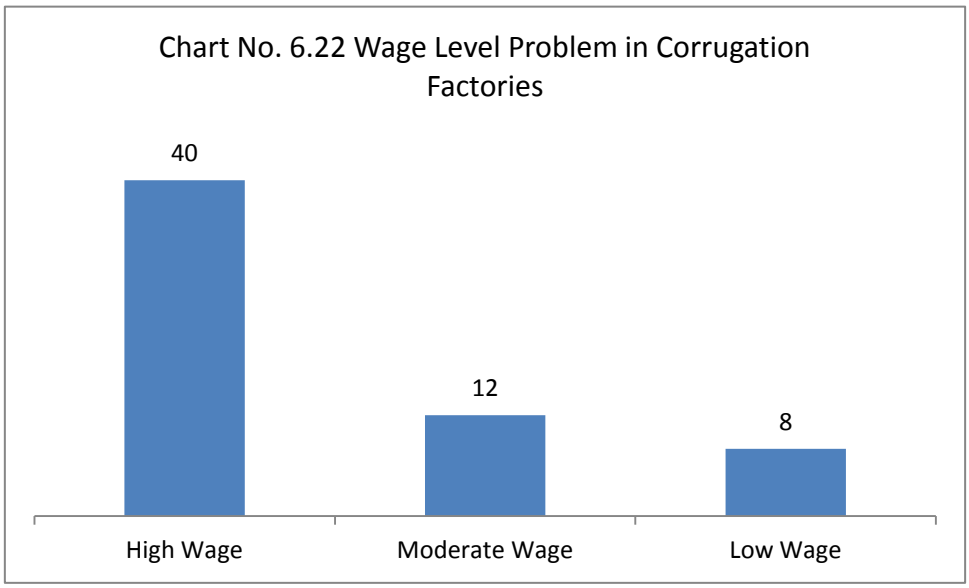
The wage level problem has also been analysed by the researcher. Although general trend of wage level in Pune was comparatively higher than what was being paid in the corrugated factories. But the researcher has considered here the approach of proprietors' regarding wage. The approach of workers' regarding their wage was not considered, since this was not the focus of the research. Table No. 6.22 and Chart No. 6.22 indicates that, majority of the proprietors of corrugated factories (40 proprietors or 60 per cent of the total) have stated that, the wage level paid in the factory was higher, which has been a problem in the production cost. These proprietors were thinking that, wage level has been a problem in the determination of smooth operation of the business. Out of the selected corrugated factory proprietors, 12 proprietors (20 per cent of the total) have stated that, the wage level which was being paid to the workers was moderate level. Hence, this was not a major part of the problem of corrugated factory. Only 8 proprietors (12 per cent of the total) have opined that, the wage level in the corrugation factories was at low level. This was not a problem for corrugated factories; instead the increasing cost of raw materials was big problem. The general opinion of the majority of the proprietors was that, there has been increasing pressure of rise in wage level. Since the corrugated factories were being operated at small scale with limited market, paying high wage could notafford by the factories. However, the proprietors' view was based on the profit motive.

Table No. 6.22

Wage Level Problem in Corrugation Factories

Wage Level Problem	No. of Corrugation Factories	% of Total
High Wage	40	67
Moderate Wage	12	20
Low Wage	08	13
Total	60	100

Source: Field Survey



6.2.23 Skill Level Problem in Corrugation Factories:

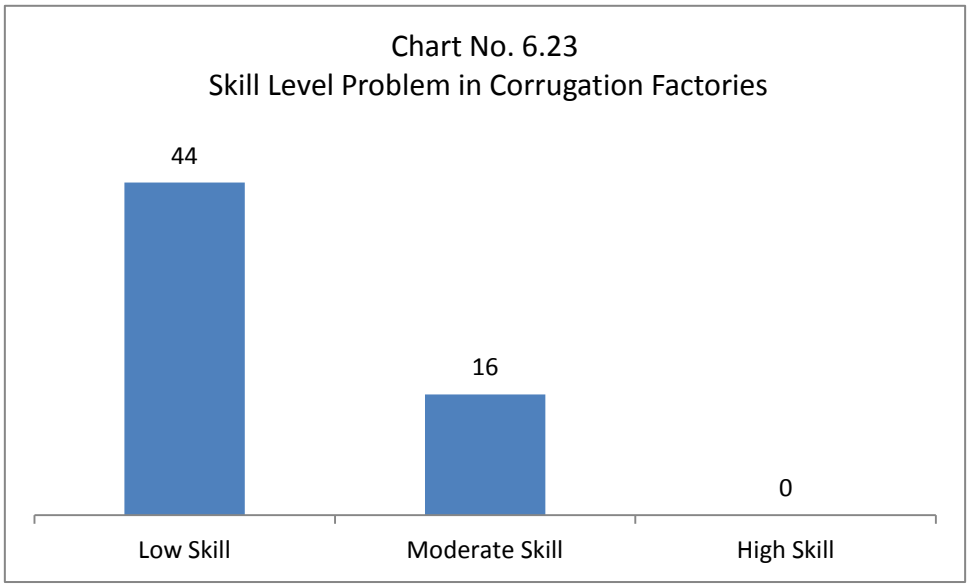
The researcher has considered various economic problems of corrugated factories. The business activity carried out in the corrugated factory was not free from the problem. The proprietors have recorded various economic problems. Along with wage level problem, one more problem was 'skill level' problem. Table No. 6.23 and Chart No. 6.23 indicates that, the skill level problem was common among the corrugated factories. Out of selected corrugated factories, majority of the factories (44 factories or 73 per cent of the total) had faced skill level problem among the workers. The proprietors had an opinion that, the skill level of the workers was low, which was affecting the production process. Remaining 16 corrugated factories (27 per cent of the total) had stated that the skill level among the worker was moderate. The proprietors of these corrugated factories were thinking as moderate skill level among the workers. None of the corrugated factory or proprietor had recorded as high level of skill. This trend shows that, the corrugated factories were in the need of promotion of technical skill among the workers.

Table No. 6.23

Skill Level Problem in Corrugation Factories

Skill Level Problem	No. of Corrugation Firms	% of Total
Low Skill	44	73
Moderate Skill	16	27
High Skill	00	00
Total	100	100

Source: Field Survey



2.24 Absenteeism Problem in Corrugation Factories:

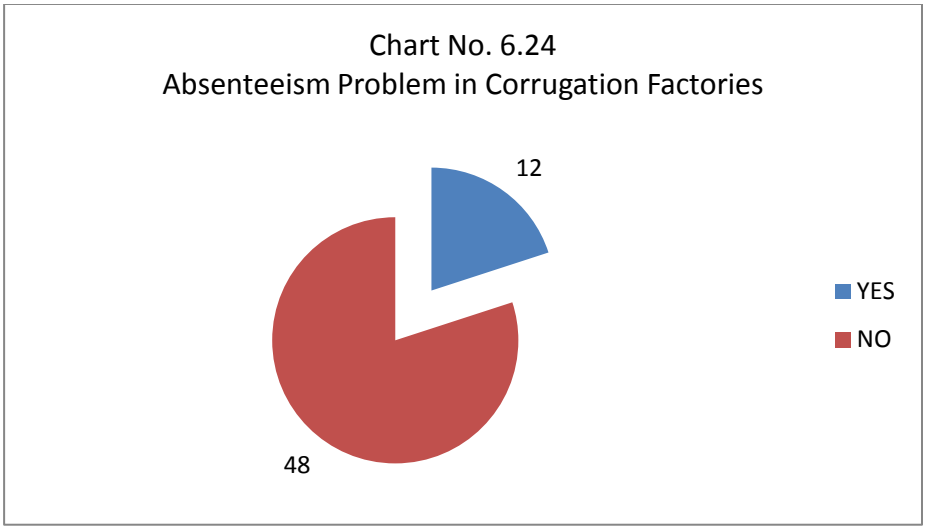
The production process depends on the workers participation. The regular attendance of workers in the production process would lead the industry towards the development. Table No. 6.24 and Chart No. 6.24 indicates the status of absenteeism in the selected corrugated factories. Majority of the corrugated factories (48 factories or 80 per cent of the total) had no problem of absenteeism. It means that, the workers were attending the work or factory more regularly. This was a positive side of the factories. Remaining 12 factories (20 per cent of the total) have opined that the corrugated factories had a problem of absenteeism of workers. This absenteeism was affecting the regular process of production. Especially, when the demand for corrugated boxes was recorded higher, the absenteeism affects the factory adversely. Therefore, the factories were taking care of alternative schedule of production process.

Table No. 6.24

Absenteeism Problem in Corrugation Factories

Absenteeism Problem	No. Corrugation Firms	% of Total
YES	12	20
NO	48	80
Total	60	100

Source: Field Survey



6.2.25 Reasons for Leaving Jobs:

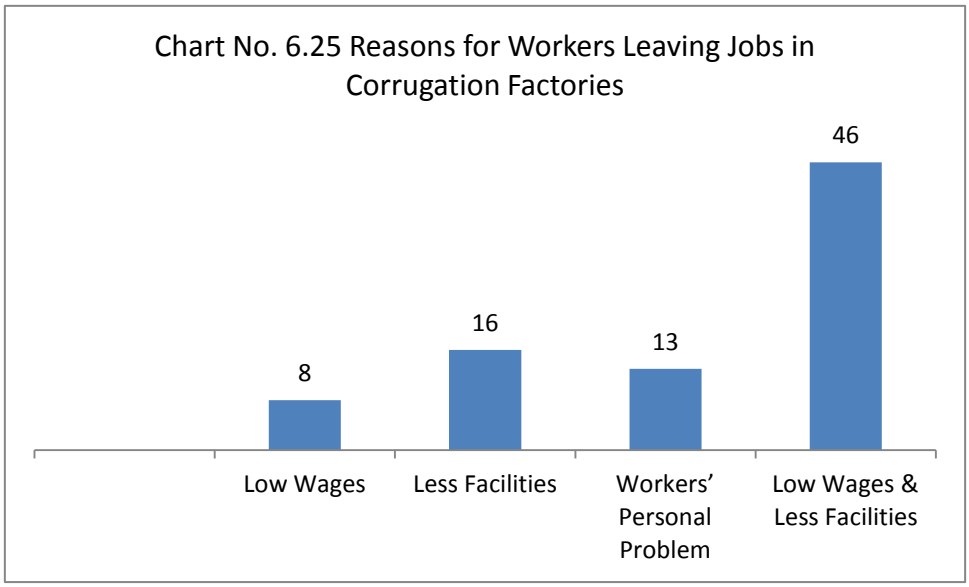
The corrugated factories were being operated with the help of workers. The regular production process more depends on the workers. The workers' attachment towards their work more depends on the wage level. Along with the low wage level, other discouraging factors would lead to leave the jobs. The researcher found that there was trend of job leaving among the workers. Hence, the researcher has analysis of reasons for leaving the jobs from the proprietors' point of view. The workers point of view has not been considered, since this was not the focus of the study. Table No. 6.25 and Chart No. 6.25 indicates this situation in the selected corrugated factories. Majority of the proprietors (46 proprietors or 77 per cent of the total) have given two reasons for leaving the jobs by the workers as low wage and less facilities. The workers had a feeling of fewer wages being paid to them along with no facilities. 8 proprietors (13 per cent of the total) have stated the low wage as single reason for leaving the job by the workers. 16 proprietors (27 per cent of the total) have stated 'less facilities' as the reason for leaving. And remaining 13 proprietors (22 per cent of the total) have stated as 'personal problems of workers' as the reason for leaving the jobs. The trend of leaving the job by the worker was not higher, however the proprietors found this was one of the problem in the smooth production process.

Table No. 6.25

Reasons for Workers Leaving Jobs in Corrugation Factories

Reasons for Leaving Jobs	No. of Corrugation Factories	% (to total in each)
Low Wages	08	13
Less Facilities	16	27
Workers' Personal Problem	13	22
Low Wages & Less Facilities	46	77

Source: Field Survey



6.2.26 Over Time Work in Corrugated Factories:

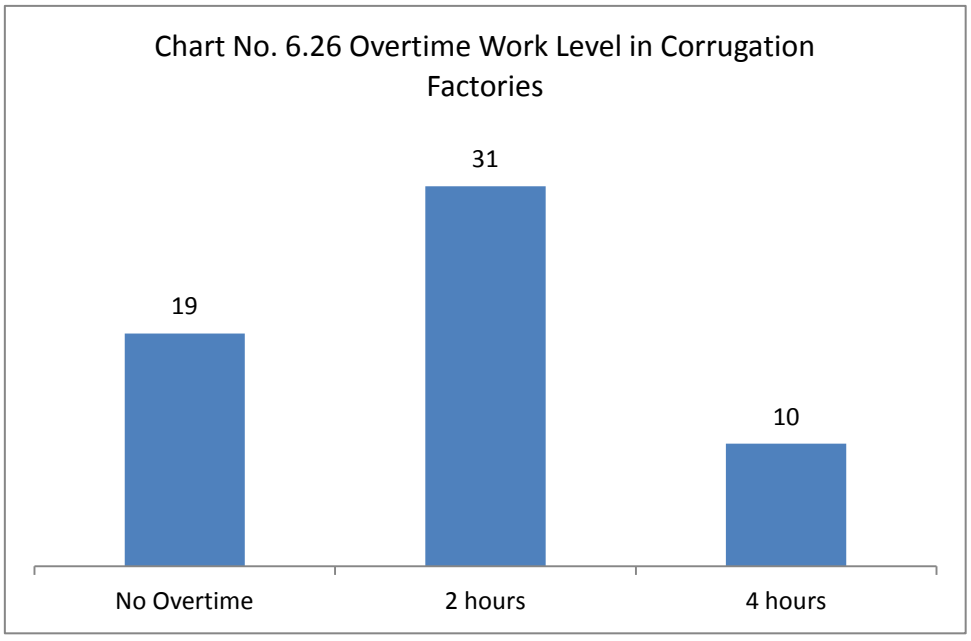
The selected corrugated factories were offering the over time to the workers, especially when the purchase order was higher. However, there were some factories which did not consider this as necessary. Table No. 6.26 and Chart No. 6.26 have shown this trend of over time work. 19 factories (32 per cent of the total) have stated that, they did not go for overtime work. This was due to regular purchase order and their time management in the available working hours. Majority of the corrugated factories (31 factories or 52 per cent of the total) had used over time to match the higher purchase order. The over time work period was 2 hours. Remaining 10 factories (16 per cent of the total) had an over time of 4 hours. This over time of work was not regular; instead it was more casual based on the demand for the corrugated boxes.

Table No. 6.26

Overtime Work Level in Corrugation Factories

Overtime Work	No. of Corrugation Firms	% of Total
No Overtime	19	32
2 hours	31	52
4 hours	10	16
Total	60	100

Source: Field Survey



6.2.27 Technical Problems in Corrugated Factories:

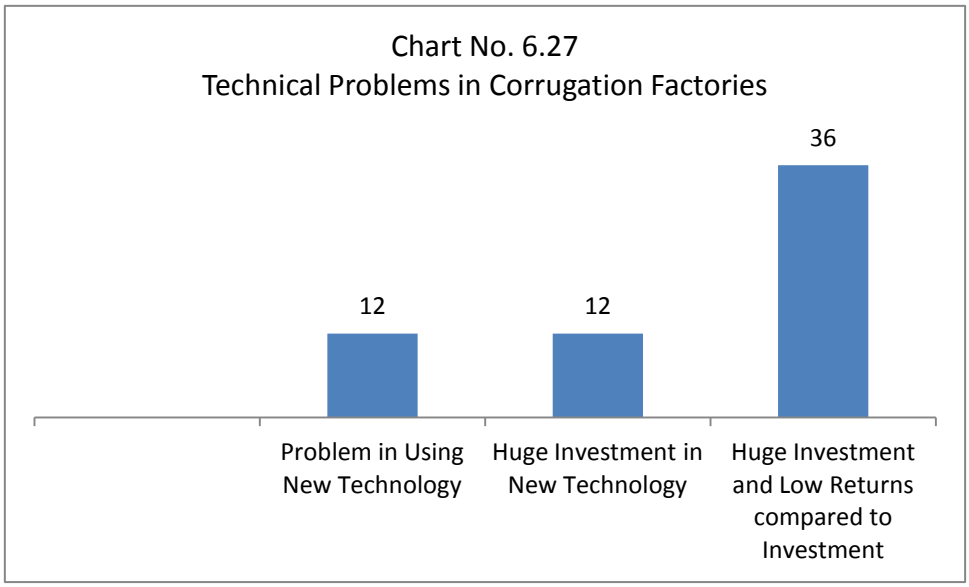
The corrugated factories were being operated on both semi-automatic machines and manual labour. Even in case of manual labour, there was need of machines. The technology level determines the production level and rest of the relevant matters. With regard to technology, the corrugated factories had different problems. Table No. 6.27 and Chart No. 6.27 indicates this problem clearly. Majority of the corrugated factory proprietors (36 proprietors or 60 per cent of the total) have compared the level of investment and rate of return. According to them, the required investment in the automatic technology in the corrugated factories was higher as compared to the rate of returns. They have opined that, the rate of returns was low; whereas the level of investment was higher. This was discouraging the proprietors to accept the automatic technology in the corrugated factories. 12 proprietors (20 per cent of the total) have opined that they could find the problem in using new technology. This was due to lack of technical training. Whereas other 12 proprietors (20 per cent of the total) have opined that the level of investment required for theautomatic technology was higher. The technological improvement is a natural process in the industry. However, all of the proprietors were being discouraged to accept the modern technology in the corrugated factories due to huge investment and huge place.

Table No. 6.27

Technical Problems in Corrugation Factories

Technical Problems	No. of Corrugation Firms	% to total in each
Problem in Using New Technology	12	20
Huge Investment in New Technology	12	20
Huge Investment and Low Returns compared to Investment	36	60
Total	60	100

Source: Field Survey



6.2.28 Marketing Problem in Corrugated Factories:

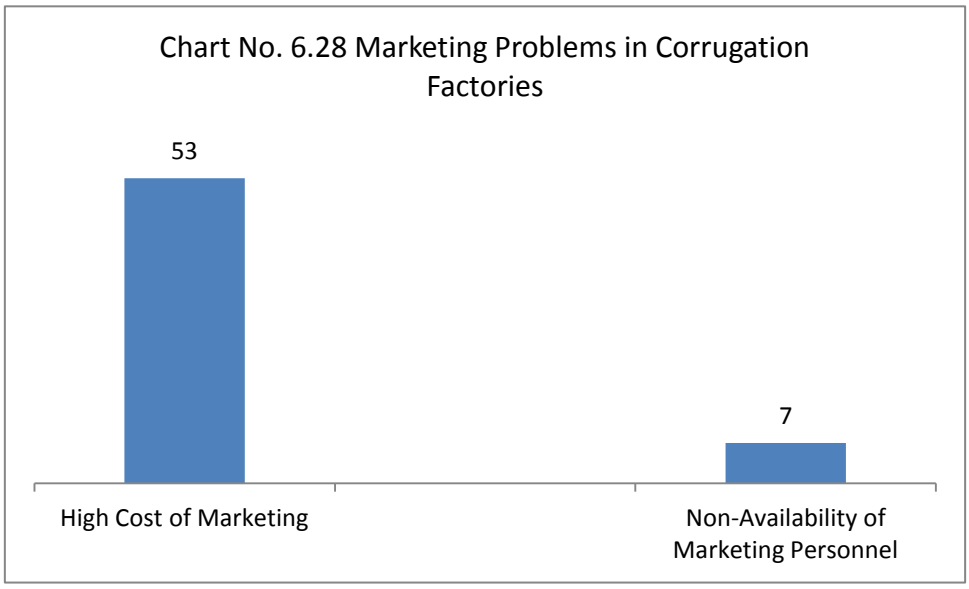
The corrugated factories were accepting the purchasing order from various firms and accordingly the production process was being carried out. However, the plan of increasing annual sale of corrugated boxes was not professional. As the large part of purchasing order was recorded from the friends and relatives, there were no special efforts from the marketing point of view. Table No. 6.28 and Chart No. 6.28 indicates the attitude of the proprietors regarding marketing. Majority of the proprietors (88 per cent of the total) did not use the advanced marketing strategy due to the high cost of marketing. They opined that, the cost of marketing was higher which kept them with traditional method of marketing. Where as, remaining 7 proprietors (12 per cent of the total) had opined that, they had no special marketing personnel. The proprietors of corrugated factories have discouraged the advertising and other advance methods of marketing. This attitude of the proprietors kept their production process at a limit. Although, all the proprietors have stated as marketing problem existed in the corrugated factories, but they also had realized the potential effect of advance method of marketing as advertisement.

Table No. 6.28

Marketing Problems in Corrugation Factories

Marketing Problems	No. of Corrugation Firms	% of Total
High Cost of Marketing	53	88
Non-Availability of Marketing Personnel	07	12
Total	60	100

Source: Field Survey



6.2.29 Raw Material Problems in Corrugated Factories:

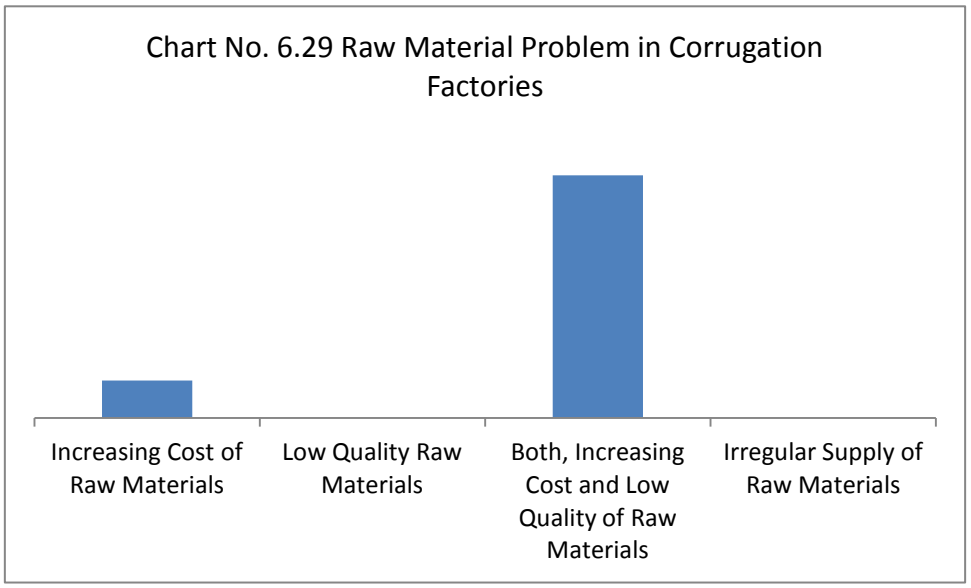
The production process is incomplete without the raw materials. The regular supply of raw material is very important to carry the production process in a smooth way. Table No. 6.29 and Chart No. 6.29 indicates the raw material problem among the selected corrugated factories. One of the best thing among selected corrugated factories that, none of the factory had a problem of irregular supply of raw material. All the selected factories were receiving regular supply of raw material. However, they had one or two problems regarding raw material. 8 factories (13 per cent of the total) had stated that, the cost of raw materials was increasing. This was the problem them, since this could affect the pricing process. Majority of the factories (52 factories or 87 per cent of the total) had stated two problems as 'increasing cost and low quality of raw materials'. The large majority of the factories had these problems. The high cost of raw materials and low quality of raw materials, both was affecting the whole production process of corrugated factories.

Table No. 6.29

Raw Material Problem in Corrugation Factories

Raw Material Problems	No. of Corrugation Firms	% of Total
Increasing Cost of Raw Materials	08	13
Low Quality Raw Materials	00	00
Both, Increasing Cost and Low Quality of Raw Materials	52	87
Irregular Supply of Raw Materials	00	00
Total	60	100

Source: Field Survey



6.2.30 Competition Problem in Corrugated Factories:

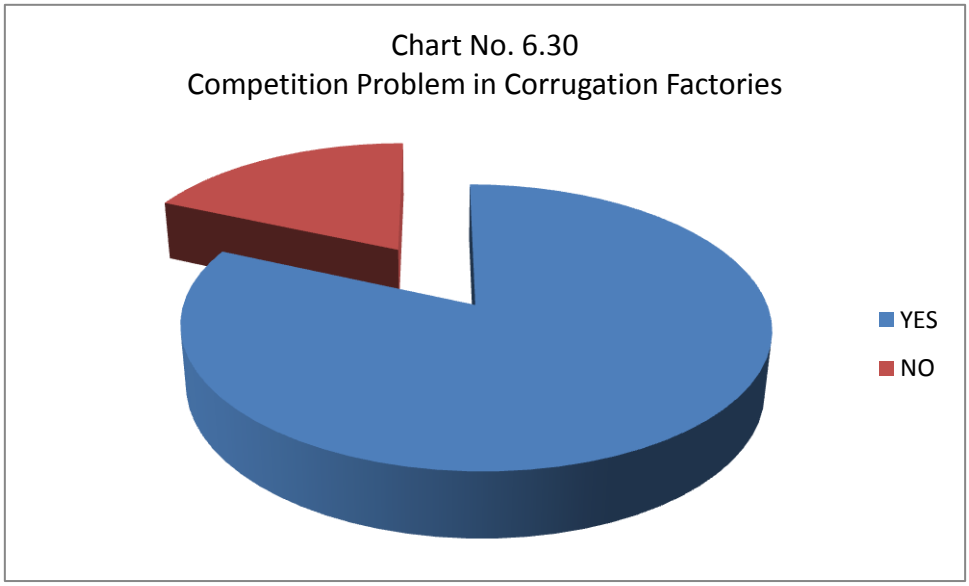
The corrugated factories were being operated as small and medium scale. Very few number of corrugated factories were being operated at large scale with automation, which have been neglected by the researcher. The small and medium sized corrugated factories also have competition problem. Table No. 6.30 and Chart No. 6.30 indicates this situation. Majority of the corrugated factories (49 factories or 82 per cent of the total) have opined that, they face competition problem with other corrugated factories. Due to increasing number of corrugated factories, the competition level was becoming tough. However 11 factories (18 per cent of the total) did not find competition as a problem. They were thinking that, there was no competition among the corrugated factories, on the contrary all the factories have sufficient scope and space in the industry.

Table No. 6.30

Competition Problem in Corrugation Factories

Competition Problem	No. of Corrugation Firms	% of Total
YES	49	82
NO	11	18
Total	60	100

Source: Field Survey



6.2.31 Environmental Problem in Corrugated Factories:

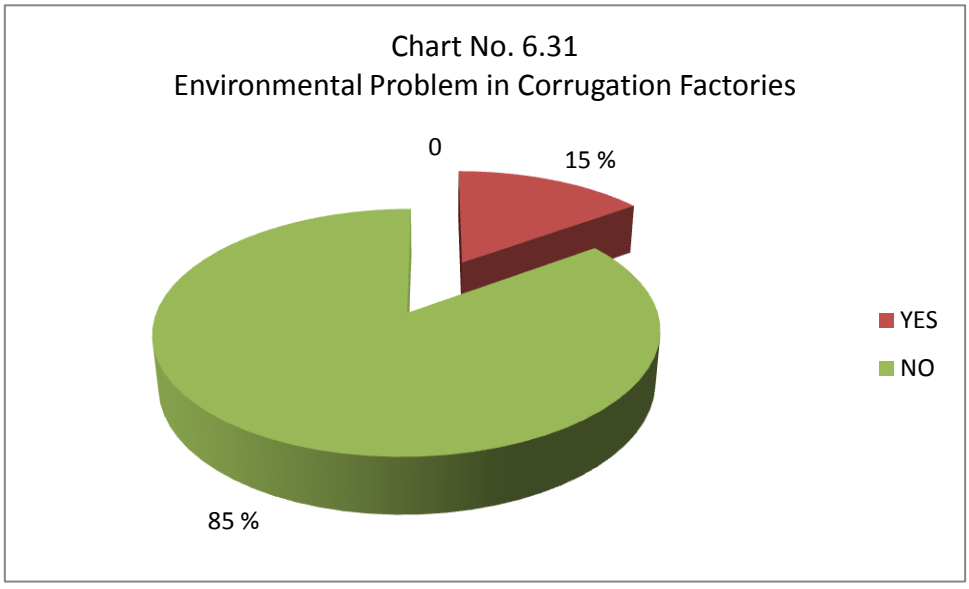
The industrial unit always has second side that is environmental side. The industries have been creating various environmental problems. The researcher has explored the environmental problem among corrugated factories. Table No. 6.31 and Chart No. 6.31 indicates that, majority of the corrugated factories (51 factories or 85 per cent of the total) have opined that they did not have any environmental problem. The wastes from corrugated factories are sold out for recycling. Therefore, they called their factories as 'environmental friendly'. However, 9 factories (15 per cent) have found environmental problem in corrugated factories. The most problem of them was the lack of proper ventilation for workers, which would result into various health problems.

Table No. 6.31

Environmental Problem in Corrugation Factories

Environmental Problems	No. of Corrugation Firms	% of Total
YES	09	15
NO	51	85
Total	60	100

Source: Field Survey



6.2.32 Problem from Suppliers in Corrugated Factories:

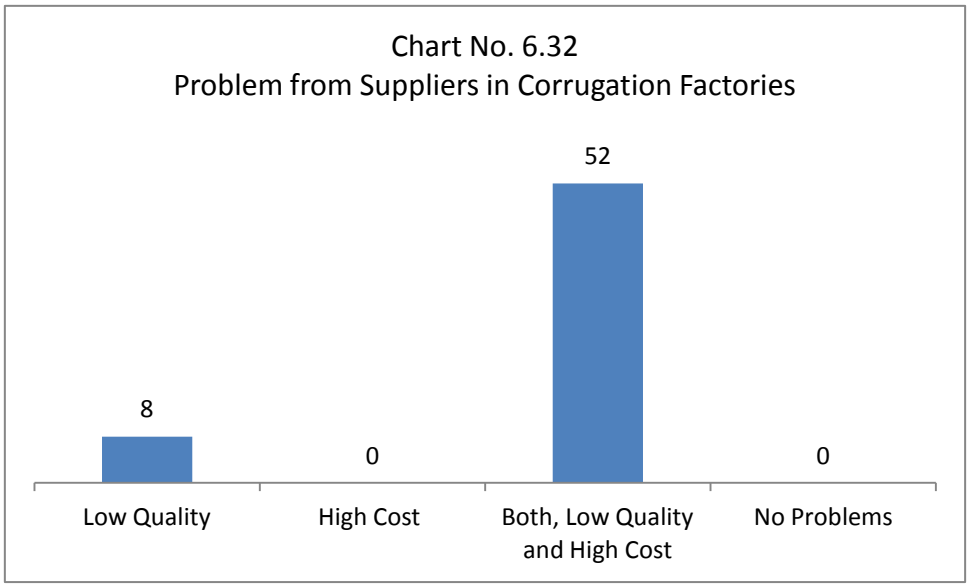
The corrugated factories need various raw materials and most important raw material is paper. The raw materials were being supplied by various manufacturers. The selected corrugated factories had a problem from the suppliers. Table No. 6.32 and Chart No. 6.32 indicates that, majority of the corrugated factories (52 factories or 87 per cent of the total) have stated that, they had two major problems from suppliers. The problems were- high cost of materials and low quality of raw materials. These two problems were more common among majority of the selected factories. The higher cost of raw materials could affect the pricing and profit of a factory whereas; the low quality of raw materials could affect the quality of corrugated boxes. Both the problems were genuine and large numbers of factories were under the clutch of this problem. Out of selected corrugated factories, 8 factories (13 per cent of the total) had a problem of low quality raw materials. They were complaining about the supply of low quality of raw materials, which was being supplied by various manufacturers. The suppliers of raw materials were equally significant factor to bring the high quality products.

Table No. 6.32

Problem from Suppliers in Corrugation Factories

Problems From Suppliers	No. of Corrugation Firms	% of Total
Low Quality	08	13
High Cost	00	
Both, Low Quality and High Cost	52	87
No Problems	00	00
Total	60	100

Source: Field Survey



6.2.33 Problems from Customers in Corrugated Factories:

There were two important parties for corrugated factories, one was supplier of raw materials and second was the purchaser of corrugated boxes. The customers were various firms located around Pune city. The proprietors of corrugated factories had a problem from the customers. Table No. 6.33 and Chart No. 6.33 indicates this position. The large majority of the corrugated factories (54 factories or 90 per cent of the total) had opined that, they had two problems- one was 'the long credit period' and second was 'delay in payment'. Majority of the factories were facing these problems. The purchases of corrugated boxes were being done on the credit. Beside this, the actual payment was also made with delay. Both the problems were serious from the proprietors' point of view. To have a viable sustain, the factory must have cash transaction or in time receipt of payment. Otherwise, both problems would create unnecessary burden on the corrugated factories, which ultimately may end its existence. The customer always does this and creating an economic problem for the corrugated factories. The selected factories (4 factories or 7 per cent of the total) had some customers, who were rejecting the boxes for various reasons. The rejection of corrugated boxes was bringing economic burden on the factories. The number of such customers was less but altogether was a problem. Out of selected corrugated factories,

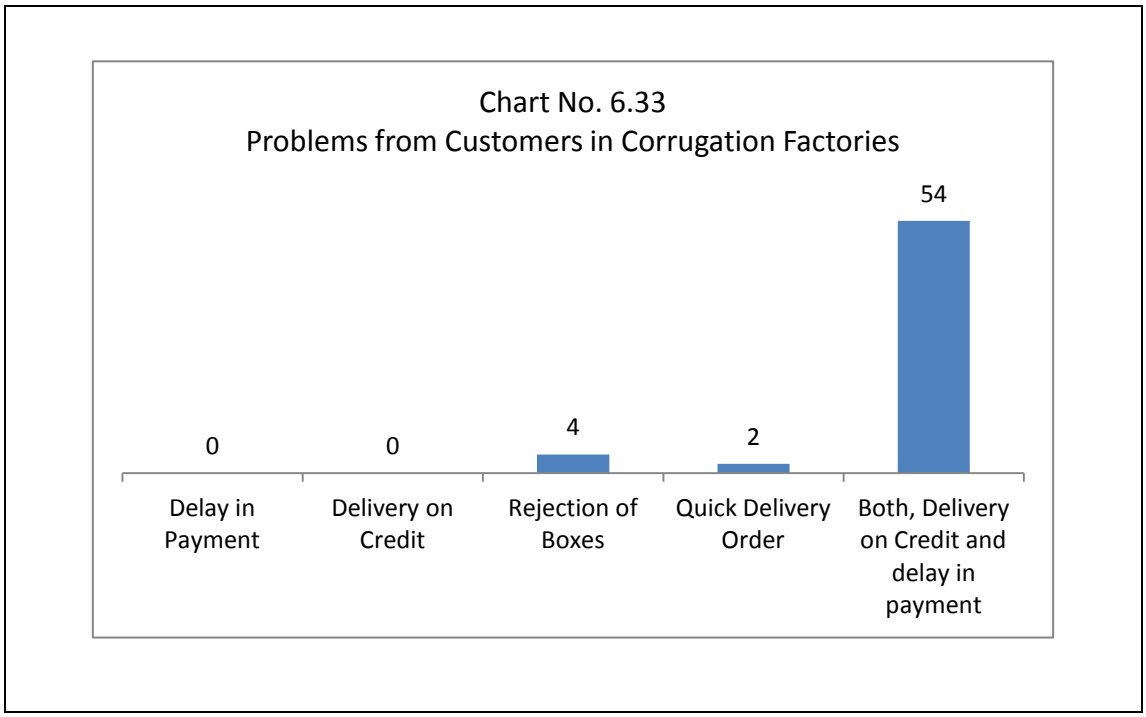
2 factories (3 per cent of the total) have stated that, some of the customer asks for quick delivery. This also was creating economic pressure on the corrugated factories, since this process needs financial transaction which the corrugated factories had raise by themselves. This was also a problem for corrugate factories. Altogether, most of the times customerswere creating economic problem for corrugated factories with extra financial burden.

Table No.6.33

Problems from Customers in Corrugation Factories

Problems From Customers	No. of Corrugation Firms	% of Total
Rejection of Boxes	04	7
Quick Delivery Order	02	3
Both, Long Credit and delay in payment	54	90
Total	60	100

Source: Field Survey



6.2.34 Nature of Sales in Corrugation Factories:

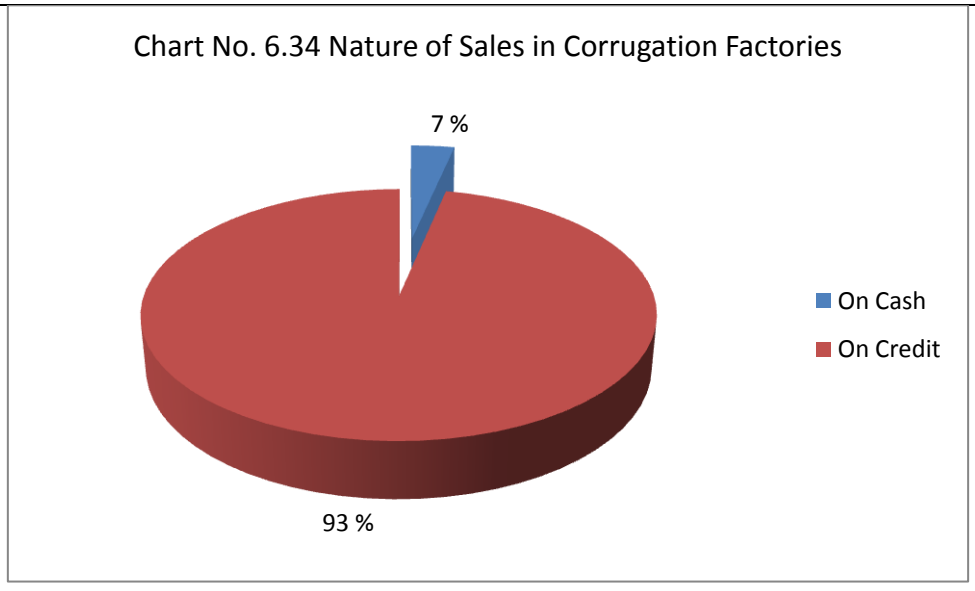
The corrugated factories were struggling hard to maintain their financial existence. The most problem was about the payment from the customers. Table No. 6.34 and Chart No. 6.34 indicates the nature of sales carried out by the selected corrugation factories. Out of selected corrugation factories, large majority of the factories (58 factories or 97 per cent of the total) had sales on credit. This means the majority of the factories were being paid later after the sale. This payment was not in time. Most of the time, the payment was made with delay. This nature of sales was creating financial problems for the corrugated factories. Out of selected corrugated factories, only 2 factories (3 per cent of the total) had sales on cash. These factories were being operated on manual labour with machines. The production level of these factories was limited. This gives an impression that; the nature of sales in the corrugation factories was being done on credit.

Table No.6.34

Nature of Sales in Corrugation Factories

Nature of Sales	No. of Corrugation Firms	% of Total
On Cash	02	03
On Credit	58	97
Total	60	100

Source: Field Survey



6.2.35 Problem of Cost of Production in Corrugated Factories:

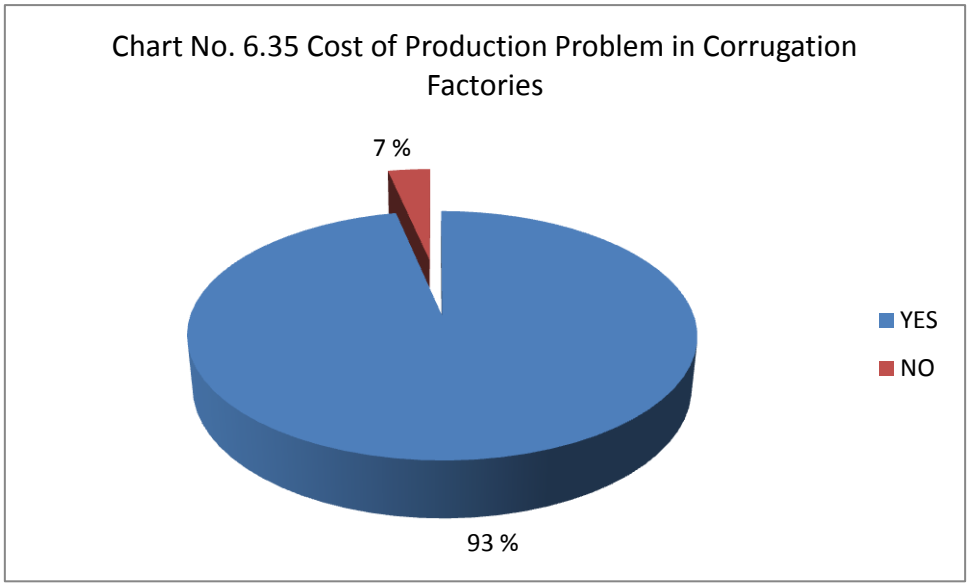
The cost of production of a firm is the most effective factor on the financial viability of it. The increasing cost of production has been major problem for most of the corrugated factories. Table No. 6.35 and Chart No. 6.35 shows that, large majority of the proprietors (58 proprietors or 97 per cent of the total)have stated that, the increasing cost of production has been main problem in the corrugated factories. Whereas 2 proprietors (3 per cent of the total) had no problem with the cost of production. The reason for increasing cost of production was due to increasing cost of raw materials, cost of labour and cost of electricity.However, the selected corrugated factories were struggling hard to control the cost of production through various means.

Table No.6.35

Cost of Production Problem in Corrugation Factories

Cost of Production Problem	No. of Corrugation Firms	% of Total
YES	58	93
NO	02	7
Total	60	100

Source: Field Survey



6.2.36 Measures to Reduce the Cost of Production:

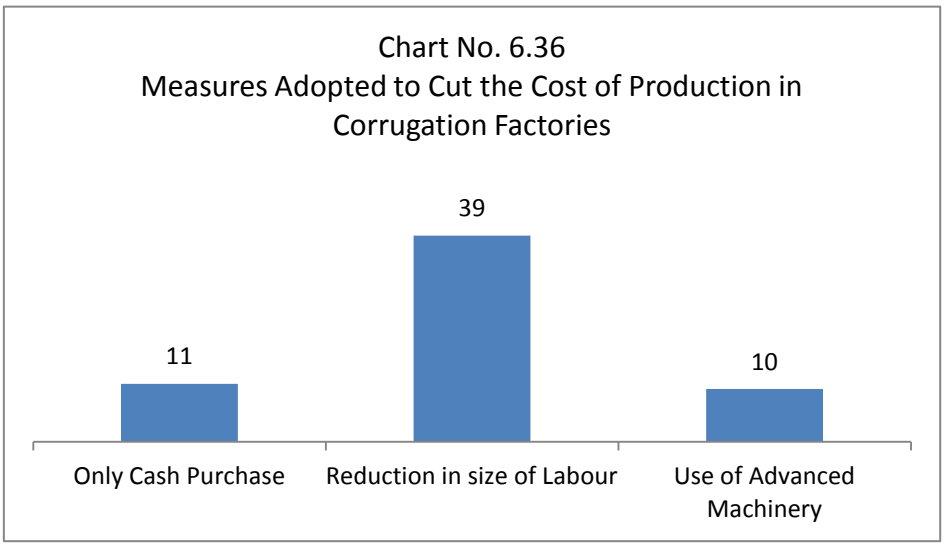
The increasing cost of production in corrugated factories was most common problem. Large majority of them had opined the cost of production over the years has been increasing. Therefore, they wanted to reduce the cost of production by adopting various measures. Table No. 6.36 and Chart No. 6.36 indicates that, the selected corrugated factories have tried to reduce the cost of production. According to this table, 11 factories (18 per cent of the total) have tried to promote the purchases on only cash. The purchase of corrugated boxes by the customers was being done on the credit. This was a big problem for the factories. Therefore, they tried to stick with the cash purchase. But this was very difficult to practice, since this may discourage the customers. Majority of the corrugated factories (39 factories or 65 per cent of the total) had adopted the reduction in the size of labour to reduce the cost of production. The labour cost in these factories was higher, which was increasing the cost of production. Therefore, these corrugated factories tried to reduce the size of labour. 10 corrugated factories (17 per cent of the total) had adopted the advance machinery to reduce the cost of production. The advance machinery could lead faster production process with less cost of production. This also reduces the requirement of labour. As a whole, the increasing cost of production in corrugated factories was more common problem for which they adopted various measures to cut the cost of production. Many of them had got success to some extent, especially those who had accepted advanced machinery.

Table No. 6.36

Measures Adopted to Cut the Cost of Production in Corrugation Factories

Measures for Cost Cut	No. of Corrugation Firms	% of Total
Only Cash Purchase	11	18
Reduction in size of Labour	39	65
Use of Advanced Machinery	10	17
Total	60	100

Source: Field Survey



6.2.37 Production Level in Corrugated Factories:

The level of production in corrugated factories was uniform. The level of production was different in different corrugated factories. The level of production was more depending on the advanced machinery and labour skill. The purchase order received by the factories was determining the level of production. Table No. 6.37 and Chart No. 6.37 indicates the production level in corrugation factories. 34 corrugated factories (57 per cent of the total) had a production level upto 250 tons per year. The corrugated boxes were being produced with different capacity. Out of the selected corrugated factories, 24 factories (40 per cent of the total) had production level between 251 tones to 500 tons per year. Remaining 2 corrugated factories (3 per cent of the total) had a production level more than 501 tons per year. This means more than half of the selected corrugated factories were having a production level upto 500 tones per year. The production level in corrugated factories during certain months was increasing as per the purchasing order.

Table No. 6.37

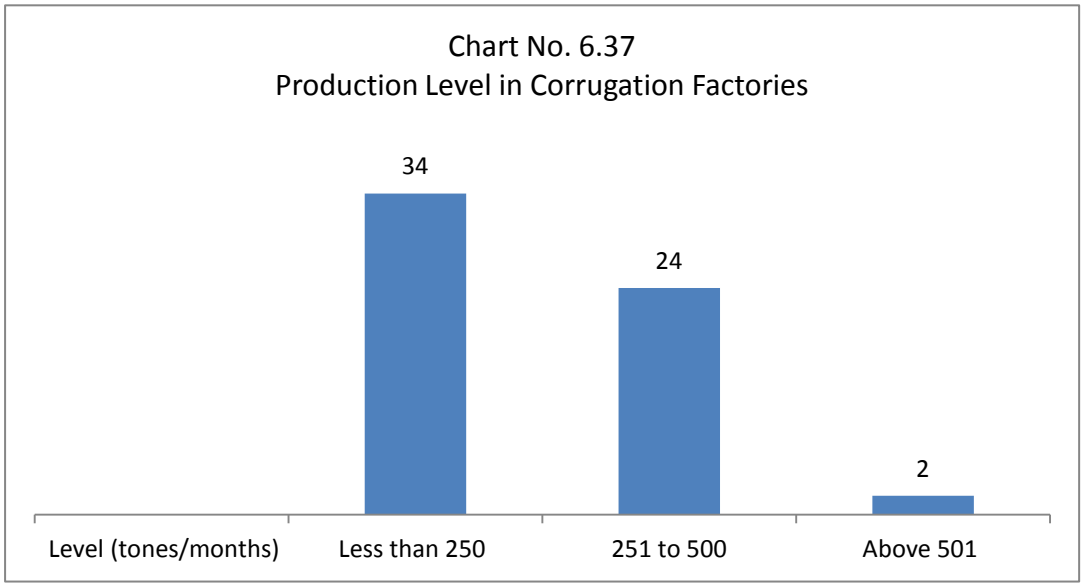
Production Level in Corrugation Factories

Production Level (tones/year)	No. of Corrugation Firms	% of Total
Less than 250	34	57
251 to 500	24	40
Above 501	02	03
Total	60	100

Source: Field Survey

Chart No. 6.37

Production Level in Corrugation Factories



6.2.38 Expenditure Categories in Corrugated Factories:

The researcher also has analysed the various indirect expenditure in corrugated factories. For the analysis, the researcher has considered on an average expenditure with a corrugated factory of having annual sales of Rs. 1 crore. This expenditure analyses was also applicable to all the other selected factories. The corrugated factories were spending on various raw materials and labour force. Major part of the expenditure was on the labour. Out of total expenditure, 39 per cent of the expenditure on the labour. This indicates that, the labour cost was comparatively higher to other cost categories. The second major expenditure was freight charges. 24 per cent of the total expenditure was spent on the freight. This was because of increasing cost of fuel and transportation cost. 12 per cent of the total expenditure on spent on sales and distribution. The corrugated factories which were adopting marketing strategy had spent some of the amount on these activities. The electricity was also a major cost category in the corrugated factories. 8 per cent of the total expenditure on spent on the electricity. The raw materials for manufacturing the corrugated boxes were paper and ink. The strapping roll was sharing 1 per cent of the total expenditure whereas ink was sharing 3 per cent of the total expenditure. The administrative staff charges were also higher. Out of total expenditure administrative charges were sharing 6 per cent. More interestingly, the wastage and scrap was sharing around 1 per cent of the total expenditure. The other charges were sharing 4 per cent of the total expenditure. The labour and freight charges were higher; both collectively were sharing 63 per cent of the total expenditure. This indicates that, the large share of expenditure in corrugated factories was on labour and freight. The other categories of expenditure were comparatively satisfactory. However, the proprietors were trying to reduce the cost of all categories by adopting various measures.

Table No. 6.38

Expenditure Categories in Corrugation Factories

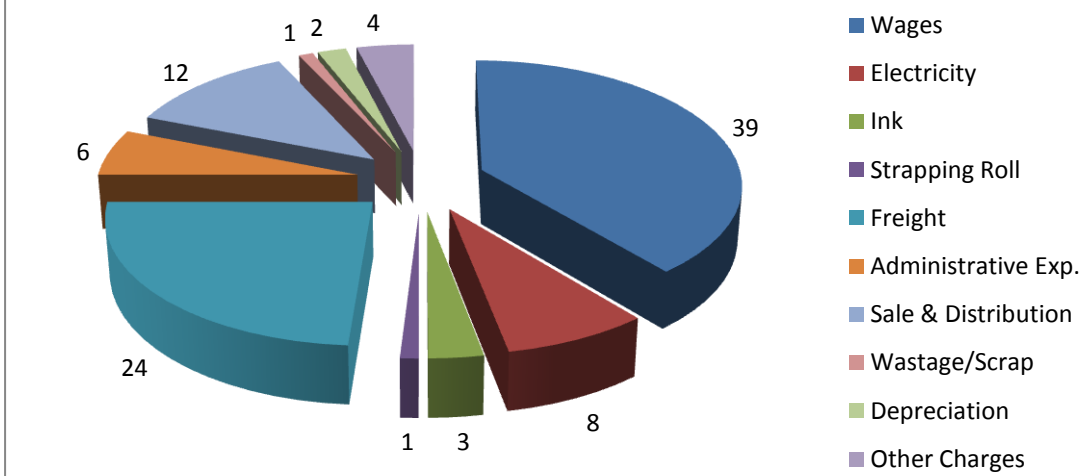
(For a Unit of Sales of Rs. 1Crores)

Sr. No.	Expenditure Category	Rs. Thousand /Month	% of Total
01.	Wages	325	39
02.	Electricity	70	08
03.	Ink	25	03
04.	Strapping Roll	10	01
05.	Freight	200	24
06.	Administrative Exp.	50	06
07.	Sale & Distribution	100	12
08.	Wastage/Scrap	10	01
09.	Depreciation	15	02
10.	Other Charges	30	04
	Total	835	100

Source: Field Survey

Chart No. 6.38

Expenditure Details in Corrugation Factories (%)



6.3 Summary of the Analysis:

The researcher has studied the corrugated factories established and working in Pune city and sub-urban area of Pune city on the basis of purposive sampling. The researcher conducted a pilot survey and found 300 corrugated industries in the selected region. The researcher has selected only small and medium sizecorrugated factories by neglecting the large units. The researcher has selected 20 per cent of the totaluniverse on the basis of systematic random sampling. After going through data analysis on various economic variables, the researcher came to following summary of the analysis.

6.3.1 Corrugated factories are major part of packaging industry. There has been increasing number of corrugated factories in India. This trend has promoted the packaging industry in India.

6.3.2 The progress of Indian economy and a rapid expansion of organized retail industry have raised the consumption of corrugated packaging materials.

6.3.3 The small to medium sized corrugated box plants are located near the customers or market.

6.3.4 The corrugated factories or plants are highly labour-intensive.

6.3.5 The corrugated factories were concentrated in and around Pune city after 'Mumbai' in Maharashtra State.

6.3.6 There were 300 corrugated factories in the selected region (Pune and around Pune).

6.3.7 The educational background of the proprietors of corrugated factories was rich. Among them, majority of them were commerce graduates.

6.3.8 The age structure of proprietors of corrugation factories indicates that, majority of them fall at the middle of the life age.

6.3.9 The gender structure shows that, there is an insignificant share of females in the proprietors of corrugation factories. The practice of gender structure in corrugated factories was replicating the traditional structure of Indian society or male dominant structure.

6.3.10 Majority of the factories were member of 'Pune Deccan Division' (PDD), an association helping for the corrugated industry.

6.3.11 Majority of the corrugation factories were being operated as a 'proprietorship' firm.

6.3.12 Majority of the corrugated factories were registered and working as medium scale industries.

6.3.13The average size of workers in the selected corrugated factory was 29 workers per factory.

6.3.14 The occupational structure was simple. The occupational positions were divided into three categories. They were- 'labour occupation', 'supervisor occupation' and 'manager occupation'. Majority of the workforce was belonging to labour force.

6.3.15 Majority of the corrugated factories were being operated with the single shift.

6.3.16 The capital investment level in the corrugation factories was higher. The minimum capital investment (on an average) in corrugation factories was Rs. 50 Lakh and the maximum capital investment was Rs. 5 crores.

6.3.17 The cost of raw materials, basically paper in the corrugation industries was higher and increasing.

6.3.18The majority of the corrugated factories had semi-automatic type technology.

6.3.19Majority of the selected corrugated factories had an independent marketing method.

6.3.20The majority of the proprietors had an opinion of that; the wage level which was being paid in the factory was higher.

6.3.21Majority of the corrugated factory proprietors has compared the level of investment and rate of return and found reasonable returns.

6.3.22Majority of the proprietors did not use the advanced marketing strategy due to the high cost of marketing.

6.3.23Majority of the corrugated factories has stated that, they had two major problems from suppliers. The problems were- high cost of materials and low quality of raw materials.

6.3.24Majority of the corrugated factories had two problems with the customers- one was ‘the long credit period’ and second was ‘delay in payment’.

6.3.25 Majority of the factories had sales on credit.

6.3.26Majority of the corrugated factories had adopted the reduction in the size of labour to reduce the cost of production.

6.3.27Major part of theexpenditure other than paper was on the labour followed by the freight charges.

CHAPTER VII

FINDINGS AND CONCLUSION

7.1 Introduction:

The corrugated factories have been existed or located in Pune city and around 'Pune' city. The factories are playing important role in providing packaging materials to various industries. The researcher has selected Pune city and sub-urban area of Pune city on the basis of purposive sampling. At the pilot study, there are 300 corrugated packaging factories/units in the selected region. For the purpose of the study these are classified accordingly to the size and capital investment. Out of total industries (300 units) only 5 industries are large scale units 1.6 per cent of the total units) Hence, the researcher has selected only small and medium size corrugated factories by neglecting the large units. Considering this classification, the researcher has used disproportionate sampling and has selected 30 per cent from small size and 15 per cent from medium size factories. Altogether, the researcher has selected 20 per cent of the total universe on the basis of systematic random sampling. Since the production method, machinery and labour size in each classified category is same; the researcher has treated these factories as homogeneous. Therefore, selected samples represent the whole universe.In general, this is the study of selected corrugated factories and the researcher has given analysis to the economic problems of corrugated industry. The findings of the study can be given as below-

7.2 Findings of the Study:

7.2.1 Higher Percentage of Educated Proprietors:

Out of 60 proprietors, 54 proprietors (90 per cent) were graduate, which shows that educational background of the proprietors was rich. Among these, majority of them (38 proprietors) were commerce graduates. Remaining 6 proprietors (10 per cent) were post-graduate. Out of them, 4 proprietors were holding a degree of 'Post-Graduate Diploma in Business Management' (PGDBM).

7.2.2 Higher Percentage of Middle Age Group

a) Out of selected proprietors, 3 proprietors (5 per cent of the total) are falling in the age between 20 to 25 years. These proprietors have established their

factories recently. 12 proprietors (20 per cent of the total) are of age between 26 to 30 years.

b) Majority of the selected proprietors, i.e. 32 of the proprietors (53 per cent of the total) are between the ages of 31 to 40 years. This can be stated as the middle age of the life.

7.2.3 Low Representation of Women Entrepreneurs

Out of the selected proprietors, 48 proprietors (80 per cent of the total) are males whereas, 12 proprietors (20 per cent of the total) are females. This gender structure shows that, there is an insignificant share of females in the proprietors of corrugation factories.

7.2.4 Membership of Association

Majority of the selected proprietors are the member of this association. 48 proprietors (80 per cent of the total) are member of two associations, namely 'Pune Deccan Division' and 'WICMA'.

7.2.5 Higher Percentage of Proprietorship Firms

The majority of the corrugation factories (41 corrugation factories or 68 per cent of the total) were 'proprietorship' firm. These firms were being operated by single owner. Whereas remaining 19 factories (32 per cent of the total) were being operated as the 'partnership' firm.

7.2.6 Higher Percentage of Medium Scale Industries

Majority of the operators or corrugated factories (43 factories or 72 per cent of the total) were working as medium scale industries. Whereas remaining 17 proprietors (28 per cent) were working as small scale industries.

7.2.7 Ideal Size of Workers

a) Altogether the average size of workers in selected corrugated factory was 29. Minimum number of actual workers was 25 whereas maximum number of workers was 36.

b) Out of selected corrugated factories, 35 corrugated factories had on an average 31 workers, 20 corrugated factories had 25 workers and remaining 5 factories had 36 workers. The workers had technically skilled and unskilled qualities.

7.2.8 Occupational Position

a) The occupational pattern in the corrugation factories was very simple. There was no complex segregation of occupations. The occupational positions were divided into three categories. They were- 'labour occupation', 'supervisor occupation' and 'manager occupation'. Majority of the workforce was belonging to labour force.

b) On average 26 workers was belonging to labour occupation, whereas on average 2 workers were belonging to supervisor occupation. There was only one manager in single firm.

7.2.9 Single Shift Working

Large number of factories (43 factories or 72 per cent of the total) were being operated with single shift. 17 corrugated factories (28 per cent of the total) were having two shifts for the production.

7.2.10 Huge Capital Investment

a) Out of selected corrugated factories, 7 factories (12 per cent of the total) had a capital investment of Rs. 50 Lakh, whereas the majority of the factories (33 factories or 55 per cent of the total) had a capital investment between Rs. 51 Lakh to Rs. 1 Crore. Remaining 20 corrugated factories (33 per cent of the total) had a capital investment between Rs. 1.1 Crore to Rs. 5 Crores.

b) The capital investment growth in the selected corrugated factories has increased over the years. Compared to capital investment in the year 2009-10, the year 2012-13 shows remarkable increase in the actual capital investment in the factories. 7 corrugated factories (12 per cent of the total) had a capital investment of Rs. 25 Lakh in the year 2009-10, which increased to Rs. 50 Lakh in the year 2012-13. This was double to earlier investment.

7.2.11 Growth in Capital Investment

The capital investment growth took place since the factories were getting good amount of returns. 33 corrugated factories (55 per cent of the total) had a capital of Rs. 50 lakh in the year 2009-10, which increased to 100 Lakh in the year 2012-13, whereas remaining 20 corrugated factories (33 per cent of the total) had a capital investment of Rs. 100 lakhs in the year 2009-10 which increased to Rs. 500 lakhs in the year 2012-13.

7.2.11 Indebtness

a) All the selected corrugated factories were being operated on the basis of bank loan. The amount of loan was higher and mostly used for the capital investment.

b) Out of selected corrugated factories, 23 factories (38 per cent of the total) had raised a loan of Rs. 50 Lakh and less than this amount. On an average, Rs. 37 Lakh amount was raised by these factories. Majority of the factory (27 factories or 45 per cent of the total) had a bank loan amount between Rs. 50.1 Lakh to Rs. 100 Lakh. and remaining 10 factories (17 per cent of the total) had a bank loan amount between Rs. 100.1 Lakh to Rs. 300 Lakhs.

7.2.12 Earning Rate

Out of selected corrugated factories, 12 factories (20 per cent of the total) were earning Rs. 6 Lakh per annum as the profit, Majority of the corrugated factories (38 factories or 63 per cent of the total) were earning Rs. 10 lakh per annum. Whereas 7 factories (12 per cent of the total) and 3 factories (5 per cent of the total) were earning annually Rs. 13 Lakh and Rs. 15 Lakh, respectively.

7.2.13 Reserve Fund

Out of selected factories, 12 factories (20 per cent of the total) had a reserve fund of Rs. 2 Lakh per annum. The reserve fund was kept for the innovative purposes, which was like boost for the corrugation factory. Majority of the corrugated factories (38 factories or 63 per cent of the total) had a reserve fund Rs. 3 lakh per annum. Whereas 7 factories (12 per cent of the total) and 3

factories (5 per cent of the total) had a reserve fund of Rs. 4 Lakh and Rs. 6 Lakh, respectively.

7.2.14 Huge Investment in Fixed Assets

a) Out of selected corrugation factories 12 factories (20 per cent of the total) had invested Rs. 20 Lakh in the fixed assets in their factories. This investment was in the year 2012-13. 7 corrugated factories (12 per cent of the total) had an investment of Rs. 40 Lakh, 15 corrugated factories (25 per cent of the total) had an investment of Rs. 80 Lakh and 23 corrugated factories (38 per cent of the total) had an investment of Rs. 150 Lakh.

b) Out of selected corrugated factories, 3 corrugated factories (5 per cent of the total) had a highest investment of Rs. 200 Lakh or 2 Crores in the fixed assets.

7.2.15 Purchase of Raw Materials

a) Out of the selected corrugated factories, 9 factories (15 per cent of the total) were spending Rs. 25 Lakh per six months on the purchase of raw materials. 15 factories (25 per cent of the total) were spending Rs. 35 lakh per six months on raw materials. Majority of the corrugated factories (33 factories or 55 per cent of the total) had spent Rs. 50 Lakh per six months on the purchase of raw materials.

b) The relatively larger sized corrugated factories were spending highest amount on the raw materials. 3 corrugated factories (5 per cent of the total) were spending Rs. 100 Lakh (or Rs. 1 Crores) per six months on the raw materials.

7.2.16 Semi-Automatic Techonlogy

Among the selected corrugated factories, the large majority of the corrugated factories (55 corrugated factories or 92 per cent of the total) had semi-automatic type technology. Only 5 corrugated factories (8 per cent of the total) had manual technology.

7.2.17 Independent Marketing

a) Majority of the selected corrugated factories (53 factories or 88 per cent of the total) had an independent marketing method. However, 7 corrugated factories

(12 per cent of the total) had special marketing department, through which marketing of products was being done.

b) The method of obtaining customers. Large majority of the selected corrugated factories (53 factories or 88 per cent of the total) had obtained their customers through their friends and relatives. However, there were 7 corrugated factories (12 per cent of the total) were obtaining the customers through marketing method.

7.2.18 Purchase Order

a) The purchase order level in the selected corrugation factories varies from 5 tons to 15 tons at a time. Out of the selected corrugated factories 17 factories (28 per cent of the total) had a purchase order of 5 tons at a time.

b) Majority of the corrugated factories (37 factories or 62 per cent of the total) had a purchase order between 6 tons to 10 tons, whereas 6 corrugated factories (10 per cent of the total) had a purchase order of more than 10 tons at a time.

7.2.19 Stock of Raw Materials

Out of selected corrugated factories 21 factories (35 per cent of the total) had a stock of less than 10 tons of paper of paper. This was the average stock of paper kept in godown of corrugated factories. 25 corrugated (42 per cent of the total) had a stock of paper between 11 tons to 20 tons and remaining 14 factories (23 per cent of the total) had a stock of paper between 21 tons to 50 tons.

7.2.20 Expenditure Method

a) Out of selected corrugated factories, 28 corrugated factories (46 per cent of the total) were paying Rs. 5000 per month as wage. 32 corrugated factories (54 per cent of the total) were giving a wage between Rs. 5001 to 7000 per month to unskilled workers.

b) Majority of the corrugated factories (41 factories or 68 per cent of the total) were paying Rs. 10,000 per month as a wage to every worker. 19 corrugated

factories (32 per cent of the total) were paying a wage between Rs. 10,001 to Rs. 15,000 per month for every skilled worker.

7.2.21 Wage Level

a) On an average, the skilled worker of corrugated factory was getting Rs. 12,500 per month.

b) Majority of the proprietors of corrugated factories (40 proprietors or 60 per cent of the total) have stated that, the wage level paid in the factory was higher.

c) Out of the selected corrugated factories, 12 proprietors (20 per cent of the total) have stated that, the wage level which was being paid to the workers was moderate level. Only 8 proprietors (12 per cent of the total) have opined that, the wage level in the corrugation factories was at low level.

7.2.22 Problems of Proprietors

a) Majority of the factories (44 factories or 73 per cent of the total) had faced skill level problem among the workers. The proprietors had an opinion that, the skill level of the workers was low, which was affecting the production process. Remaining 16 corrugated factories (27 per cent of the total) had stated that the skill level among the worker was moderate.

b) Majority of the corrugated factories (48 factories or 80 per cent of the total) had no problem of absenteeism. Remaining 12 factories (20 per cent of the total) have opined that the corrugated factories had a problem of absenteeism of workers.

c) Majority of the proprietors (46 proprietors or 77 per cent of the total) have given two reasons for leaving the jobs by the workers as low wage and less facilities. 8 proprietors (13 per cent of the total) have stated the low wage as single reason for leaving the job by the workers. 16 proprietors (27 per cent of the total) have stated ‘less facilities’ as the reason for leaving. And remaining 13 proprietors (22 per cent of the total) have stated as ‘personal problems of workers’ as the reason for leaving the jobs.

7.2.23 Overtime Policy

Out of selected corrugated factories, 19 factories (32 per cent of the total) have stated that, they did not go for overtime work. Majority of the corrugated factories (31 factories or 52 per cent of the total) had used over time to match the higher purchase order. Remaining 10 factories (16 per cent of the total) had an over time of 4 hours.

7.2.24 Problem of Automatic Technology

Majority of the corrugated factory proprietors (36 proprietors or 60 per cent of the total) have compared the level of investment and rate of return. 12 proprietors (20 per cent of the total) have opined that they could find the problem in using new technology. Whereas other 12 proprietors (20 per cent of the total) have opined that the level of investment required for semi-automatic or automatic technology was higher.

7.2.25 No use of Advanced Marketing Strategy

Majority of the proprietors (88 per cent of the total) did not use the advanced marketing strategy due to the high cost of marketing. Whereas, remaining 7 proprietors (12 per cent of the total) had opined that, they had no special marketing personnel.

7.2.26 Increasing Cost Raw Materials

a) Out of selected corrugated factories, 8 factories (13 per cent of the total) had stated that, the cost of raw materials was increasing. Majority of the factories (52 factories or 87 per cent of the total) had stated two problems as ‘increasing cost and low quality of raw materials’.

b) Majority of the proprietors (58 proprietors or 97 per cent of the total) have stated that, the increasing cost of production has been main problem in the corrugated factories. Whereas 2 proprietors (3 per cent of the total) had no problem with the cost of production.

7.2.27 Huge Competition

Majority of the corrugated factories (49 factories or 82 per cent of the total) have opined that, they face competition problem with other corrugated factories. However 11 factories (18 per cent of the total) did not find competition as a problem.

7.2.28 No Environmental Problems

a)` Majority of the corrugated factories (51 factories or 85 per cent of the total) have opined that they did not have any environmental problem. However, 9 factories (15 per cent) have found environmental problem in corrugated factories.

b) There is no pollution like air pollution, water pollution, sound pollution, drainage problem etc.

7.2.29 High Cost and Low Quality of Materials

Majority of the corrugated factories (52 factories or 87 per cent of the total) have stated that, they had two major problems from suppliers. The problems were- high cost of materials and low quality of raw materials. 8 factories (13 per cent of the total) had a problem of low quality raw materials.

7.2.30 Long Credit Problem

a) Majority of the corrugated factories (54 factories or 90 per cent of the total) had opined that, they had two problems- one was ‘the long credit’ and second was ‘delay in payment’. 4 factories (7 per cent of the total) were facing rejection problems.

b) Out of selected corrugation factories, large majority of the factories (58 factories or 97 per cent of the total) had sales on credit. Only 2 factories (3 per cent of the total) had sales on cash.

7.2.31 Low Percentage of Purchases on Cash

Out of selected corrugated factories, 11 factories (18 per cent of the total) have tried to promote the purchase on only cash.10 corrugated factories (17 per cent of the total) had adopted the advance machinery to reduce the cost of production.

7.2.32 Production Capacity

Out of selected corrugated factories, 34 corrugated factories (57 per cent of the total) had a production level upto 250 tons per year. The corrugated boxes were being produced with different capacity. Out of the selected corrugated factories, 24 factories (40 per cent of the total) had production level between 251 tones to 500 tons per year. Remaining 2 corrugated factories (3 per cent of the total) had a production level more than 501 tons per year.

7.2.33 Expenditure Categories

a) Out of total expenditure apart from paper, 39 per cent of the expenditure on the labour. 24 per cent of the total expenditure was spent on the freight. 12 per cent of the total expenditure on spent on sales and distribution.

b) The electricity was also a major cost category in the corrugated factories. 8 per cent of the total expenditure on spent on the electricity. The strapping roll was sharing 1 per cent of the total expenditure whereas ink was sharing 3 per cent of the total expenditure.

c) Out of total expenditure administrative charges were sharing 6 per cent. More interestingly, the wastage and scrap was sharing around 1 per cent of the total expenditure. The other charges were sharing 4 per cent of the total expenditure.

d) The labour and freight charges were higher; both collectively were sharing 63 per cent of the total expenditure.

7.3 Testing of Hypothesis

The researcher has set three hypotheses as below. These hypotheses have been tested with the help of statistical data.

Hypothesis No.1-

The financial strength regarding capital investment in corrugated industries is not satisfactory

Justification:

As indicated in Table No. 6.10 and Chart No. 6.10, the capital investment position in selected corrugated factories was relatively lower. As per the Government of India Guidelines on MSME, the investment limit was Rs. 5 Crores. However, in the selected corrugated factories, majority of the factories (40 factories or 67 per cent of the total) had an investment less than Rs. 1 Crore.

Therefore, the first hypothesis has been proved.

Hypothesis No.2-

The corrugation industries have greater potential to grow.

Justification:

As indicated in Table No.6.13 and Chart No. 6.13, the amount of profits and reserves in selected corrugated factories was increasing over the years. According to the proprietors, there was more potential to earn more profit.

As indicated in Table No. 6.11 and Chart No.6.11 the capital growth in 40 factories (67 per cent of the total) 2009-10 to 20120-13 was increased twice and in case of 20 factories (33 per cent of the total) during the same period was increased to five times.

On the basis of above justifications, hypothesis No.2 has been proved.

Hypothesis No.3-

The corrugation industry facing economical problems.

Justification:

As indicated in Table No. 6.12 and Chart No. 6.12, the loan structure in corrugated factories was common. The amount of loan was from Rs. 50 Lacs to 3 Crores.

As indicated in Table No. 6.16 and Chart No. 6.16, the level of technology was not automatic due to the requirement of huge investment. Although the growth potential was higher, it was not possible for proprietors to invest in large amount. Table No. 6.27 and Chart No. 6.27 also describes the technical problem in the selected corrugated factories

As indicated in Table No. 6.17 and Chart No. 6.17, the marketing method followed in the selected corrugated factories was independent in 53 factories (88 per cent of the total). The marketing expenses were large and unaffordable for the proprietors. (See Table No. 6.28 and Chart No. 6.28)

As indicated in Table No. 6.21 and Chart No. 6.21, the level of wage offered in the selected corrugated factories was relatively lower. The minimum range was Rs. 5000 per month and maximum was Rs. 15,000 per month depending on the skill of labour. However the low level of wage was discouraging the labour force to work on regular basis. The turn over ratio of labour has been higher. (See Table No. 6.25 and Chart No. 6.25). This has been a problem for corrugated factories.

As indicated in Table No. 6.29 and Chart No. 6.29, increasing cost of raw materials and low quality of raw materials were basic problems among the selected corrugated factories. 87 per cent of the total had opined these as problems.

As indicated in Table No. 6.33 and Chart No. 6.33, the long credit period and delay in payment were also the problems of the corrugated factories. 90 per cent of the proprietors had opined the same. This was increasing financial burden on the factories.

On the basis above justifications, the hypothesis No. 3 has been proved.

7.4 Conclusion:

The economic study on corrugated factories has given following conclusion. These conclusions have been drawn on the basis of economic indicators used for the analysis. The corrugated factories and the proprietors were part of this study. Hence, the conclusion drawn below replicates the position of them in general.

Corrugated factories are major part of packaging industry. The expansion of retail industry has promoted packaging and corrugated industry. The corrugated industries located were being operated on the small to medium sized plants with a labour-intensive technology. The proprietors with strong educational background have entered this industry of corrugation. The corrugated factories were getting help of various associations at regional and national level. These associations were providing technical help to these factories. The corrugated factories were single proprietorship firm registered as small or medium industry. The size of the workers was not large since the market structure was limited. The occupation segregation in the corrugation industry was not more complex. The level of investment in the corrugated industry has been higher, especially with semi-automatic technology. The corrugated industries were facing various problems related to raw materials, technology, marketing, cost of production, investment, expenditure, sales, repayment, labour skill etc.

CHAPTER VIII

RECOMMENDATIONS

8.1 Introduction:

After the data analysis, the researcher has given selected recommendations. These recommendations are based on practical problems. The researcher has considered the production and marketing approach in description of recommendations. The recommendations can be given as below.

8.2 Recommendations:

i. It is important to find out the type of boxes which are successfully being used by the industry in the country and make specifications in such a way that users are able to buy boxes of those specifications economically at the right price.

ii. Improvement is required to be made by small and medium paper mills. No, only technology, but vigorous personal management efforts are required to be made by these paper mills, to control and improve the quality of their paper.

iii. It is believed that with the liberalization of import policy for import of pulp and waste paper, the small and medium paper mills would be able to deliver goods.

iv. Government should liberalize the import of industrial kraft paper on concessional Import Duty to meet the future requirement of our industry and to create a healthy competition.

v. Requirement of kraft paper is going to be tremendous in the near future, with horticultural produce and packaging requirements going to go through. How to meet the exacting specifications is something that we should deliberate upon.

vi. With the dwindling forest resources in the country, the major hope for increase in production of paper will only be in the utilization of annually renewable agricultural resources like straw, bagasse etc. and recycling of waste paper and industrial waste to convert this waste into wealth. The bulk of the requirements of the packaging industry will have to be met by the small sector alone and to meet this challenge, the industry has to gear itself up both for increasing its production and upgrading its quality while ensuring that the ultimate cost to the consumer does not make it prohibitive for paper to substitute other packing commodities like wood or synthetics, plastics etc.

vii. Improve the quality of work by the use of advance machinery. Improve the life and improve the quality of environment. It suggests ways and means of doing work in short time. It helps to arrange for better life for workers. Improve productivity. Improve images as they are ideal workers. It helps improvement of the company.

viii. The corrugated manufacturers will have to be innovative to ensure that the market does not slip out of their hands in favor of substituting material.

ix. Design of the packaging, it is therefore necessary to evaluate the use of the most economic material. For instance, use of second grade paper or recycled paper can be tried out and can be accepted by the buyer if the performance is not affected. The supplier can assert himself based on his experiments and knowhow, offering practical and economical design without changing the performance of the exterior of the box and to do that, it is imperative to have a full knowledge of the different raw materials available in the market.

x. The statistics of India say today that as many as 30 million tons fruits, vegetables and other perishables get lost due to the lack of proper post harvest care and in that much more comes of the packaging and transportation.

xi. Kraft paper is normally made from tree based pulp however; it can also be made from non-conventional raw material such as bagasse. Or it can also be made from waste paper. Secondly, in earlier days, kraft paper used to be made from pine trees/oak trees/bamboo, etc. The average life cycle of a pine tree is about 35 years. The new developments have resulted in plantation of eucalyptus trees, which mature within 5 years. Therefore, the use of kraft paper tremendously reduces the dependence on conventional forest based pulp.

xii. The quality circle is essentially a team spirit of the management and workmen. One of the main function of quality circle is, how to bring down the cost of production, how to reduce wastage. Small group of workmen and supervisors meet daily during or after office hours and hold group discussions to find out the ways to solve the problems facing the quality control. The solution emerges through group discussions when recorded. The problems are identified and analyzed for finding a solution. The solution part should devolve on the Manager, Supervisors for implementation. The jobs of the workmen need to be updated through periodic meetings. Mutual discussions

may be held to find out as to how to improve the area of operation and the job so as to make the quality circle meaningful. In this way, the workmen can know each other; leadership is developed in the organization. With people working together the question of safety will invariably come up. Group discussions at certain intervals will automatically make the product better if the conclusions and findings are implemented forthwith.

xiii. In the second step, in any business organization, the junior officer can be made to act as a supervisor of the quality circle and made to conduct the meetings and find out solutions. How to encourage the workmen in developing the ideas for quality improvement and implementing the same is a matter to be tackled by the respective junior officers.

xiv. Quality Circle also differs from Productivity Circle. Productivity Circle has a different connotation. In Japan, the basic objective of the Quality Circle is to improve the quality of the products to be produced. All members get medals, certificates and not money.

xv. It has to be understood that quality circle is purely voluntary. The message of quality circle has got to be disseminated. Involve the workers in quality circle. The workers should themselves. Don't think you will get the result overnight. It is a continuous process.

xvi. Quality control is very important to performance and productivity. There has been a parallel upgrading of corrugated machinery, besides the quality of corrugated boxes and paper board. The main object of upgrading is to increase the efficiency of the products, besides productivity and also to reduce labor cost which is becoming very much costly in Europe today. By upgrading the machinery, there has been a marked improvement in the quality of corrugated boxes.

xvii. Central purchasing or group purchasing may reduce the purchase cost.

xviii. Not to participate in reverse auction to avoid the unhealthy competition.

xix. Technical training and education should be promoted to promote skill, which can minimize the wastage.

xx. Creating cost awareness amongst the corrugators.

xxi. Reasonable wages and other facilities like Provident Fund, Allowances, and Medical Facilities should be given to workers to reduce labour turn over rate. This would help to increase the production.

xxii. The internal transportation from the store area to the machines is carried out by hand. By using small roll conveyors or pallets on wheel would reduce the wastage and labour.

xxiii. Adoption of preventive maintenance would reduce the breakdown of machines. Proper and regular maintenance of machinery enhances the life span of the machines.

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Appendix No.I

Questionnaire

Research Topic- **"Analytical study of Economic Problems of Packaging Industry with special reference to Corrugation Industry in & around Pune region".**

A) Personal Information:

No.		
1	Name and address of the Firm	
2	Year of Establishment	
3	Name of the Owner or Manager	
4	Designation (Owner or Manager)	
5	Phone No. (Office)	
6	Mobile No.	
7	E-mail	
8	Educational Qualification (e.g. SSC, HSC, Diploma, Graduate, Post Graduate)	
9	Age	
10	Gender (Male / Female)	
11	Are you a member of any organization, if yes, please specify name: (e.g. WICMA / Deccan Division, Pune / IIP /FCBM / Any other)	

B) Business Information

1	Type of Organization (e.g Proprietor / Partnership / Private Ltd./ Public Limited /Limited Liability Partnership)	
2	Nature of organization (E.g. Small Scale- Sales upto Rs.1 crore p.a. Medium Scale- Sales Rs. 1 to 5 crore p.a. Large Scale- Sales more than Rs. 5 crore p.a.)	
3	Number of Workers /Staff: i. Labour ii. Supervisor iii. Manager	Trained + Untrained = Total + = = =
4	No. of Shifts (One / Two / Three)	
5	Capital Investment i) Upto 50 Lacks ii) 50 Lacks to1 Crore iii)1 to 5 Crore iv) More than 5 Crore	
6	Type of boxes produced	

7) Financial Position (Rupees in Lacks)

Head	2009-10	2010-11	2011-12	2012-13	2013-14
1) Capital					
2) Loan					
3) Creditors					
4) Other Liabilities					
5) Profits and Reserves					
Total (1 to 5)					
6) Fixed Assets					
7) Current Assets					
8) Investments					
9) Other Assets					
10) Losses					
Total (6 to 10)					
Yearly Purchases					

No	Question	Write Answer here
8	Technology Used for Production i) Manual ii) Semi-Automatic iii) Automatic iv) Outsourcing / Labour charges	
9	Marketing / Advertisement i) Own Marketing ii) Separate Marketing Dept. iii) Marketing through Agents iv) Mouth Publicity v) Any Other (e.g. Just Dial, Web, Yellow Pages, etc.)	
10	How you obtain the Customers / Clients i) Relatives ii) Friends iii) Marketing iv) Existing Customers	
11	State the type of material handling. i) Labour ii) Semi-Automatic Equipment iii) Automatic Equipment If equipment, then give name of equipment:	
12	State the size of Purchase Order, in terms of quantity: 1. Less than 5 tons 2. 6 To 10 tons 3. Above 10 tons	
13	State Average Monthly stock of paper held in godown: i) Upto 10 ton ii) 11 to 20 tons iii) 21 to 50 tons iv) Above 51 tons	
C) Economic Problems **1. Labour Problems relating to:**		
1	High rate of Wages	Yes / No
2	Untrained / Unskilled Labours	Yes / No
3	Payment range: **a) Skilled: (in thousands):** 10 to 15 15to 20 Above 20	

	b) Unskilled: (in thousands): Upto 5 5 to10 Above 10	
4	Whether the workers leave the job:	Yes / No
5	**iv) Reasons for leaving:**	
	a) Low wages:	Yes / No
	b) Less facilities:	Yes / No
	c) Competition :	Yes / No
	d) Workers' personal problems:	Yes / No
6	Is there any health problem due to corrugation work? If yes, please mention:	Yes / No
7	Motivations provided by organisation to workers/employees :	
	a) Allowances	Yes / No
	b) Medical	Yes / No
	c) Canteen	Yes / No
	d) Residential facilities	Yes / No
	e)Transportation	Yes / No
8	Is there any demand from workers regarding overtime?	Yes / No
9	If yes, how many hours?: 2Hrs. 4 Hrs. 6 Hrs. 8 Hrs.	
10	Is there any risk in machine handling?	Yes / No
11	Is there any insurance coverage for such type of risk?:	Yes / No
2	**Technical Problems:** 1. Problems in using new technology: 2. Easy Availability of operators/labours for new technology 3. Investment for new technology is huge:	 Yes / No Yes / No Yes / No
3	**Marketing Problems:** 1 High Cost of Marketing: 2 Non-Availability of Marketing Personnel: 3 Time required for marketing is huge (i.e. for development of new client):	 Yes / No Yes / No Yes / No
4	4.1 Whether there is problem of labors regarding availability?	Yes / No

	4.2 The cost of material is increasing?	Yes / No
	4.3 Does technological changes increase the competition?	Yes / No
	4.4 Is there any Environmental Problem?	Yes / No
5	**State the problems arises from suppliers :**	
	i) Regarding Quality:	Yes / No
	ii) Non fulfilling of Delivery Schedule:	Yes / No
	iii) Continuous increase in prices of Raw Material:	Yes / No
	iv) Inferior quality sent by supplier / mill:	Yes / No
	v) Interest to suppliers for delay payment:	Yes / No
	vi) Any other, please mention:	
6	**State the problems arises from customers :**	
	i) Recovery from debtors:	Yes / No
	ii) Long Credit Period:	Yes / No
	iii) Do not give sufficient time for Mfg.:	Yes / No
	iv) Makes delay for Payment:	Yes / No
	v) Bad Debts:	Yes / No
	vi) Rejection of boxes:	Yes / No
	vii) Any other, please mention:	
7	**Percentage of sales:** Cash	
	Credit	
8	Does your next Generation interested to continue the same business? If no, why?	Yes / No
9	Give the measures adopted to minimize the scrap/wastage	
10	Give the measures adopted to minimize the costing	

D. Monthly Data: (approximate)

1. Production per month: Ton

2 % of Paper consumed per month:

B.F.	16	18	20	22	24	28	Duplex Unquoted	Duplex Quoted
%								

3. GSM of paper consumed per month:-

GSM	100	120	140/150	160 To 200	Above 200	Duplex Unquoted 180	Duplex Quoted 230	Duplex Quoted Above 230
%								

4. Starch consumed per month:

Corrugation Powder kg.	Pasting Powder kg.	Corrugation Liquid Ltr.	Pasting Liquid Ltr.

5 Stitching wire consumed per month:

Ordinary kg.	Rust-Proof kg.	Brass Kg.	Other Kg.

6. Expenses details per month:

Sr. No.	Particulars	Units/ kg.	Rs. Per month
1	Wages	-----	
2	Electricity	units	
3	Ink	kg.	
4	Strapping roll	Meter	
5	Freight	------	
6	Administration Expenses	------	
7	Selling & Distribution Expenses	------	
8	Wastage/Scrap	kg.	
9	Depreciation of Assets		
10	Sales Per Months		

Appendix No. II

Selected Photographs

- Using powerful fork-lifts, skilled equipment operators select, move, and load rolls of craft paper at one end of the corrugators on reel stand.

- Corrugating is done in a machine that utilizes heavy rollers.
- One roll of cardboard is corrugated and then glued to other layer by the same machine.
- The glue is then cured by passing the cardboard over heated rolls.

- Sheet Cutter machine cuts the two ply sheet coming out of corrugation machine at desired length according tolength & width of the box.

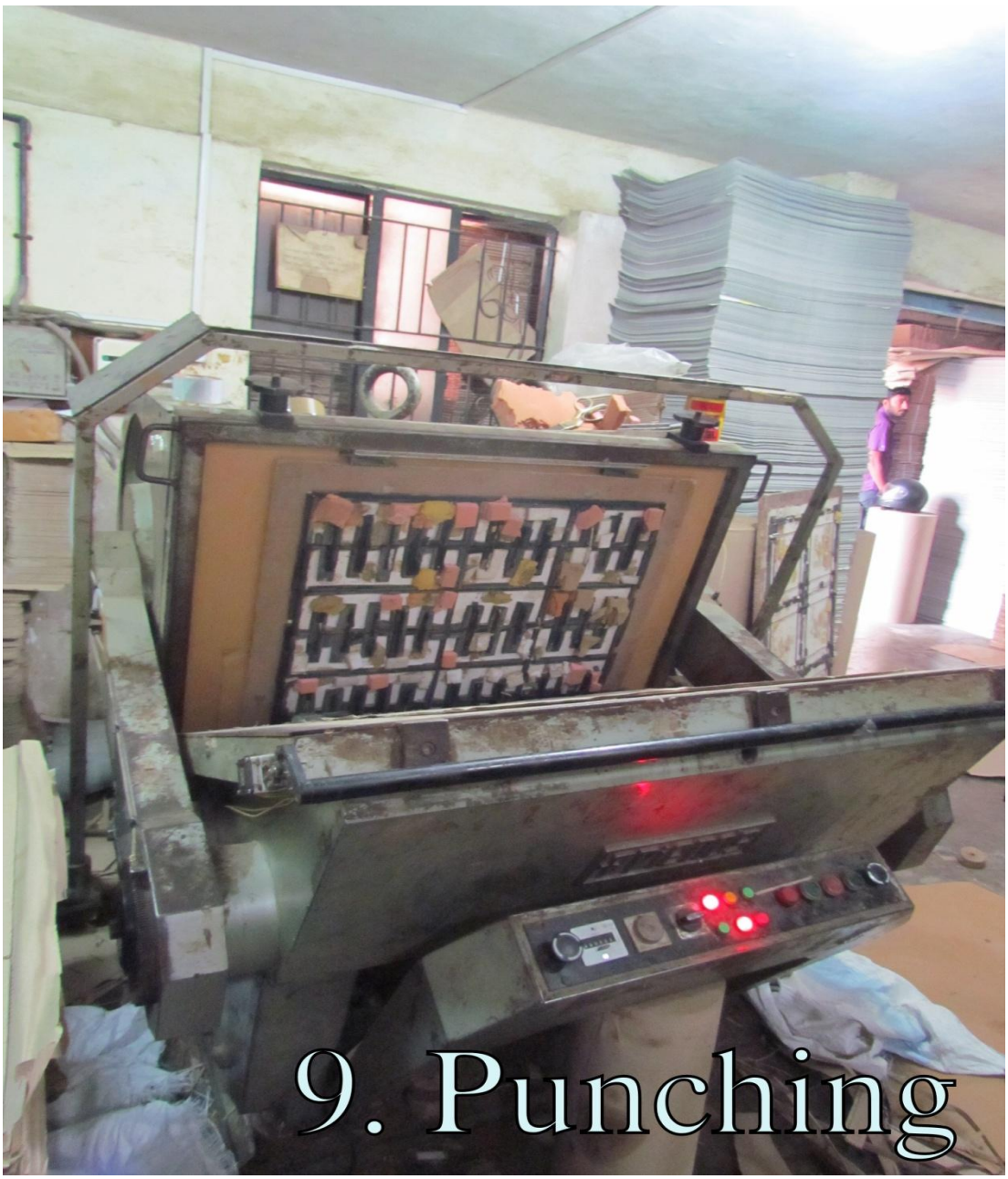
- Pasting machine is used to glue different two ply sheets & plain sheet.
- E.g. to make five ply sheet 2 two ply sheets & one plain paper is glued together.
- Plain paper is either plain or printed as per requirement.

- It comes with 4 Sets of Cutting and 4 Sets of Creasing Dies; it cut and creases the corrugated board simultaneously.
- Cutting is done to provide finished border to the box.
- Creasing is done to allow the sheet to be folded at desired position.

- This machine is combination of four bar rotary & slotting machine.
- Hence it allows border cutting , creasing & slotting function all at once.

- This machine is used to cut slots on the sheet which become the flaps of the box.

- This machine is used to staple both ends of the corrugated sheet to make as closed box.



The Die Punching Machine is used for cutting, Creasing, trimming the corrugated board and boxes.

- It can cut shaped Box small or Big, Cut Letter, Digits and number on Boxes with very fine and accurate cutting.

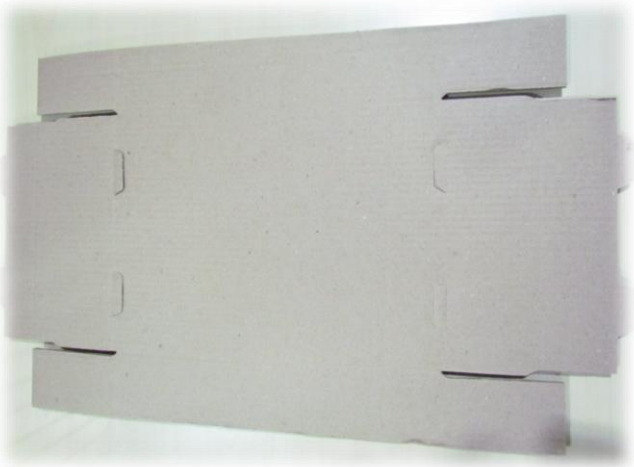
- This machine is used to make bundles of ready boxes.
- After this bundles of 10 to 25 boxes are ready for dispatch.

- This machine is used to check Burst factor of the paper coming from mill or corrugated sheet / box being dispatched.

- This machine is used to calculate Grammage per square meter of plain as well as corrugated sheet.

- This machine decides the weight carrying capacity of the box by calculating the force at which it gets punctured.

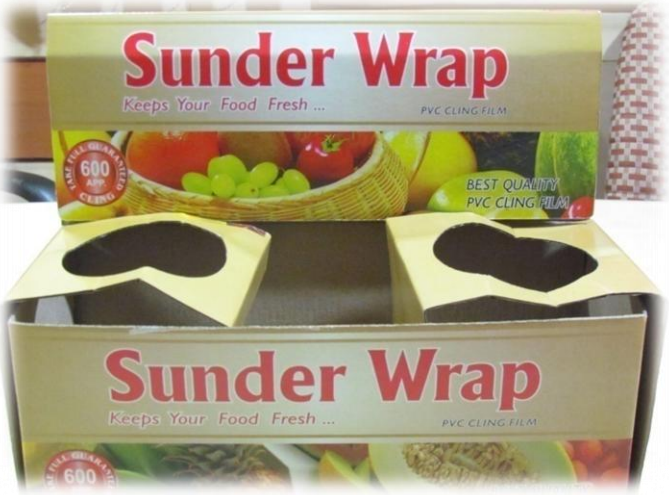
Stapled Tray



Self Locking Tray

Five Ply Universal Type Box

Three Ply Universal Type Box



Three Ply Punched Box

Three Ply Four Colour Dispenser

Three Ply Four Colour Gift Box

Appendix No. III

Costing, Quality and Maintenance Model

III-A) Costing

In corrugation Industry it is important to calculate the Cost. While calculating cost one must obtain following technical specification.[1]

- Style/Design of box i.e. universal or in any other shape.
- Product to be packed.
- Arrangement of contents in the box (alternatives).
- No. of plies of the box, including interior fitments.
- Type of paper: GSM/BF etc.
- Flute configuration i.e. E / Narrow / Broad flute etc.
- Minimum required bursting strength.
- Inside dimensions of the box and tolerances.
- Type of manufacturers joint.
- Detailed printing instructions,
- Quantity to be purchase
- Method of packing.

After receiving all the above details calculate the cost price. For these following various elements of cost to be considered.[2]

1. Box Size and Design/Style.
2. Kraft Paper Grade / Substance / No. of Plies / BF-NF.
3. Printing / Stitching / Punching / Bundling / Marking Details.
4. Sheet Size with Trimming.
5. Weight of Kraft Paper.
6. Waste Allowance.
7. Cost of Paper.
8. Cost of Adhesive.
9. Cost of Labor.

[1] The Corrugator July-Sept.2012

[2] Shah B.A. Proceedings of Technical Sessions, December 1982- August 1990, Page Nos. C4-C7, FCBM

10. Cost of Printing.
11. Cost of Coating / Waxing.
12. Cost of Stitching.
13. Cost of Packing.
14. Cost of Delivery.
15. Cost of Overhead.
16. Cost of Credit.
17. Profit.
18. Price.

Important Elements in Pricing:[3]

Three main factors are there

1. Direct Costs
2. In-Direct Costs (Overheads)

Direct Costs include

1. Cost of Paper
2. Cost of Labor
3. Cost of Gum
4. Cost of Pins
5. Punching Cost
6. Cost of Waste during process
7. Cost of Printing
8. Cost of Delivery
9. Cost of Sampling
10. Cost of Packing/Forwarding
11. Cost of Consumables

Cost of Labor should include

1. Salary of production personnel/ Wages
2. ESI
3. PF
4. Bonus

[3]Arora H. P .Proceedings of Technical Sessions, December 1982- August 1990, Page Nos. L4-L7, FCBM

5. Overtime Wages
6. Wages for Paid Holidays
7. Wages for Earned Leave
8. Gratuity
9. Labor Welfare

Indirect Costs include

1. Rent
2. Salaries of office staff
3. Sales Expenses
4. Cartage
5. Travelling and Conveyance
6. Printing and Stationery
7. Insurance
8. Tax, Rates,Factory License / Corporation License Fire License
9. Advertisement
10. Out of Pocket Expenses
11. Telephone, Telegram, Postage etc.
12. Interest
13. Depreciation
14. Repairs & Maintenance
15. Inward Transport
16. Oil and Lubricants.
17. Cloth
18. Packing Material
19. Gum Tape
20. Pooja
21. Samples for Testing
22. Entertainment
23. Electricity Light
24. Fire Hydrant Replacements
25. Awards
26. Advertisements
27. Donations
28. Professional Charges

Direct cost plays important role for fixing price. Therefore in calculating cost of paper, gum following factors to be taken into consideration.[4]

1. **Cost of Paper**
   a. Mill rate
   b. Excise
   c. Cess
   d. CST
   e. Freight
   f. Agent's Commission
   g. Moisture Content
   h. Wrapper / Gunny
   i. Core
   j. Interest for Credit
   k. Grammage Variation
   l. Cost of Keeping Unwanted Size
   m. Cost of Cuts, Ribbons
   n. Transit Insurance

2. **Cost of Gum**
   a. Price, CST
   b. Freight
   c. Cooking Cost / Steer Cost – Energy and Personnel
   d. Waste which is thrown out
   e. Wastage due to it being powder /wastage due to leakage in case of liquid.
3. **Cost of Pins**
   a. Price, CST
   b. Freight
   c. Wastage due to "Rust" or bad Reeling

[4]Murugan N. Proceedings of Technical Sessions, December 1982- August 1990, Page Nos. L18-L21, FCBM

4. Cost of Waste[5]

a. Corrugating
b. Reel Cutting
c. Roll Cutting (2 Ply)
d. Printing
e. Box Making
f. Grammage Variation
g. Extra Cutting
h. Deckle Suiting
i. While unloading from lorry/train
j. Due to transit damage – cuts
k. Due to bad reeling / winding
l. Due to moisture content
m. Due to extra size
n. Rejections and testing

5. Cost of Delivery

a. Packing / Bundling
b. Forwarding
c. Freight
d. Sampling
e. Urgent deliveries being in uneconomic lots
f. Rejections - returns

6. Cost of Credit Facility

a. Interest to our financiers
b. Overdue interest
c. Cheque realization time
d. Visits to collect Cheque

[5]Ibid

7. **Cost of Printing**
    a. Art Work
    b. Blocks / Negatives Positives
    c. Plate Making
    d. Minimum per 1000, Strikes – minimum 3000, Strikes per Color
    e. Any change on in layout or words you pay extra.
    f. Cost of ink consumed and number of copies
    g. Proofing Charges
    h. 2% to 3% Printer – Waste – 5% for short received.
    i. Variation in color / placement / spelling
    j. Labor
    k. Power

Practical Cost Estimation of Box:[6]

A) Paper

- Determine the area of board.
- Determine the number of liners and media required based on ply of the board.
- For 3 ply board, you need 2 liners and 1 media.
- For 5 ply board, you need 3 liners and 2 media.
- Total weight of liners = No. of liners X Area of board X GSM of liner.
- Total weight of media = No. of medias X Area of board X Take up factor (T.F) X GSM of media.(T.F.= Extra paper required for fluting)
- Total cost of liners = Wt. of liners X Rate of Paper
- Total cost of media = Wt. of medias X Rate of Paper.
- Rate per Kg of paper depends on Burst Factor of paper used.
- Total paper cost = Cost of liners + Cost of media.

[6]Excellence Learning Centre, Packaging Material Management, Page No.76-82

5 Ply Board, B/B		**T.F = 1.40**	**Area = 2 Sq.mt**	
Ply	**GSM/BF**	**Weight**	**Rate / Kg**	**Cost**
Liner 1	150/28	0.300 Kg	X_1	
Liner 2	120/24	0.240 Kg	X_2	
Liner 3	100/22	0.200 Kg	X_3	
Media 1	120/20	0.336 Kg	X_4	
Media 2	100/18	0.240 Kg	X_5	
Add 3 % paper wastage to the cost				
Total	***GSM / B.S**	**Weight**		**Cost**

***Total GSM is to be calculated as under**

GSM of Board

- GSM of corrugated board is weight of total paper used in liner and medium per square meter of the board.
- The take up factor for medium ranges from 1.28 to 1.55 i.e. 28% to 55% more paper is required in corrugation medium as compared to liner.

How to Determine GSM of Corrugated Board

- Example:- 5 ply board of all papers 150 GSM , then
- Find sum of GSM of all Liners.
  - GSM of Top + GSM of Middle + GSM Inner=150+150+150= 450 GSM
- Find sum of Take-up factor multiplied by GSM of each media.
  - [GSM of 1st Flute **x** Take-up Factor] **+** [GSM of 2nd Flute **x** Take-up Factor]
  - [150 x 40% of 150]+ [150 x 40% of 150]=210+210=420 GSM
  - Therefore total sum of these two is the total GSM of the board
  - GSM of the board =450+420=870 GSM

B) Cost Estimation of Adhesive

- In corrugation, that single face the adhesive required is 20 to 35 grams/ sq. meter.
- In lamination, the adhesive required is 40 to 45 grams/sq. meter.
- Starch based adhesives cost between Rs. 35/- to Rs. 40/- per Kg.
- For 3 ply board, there is one corrugation bond and one lamination bond.
- For 5 ply board, there are two corrugation bonds and two lamination bonds.
- For 7 ply board, there are three corrugation bonds and are three lamination bonds.

- For 5 ply board having area of 2 sq. meter
  - The corrugation adhesive required is 2 X 2 = 4 sq.mt X 30 grams/sq.mt = 120 grams of starch power
  - The lamination adhesive required is 2 X 2 = 4 sq.mt X 45 grams/sq.mt = 180 grams of starch power
- For 7 ply board having area of 2 sq. meter[7]
  - The corrugation adhesive required is 3 X 2 = 6 sq.mt X 30 grams/sq.mt = 180 grams of starch power
  - The lamination adhesive required is 3 X 2 = 6 sq.mt X 45 grams/sq.mt = 270 grams of starch power

The fact that adhesive is an essential component in the paper conversion industries and plays a very important role to achieve a desired quality of the board without distributing the economy on adhesive cost.[8]

Being a competitive market, we economize on adhesive also. Our efforts should be to use minimum possible water in our adhesive without stretching our economy on adhesive cost. We can use higher solids adhesive without stretching our adhesive cost.

Before going into the details of the required adhesive, let us see adhesive cost.

Liquid Corrugating Gum

Base	=	Starch with filing materials
Solid	=	8% to 10%
Viscosity	=	30 to 40 Seconds at Ford cup no. 4
PH Value	=	8 to 9
Color	=	Off White, Yellowish
Setting Time	=	Immediate
Cost	=	@ Rs. 36/- to Rs.40/-per kg. approx.
Quality of Required gum per M	=	30 to 40 grams approx.

[7]Excellence Learning Centre ,Packaging Material Management, Page No.76-82
[8]Goyal K.B. Proceedings of Technical Sessions, December 1982- August 1990, Page Nos. K63-K66, FCBM

Setting Time	=	should not settle for 8 hours
Quantity Required for Application		
Per Sq.M.of Board	=	20 to 35 grams/Sq.M. + 5%

Pasting Machine Gum[9]

Adhesive Base	=	Modified Starch
Solid Contents	=	20% to 25%
Viscosity	=	18 to 20 Seconds at Ford cup No. 4
PH Value	=	8 to 9
Color	=	Honey like transparent
Cost	=	@ Rs. 36/- to Rs.40/-per kg. approx.
Quantity Required for Application		
Per Sq. M.of board	=	40 to 45 grams/sq.m. + 5%

Cost consideration per square meter of board for the above adhesive.

For Corrugating Machine

Average quantity of gum required on corrugating machine is 20 grams/Sq. M @ Rs. 36.00 per kg.come to Rs. 0.72 per meter.

For Pasting Machine

Average quantity of gum required on pasting machine is 42 grams/Sq. M @ Rs. Rs. 36.00 per kgcomes to Rs. 1.51 per meter.

The total adhesive cost per Sq. Meter of 3 ply board comes in Rs. 0.72 + 1.51=Rs. 2.23 per square meter

By using more quantity of adhesive, you are feeding more water which is harmful to the paper. So our attempt should be to use more actual adhesive, i.e. solid contents and less water to avoid damage to paper fibre and to avoid drying problem. By using higher viscosity and lower solids, you require more gum to effective the bond at higher cost and higher risk of quality. On the

[9] Ibid

other hand the problem is by using higher solid and low viscosity. You require less gum to be used with excellent results. At the same time the cost of adhesive instead of increasing is reduced.

C) Printing[10]

- It calculated on per impression basis.
- Minimum quantity charged
  - For Offset printing is 3000 / 5000.
  - For Flexo printing is 1000.
- Cost ranges from Rs. 200 to Rs. 300 per color per 1000 impressions.
- Transportation, wastage to be considered.
- Box can be one-piece or two-piece depending on size.
- Screen Printing.

D) Stitching Pins

- The cost of stitching wire is
  - Rs. 70 to Rs. 75 per Kg for ordinary wire.
  - Rs. 90 to Rs. 95 per Kg for rust proof wire.
  - Rs. 75 to Rs. 85 per Kg for copper plated wire.
  - Rs. 500 to 550 per Kg for brass wire
- In one Kg of wire you will get approx. 2100 to 2300 pins.
- Cost of pins per box can be calculated knowing the number pins used per box.

E) Others

- Transportation cost varies from Rs. 0.40 to Rs. 1.00 per Kg of Box, depends on destination.
- You need to add finance cost depending on the credit period. This can be between Rs. 1.25 to Rs. 2.00 per month.
- Last give at least 5% of cost as return on Investment.

[1010]Excellence Learning Centre, Packaging Material Management, Page No.76-82

III-B Quality

Quality according to dictionary is defined as that which makes a thing what it is, its nature, character, kind, property, attribute, social status, presence of upper class collectively grade of goodness excellence, skill, accomplishment. Quality depends again on raw materials, skills of man power, designs and methods, care during manufacture, machines, attitude of buyer seller and labor and market conditions.[11]

Quality Controls

Quality is not something which is tested in the laboratory. It is only one aspect. Quality was built from the good manufacturing methods and other aspects that go into the manufacture of the products. The manufacturers should employ technical people and further upgrade their technical knowledge besides in-house testing facilities so that performance of the boxes could be regularly evaluated.[12]

For maintaining quality one should know the following [13]

1. Do we stick to –
   a. Schedules of delivery?
   b. Quality of product?
   c. Are we open to our Customer on the question of "Performance" vis-à-vis "Specifications"?
   d. Any variation in Quantity?

2. To produce quality the requirement is to have -
   a. A trained batch of workers
   b. Committed Management
   c. A quality raw material
   d. A quality planning
   e. A quality machinery
   f. A quality industrial relations

[11] Proceedings of Technical Session, December 1982 – August 1990, Page No.F11 FCBM

[12] Proceedings of Technical Session, December 1982 – August 1990, Page No.K11, FCBM

[13] Ibid Page Nos.G7-G12

3. How to achieve?
    a. Trained workers: updating their knowledge
        - Conduct lecturers
        - Commit them to "Zero Error".
    b. Regular meet of management cadre
    c. Testing of raw materials
    d. Proper pre-planning from the receipt of order to dispatch. Normally, at any given time, you should be able to state[14]
        (i) Its positions,
        (ii) Its terminal and
        (iii) No stuck up of production at any point of process whether it is printing, pasting, punching etc.
    e. Maintenance of machinery has to be regular.
    f. The labor relations should be such that laborers feel as part of the system and want to achieve "Zero Error". Management has also to feel the laborers as their kith and kin. Their human problems have to be attended to.

4. Testing of Incoming Raw Materials
    a. Grammage – 100 in place of 120 or 180
    b. Size
        - 45.3/4" in place of 46.1/2"
        - 49" in place of 46.1/2"
    c. Moisture content
    d. Bursting strength
    e. Cobb Value – Very Important
    f. Glue-Viscosity

5. Testing of Finished Products
    a. Style, Ply and Flute
    b. Printing details
    c. Size – Proper creasing and slotting, dimensions.

[14] Ibid Page Nos.G7-G12

d. Pasting – Delimitation, Warping, Wash boarding, uneven surface due to appearance of flute.
e. Stitching – Closures – manufacturer joints.
f. Whether flaps meet – Squaring? – Breaking of Flaps.
g. Specs
h. Bursting strength
i. Puncture resistance
j. Flat crush test[15]
k. Edge crush test
l. Interior fittings

6. Performance Standards
    a. Compression Test
    b. Drop Test
    c. Vibration Test
    d. Puncture Resistance

7. Relevance of gum
    a. Delamination
    b. Stiffness
    c. Reactivity on paper and ink – corrodes even the contents, if sodium silicate based
    d. Optimal percentage of moisture
    e. PH value – acidic and alkaline
    f. Viscosity (Quality of Gum)

8. Areas of Quality
        a. Production
        b. Scheduling
        c. Maintaining Specs

[15] Ibid Page Nos.G7-G12

9. Zero defect production

   Commitment to quality –

   a. By Owners
   b. By Managers
   c. By Laborers

10. Bubbles in pasting

    a. Height of flutes uneven
    b. Applicating roller uneven[16]
    c. Liquid gum viscosity – insufficient
    d. Uneven pressure

11. Doctor Finger Crescent – its importance

    a. Height of flutes uneven
    b. The flutes will be uneven, slanting, crushed
    c. Draw of corrugating medium will be erratic
    d. The "corrugating" will have improper strength.

12. Burrs in slotting

    a. The knives are not sharp
    b. Too much space between the knife edges
    c. Paper is wet

13. Paper has become very dry; or number of boards fed is excessive. Space between knife edges.

14. Stiffness

    a. Gum preparation and application defective
    b. The heating is more / less during manufacture
    c. The moisture content is more / less

15. Breaking of Flaps at Creased Places

[16] Ibid Page Nos.G7-G12

a. Lack of moisture content
b. Creaser head out of order
c. Creasing spaces insufficient
d. Defective paper

16. Shrinking of Boxes
    a. Cob value of paper defective
    b. Water content was more, which on drying is gone
    c. Boxes were made when wet

Quality Parameters for Kraft Paper

Kraft paper is the basic raw material of corrugated Fiberboard container and constitutes almost 75% of its input. Requirement of Kraft paper for Corrugated Packaging Industry is in respect of three qualities – known[17]

(a) 'A' Grade Kraft Paper – called as virgin kraft paper,
(b) Semi Kraft Paper – Known as 'B' Grade Kraft Paper, and
(c) Media Kraft – known as Media paper

The basic requirements of our industry as to kraft paper are:

1) Burst factor
2) Cob value
3) Ring stiffness
4) Tear factor
5) Moisture content
6) Consistency in quality
7) Standardization of substance
8) Proper runnability of paper reels on the machine
9) Equitable distribution of pulp
10) Ash, chloride, sulphate and other contents in paper.

[17]Mehra M.L. Proceedings of Technical Session, December 1982 – August 1990, Page No.E7, FCBM

Basis Weight Variation[18]

Since the tare weight of a box has to be specified and maintained within a specified tolerance, the basis weight (grammage) of paper has got to be controlled within the specified limits. Most of the Indian Mills are capable of maintaining the specified grammage +/- 5% limits, which is satisfactory. If the grammage of the papers is maintained within +/- 5% limits, then by statistical calculation, it can be seen that for a three layered corrugated board, the basis weight variation is most likely to be confined within +/- 2.5% only.

The importance of each and every physical/strength properties of paper governing the quality of cartons:[19]

1. **G.S.M.**

   With the GSM variation beyond certain tolerance say +/- 5% the cartons are bound to give varied in bursting strength.

2. **Bursting Strength:**

   Bursting Strength is by far most important strength characteristics locked for in CFCs. This particular property is responsible for sustaining the loaded material inside the CFC. The bursting strength of the papers used. The bursting of a paper is mainly a function of two factors: (i) its weight per unit area, and (ii) its intrinsic strength value, which is defined as BS in kgs/cm^2 divided by the grammagegms/cm^2 of the sheet, called "Burst Factor".

   Possibly the most important characteristic of paper which is sought for as this particular item is mostly responsible for the ultimate Bursting Strength of the Cartons.

   Bursting Strength vis-à-vis Burst Factor vs. GSM of paper. The Bursting Strength of the paper increases as the grammage of the paper increases, but the Burst Factor goes down. For example A 30 B.F. paper in 100 GSM means the Bursting

[18]Proceedings of Technical Session, December 1982 – August 1990, Page No.E51-E55, FCBM

Strength is 3.0 kg/cm^2. If the same furnish in the pulp stock to be maintained for the manufacturing of paper at 120 GSM, the Bursting strength would be 3.3 – 3.4 kg/cm^2, which means the Burst Factory of 28.

$$BF = \frac{BS}{GSM} \times 1000$$

GSM	100	120	140
BS	3.00	3.36	3.64
BF	30	28	26

Adhesive

There are two ways in which we consume adhesive. One is we buy the powder and mix it with water and alternatively we buy ready mix glue from glue suppliers. When we mix the glue in our own factory, we know how much of solid content that we are using in the glue, but if you buy it from ready mix manufacturer, we do not know to what extent of solid content we are using. Observation that we have made in the adhesive cost, lower the Grammage, lower the adhesive consumption, higher the Grammage, higher the adhesive consumption. There should be a particular quality check on the adhesive and it is left to each individual to decide what type of check he wants to make. There is nothing much that can to reduce adhesive consumption but we can control the quantity of glue consumed by recording properly and using it more effectively.[20]

Quality Parameters for Stitching[21]

Wire stitching is one of the earliest means of closing the joint of corrugated containers. U-shaped stitches are formed from a continuous length coil of steel wire by a machine which also applies the stitch to the board. All wire stitchers feed wire from a coil, cut to length, from it, drive it into corrugated blank and clinch the legs. A

[20] Proceedings of Technical Session, December 1982 – August 1990, Page No.F8-F9, FCBM
[21] Proceedings of Technical Session, December 1982 – August 1990, Page No.E61-E63, FCBM

wire stitch consists of a crown and two legs. Leg length can be varied within the capacity of the stitching machine.

In general a good stitch is one which has its crown flush with the surface of the material being stitched and the legs clinched tight enough to partially bury the ends in the material. Even though the stitch crown may appear to be correct, this is no guarantee that the stitch is properly clinched. Efficient operators inspect it periodically.

A proper stitch strength, will vary with tensile strength of the wire used, type of material in which it located, placement of the stitch in relation to the direction of shear and the thickness of the material. While stitches can be applied to the blank perpendicular, parallel or diagonal to the line pull, most units drive stitch in at 45 degree able so that whether corrugations are perpendicular or parallel to the manufacture joint, the stitch will never be parallel with them.

Getting a Good Stitch

Important adjustments must be made on any equipment to assure a good stitch. There must be uniform wire draw so that the correct amount of wire is drawn from the coil for each stitch. To check wire draw good operators will compare several out lengths of straight pieces of wire before they are formed into stitches. Wire draw must also be adjusted for thickness of board being stitched. Legs of stitch should be long enough for thickness of work after compression plus 3/16” to 5/16” on each leg for clinching. Legs should be of equal length. Operator may check this by turning the stitcher fly wheel by hand until legs protrude from ends to the flywheel and nothing whether exposed lengths are equal.

A good operator will check the top of the stitch, should be nearly flush with surface of the outer liner. Clinch legs only, are driven into the board. Wire cut off should be clear, without burrs which prevent straight penetration through the material. Inspect periodically the leg ends of unclenched stitches. Clincher adjustment also must be checked so that the legs of the stitch contact clincher grooves in same relative position. Clincher height must be watched carefully. Compression is sufficient when

the material being stitched is clamped firmly between the former and clincher. Sides of box forming join must lap not less than 1.25 and the stitches not more than 2.50 apart from this number and position of stitches for a box are usually dictated by the customer and are stated on a work order. Where the number of stitches not specified then use the rule “Half the depth of the box plus one or two depending on whether single or double wall board. “Following this rule, five stitches would be put in a single wall blank eight inches deep.”

Operators of these units must exercise a great deal of caution. For instance, they must avoid getting the last stitch in a box outside of the stitch flap. Such a stitch merely goes through the wall of the box weakening it at that point. Yet stitches must be as close to the box edge as possible or box may break along its stitch line instead of along its score line as it should.

Preventive maintenance of stitching machines is an important part of the stitching operation. Oil each machine thoroughly before each shift goes to work. The machine should be properly lubricated and checked.

III-C) Maintenance[22]

Maintenance of Machinery

Proper and Regular maintenance of machinery enhances its lifespan and also helps production uninterrupted

The entrepreneurs who neglect this maintenance part always have

a) Extra breakdowns in their factories
b) Labor who will have no scruples in spoiling the machine
c) The product at their end will be clumsy
d) They will pay a heavy price in the end when it will be too late for them to save themselves.

The dust and moisture in the atmosphere and the wear and tear due to continuous working of machinery are the three factors which tend to reduce life of machines.

Regular cleaning, proper lubrication, timely replacing of the worn out parts, regular painting, using of protective oil are the means of saving the life of a machine.

1. Corrugating Plant

When we do not use the total width of rollers, the used areas have the tendency to wear out the unused areas remain unworn. This results in faulty work when full width is used. To overcome this irregular wear-out, every week the feeding should be alternated from left-end to right-end, so that this partial wearing out can be overcome to a great extent.

2. Flutes Break During Manufacture

Reasons can be

- Breaks may be over tight
- Top pressure may be excess
- Doctor's setting may be faulty and
- Rewinding may be over tight

[22] Proceedings of Technical Session, December 1982 – August 1990, Page Nos.L22-L29, FCBM

3. **Flutes may be Slanting**

   Check for remedies in

   - Doctor's setting
   - Rollers setting
   - Rewinding unit.
   - Also check if the machine rollers are in level.

4. **While Corrugating, the Base Paper get Creasing Lines**

   Check up for

   - Doctor's setting
   - Improper heat
   - Uneven winding in reel stock

5. **Variation in Flute Height even after all adjustments are completed and Normal Production is on**

   - Look for gap in the bearings and the fluted rollers.
   - Doctor's setting may be faulty
   - Rollers alignment may not be correct
   - Thickness of paper may be uneven
   - Kraft reel unwinding may not be uniform due to breaking effect.

6. **Heaters Short Circuit**

   - The rod carrying the heaters might have sagged by bending.
   - Nichrome wire might have snapped.
   - Wire element might be touching the inside of the roller.

   Remedial Measures:

   - Nichrome spiral has the quality of sagging and expanding. Proper length should be maintained, after cutting off the extra length of spiral.
   - The position of rod as such should be regularly changed so that the sagging in different directions will straighten the rod.

7. System of Minimum Maintenance of Corrugating Plant

- Every evening, pour mobile oil on the rollers well.
- Every evening, remove the gum traces from the gum rollers.
- Next morning, pour mobile oil into the oil grooves in the bushes and other moving parts.
- It should be checked if the oil circulates in the machine. If need be, clean the nipple and replace the same. Oil coming out, should have the original color and not the black soiled color. The outcoming oil's black color is a sure indication that bushes and rollers are 'eating' and 'wearing out' each other. This must be immediately attended to. Correcting circulation of oil is more important than having production for the day.
- Every morning, first heat the rollers to a nominal heat of say 40^0 to 50^0. Then pour some kerosene over the rollers. This will burn away foreign and waste materials on rollers. Now take waste paper of full roller size and pass the same through rollers twice or thrice, till kerosene is removed. Apart from removing the waste materials and foreign materials from rollers, this also helps the rollers to harden by using mobile oil in the evening to cover the total roller. This helps rollers to attain back its original state without losing its shape and quality.
- Oil and grease circulation – checking every oil groove and grease hole is essential.
- Paint the machine's static parts once in a year.

8. Minimum Regular Maintenance of Pasting Machine

- Every evening drain away the gum from tray
- Fill up the tray with water
- Run idle machine for 10 minutes with water in the tray
- Drain out the water and bring down the tray
- Paint the static parts of the machines with red oxide and paint at least once a year.

9. Pinning Machine

Every week end, open the brake place the front head of pinning machine in a tray full of kerosene. This is necessary as Indian coils have burrs.

10. General

Remove every day from all gears teeth, from oil rotating parts of the machine – all dust and foreign parts. The machines and their surrounding must be cleaned. If not inconvenient, a compressor-blower should be handy to clean the machine.

11. Gears

- The meshing of gears should be proper. The stop pins should be checked if they are in gap or is tight.
- The grease should be regularly and properly used for the gears.
- These should be regularly cleaned for Dust.
- The meshing should neither be loose nor tight.
- In case by error, a tooth breaks, then the same should be first rectified by brazing and in the meantime a new gear prepared.

12. Pulleys

It is easy to manipulate the speed of the machine with the help of the pulley. But speed has to be manageable. It should not hurt the machine by excessive shake of the machine / machine parts.

13. Foundations

The machine should be properly founded on the ground. At the given speed of the machine, there should not be vibration of the paint. The foundation should be strong and deep. Care must be taken that the foundation is so laid that operating rollers of the machine is neither cross, horizontally nor paralleled when compared to other parts of the machine. The machine should be perfect perpendicular and perfect parallel. Set squares, drop line and Bubble-Gauge must be used for this purpose.

14. Knives Setting

- The movement of knives for cutting has to be based on the principle of scissors cutting. The 2 knives should never cut into one another. There should always be a space of 1 to 2 mm between 2 cutting knives, when they work against each other.

- Regular use of wax on the cutting edges of knives is a must.
- **Grinding**
  - While grinding knives, maintenance of original angle is very necessary
  - No knife is to be ground at 90

15. Punching Machine Safety

While guards for all moving wheels and gears are definitely required, safety guard for the punching machine operation is must. The guard shall be so provided that the operator's hand is thrown out beyond a certain point.

16. Electrical Safety

- Every machine should be earthed with three copper wire and salt and coal pit at least at 2 places.
- Tripping (MCB) system must be there for all motors.
- Voltage stabilizers need to be used.
- No electrical repairs should be done without putting off the mains.
- Rubber shoes must be made compulsory for all workers in factories.

17. Reel web Irregular Unwinding

The reel web will become loose on one side while being fed in the corrugation machine if

(a) Reel winding is loose

(b) Reel winding is uneven

(c) The grammage variation is there in the paper.

To overcome this, it is advisable to use spring loaded bearing dancing rollers to the machine for both the reels. This movement should be both horizontal and vertical.

18. Role of Doctor and Fingers

These are used for

(a) Keeping the paper web at regular distance from corrugating roller while passing over the middle roller and

(b) To feed it back in between pressure roller and middle roller and

(c) To keep some 'air' ship to make the board flexible.

19. Gum Application

Large gum roller should be smooth, even and true. All dirt deposit, dried gum must be removed from it. Applicator gum roller's grooves should properly seat the doctor fingers. This roller also should be devoid of deposits and should be even.

Distance between large gum roller and applicator gum roller should be so adjusted that distance between these two is even throughout the length and you get a thin capillary action lifting the gum uniformly. While moving the rolls, you should be able to observe a continuous thin glue line between two rollers.

To set the rollers properly, a small paper bit test is done at both ends. A small lengthy bit of paper of lower grammage is kept between Corrugating Roller (Middle) and applicator gum roller in between doctor fingers. The gum roller is lifted till it touches the corrugated roller. Now pull the paper and if it does not come out, it means that setting of fingers is alright and if it comes out the lower the gum roll and take small bits of paper and insert in between each doctor blades, remove one by one and adjust the fingers till all the bits of papers are properly seated.

20. Stitching Machine[23]

Preventive maintenance of stitching machines is an important part of the stitching operation. Oil each machine thoroughly before each shift goes to work. The machine should be properly lubricated and checked.

[23]Proceedings of Technical Session, December 1982 – August 1990, Page No.E61-E63, FCBM

LAYOUT[24]

In developing the layout, the task is to arrange the machines with their work areas and storage and service areas so that the bulk of the material flows through the plant in the most direct path with no wasted space or dead corners and In the least expensive building (as square as possible).

There are a number of points to be considered in developing the plant layout, among which the following are considered to be of importance:

1. Parts of the site which cannot be constructed should be utilized as service areas such as storage, parking, loading and unloading of trucks, etc.
2. The storage of finished products and roll stock should be located close to each other that gives a certain flexibility in storing these products.
3. Boiler and starch preparation rooms should be located as close as possible to the corrugation.
4. The waste collection area located as close as possible to the corrugation.
5. Offices for the foremen/supervisor should be located as close as possible to the machines.
6. Service areas like ink, glue, stitch wires, etc. close to the converting machines.
7. Try to plan the layout in L-shape to avoid turning the pallets from the corrugation.
8. Consider future expansion of the plant.
9. Upto a certain limit it is better to give preference to good function of the plant instead of construction cost.

It is not always possible to fulfill all requirements when developing a layout, but it is advisable to have them in mind.

Following individual areas make up the total area of the plant:

a. Roll storage
b. Machine areas
c. In-process storage areas
d. Finished storage
e. Truck docks

[24] Indian Institute of Packaging-2004-Page52-56

f. Boiler room
g. Adhesive mixing and storage
h. Waste collecting room
i. Maintenance shop
j. Sample room
k. Laboratory
l. Service
m. Office area (production)
n. General office
o. Changing room, toilets, lunch room, etc.

Storage/Shipping area[25]

This is tendency in the world of today to deliver the orders with a very short delivery time i.e. "Just in time" delivery (JIT).

JIT means to deliver the products, with a correct quality and according to norms specified, utilizing a minimum of storage area, in a minimum of time and just when the client needs the product.

There is no question that a manufacturer of corrugated boxes who has the maximum productivity and quality and can react very quickly to the demands of the customer, will have success in his business. In order to achieve this goal, it is necessary to have a good and efficient system to collect data of the production. There are several computerized systems which could be used. Anyhow these systems are very expensive and the need for a perfect organization of the production is a must.

Another form of JIT delivery is to have the storage/shipping area sufficiently big in order to store the product for the customer and deliver it when necessary.

[25] Ibid