TO STUDY STANDARD OPERATING PROCEDURES TO
MINIMIZE THE PACKAGING MATERIAL LOSSES IN
AMUL DAIRY PLANT

A PROJECT REPORT

Submitted by

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of

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UNDER THE GUIDANCE
OF

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(Assistant Professor)

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ANAND - 388 110

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DAIRY PLANT

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ABSTRACT

Indian economy was not the globalized till 1992; due to recession, the
government has to make strategic changes in economic policy during this
time. This new economic reforms came into action which leads to
globalization and made the Indian market open for world. Reforms raised
the competition for even survival of the domestic cooperative dairies.
Government realized the need to support the cooperative dairies and
decided to protect the cooperative dairies by introducing the Milk Shade
Area but it was introduced to groom the domestic cooperatives until it
becomes mature to a level where it can face the global competition. When
this cooperative sustained for almost a decade, government found them
sustainable and they decided to remove such barriers.

Today Indian traditional dairy cooperatives not only raised Indian milk
production highest in the world but it has also introduced the Indian dairy
product in foreign market. This needs to produce world class quality milk
products along with minimizing the cost of production. In modern age of
competition marketing experts has also considered Packaging as eighth ‘P’ of the marketing so Amul dairy realized to provide attractive packaging to its customers but at the same time they found that the losses of packaging material is a part of profit cake so they needs to monitor it.

This study is based on the problem suggested by the company which is namely “Study of Standard Operating Procedures (SOPs) to minimize the Packaging material losses in Amul Dairy Plant, Anand.” This study conducted at Amul dairy, Anand and Satellite Dairy, Pune with the objectives to minimize the packaging material loss and to understand the overall operation of both the plants.

Generally management reports are prepared based on the market survey and responses of the sample drawn by the researcher and statistical tools applied on it, but this study is based on the observations. Though expected outcome is a set of modification to existing SOPs but it is found that the problem identified was the symptom because most of the SOPs are found satisfactory along with the couple of modification proposed.

The word SOP was introduced in Amul dairy by ISO 9000 series with a focus to follow the set of procedures for performing the procedure to operate machinery or provide services. These SOPs are prescribed set of processes which are to be performed and previously studied followed by
approval from the management. These SOPs are able to fulfill the objectives of the organization and also simplifies the task to be performed.

The study found that machines are either old age technology or depreciated due to continuous operation. So, preventive maintenance is the key for minimizing the packaging material losses. It is also found that any deviation in course of action defined in the SOP results into the losses.

Finally study has recommended Training & development programs for work safety, hygiene, packaging practices; product loss minimization, utility conservation and motivation can help the organization in achieving the overall organizational goal.

Amul can also adopt new technology available in the market after analyzing financial feasibility. Pneumatic Ghee pouch packing machine can be converted into mechanically operated type of machine. In Butter department, parts replacement is proposed for depreciated parts.

It is also proposed to Satellite Dairy, Pune that they can go for automation of curd pasteurizer along with application of magnetic control valve. Milk pasteurizer also proposed to be provided with magnetic control valve to control hot water temperature in milk pasteurizer.
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5.1 Summary of the Project  

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<th>Description</th>
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<td>Anand Milk Union Limited</td>
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<tr>
<td>CBX</td>
<td>Corrugated Fiber Boxes</td>
</tr>
<tr>
<td>CRT</td>
<td>Corrugated Retail Cartons</td>
</tr>
<tr>
<td>DCS</td>
<td>District Cooperative Society</td>
</tr>
<tr>
<td>EIC</td>
<td>Export Inspection Council</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization</td>
</tr>
<tr>
<td>GCMMF</td>
<td>Gujarat Cooperative Milk Marketing Federation</td>
</tr>
<tr>
<td>GOI</td>
<td>Government of India</td>
</tr>
<tr>
<td>HR</td>
<td>Human Resource</td>
</tr>
<tr>
<td>KDCMPU</td>
<td>Kaira District Cooperative Milk Producers Unions Limited</td>
</tr>
<tr>
<td>kg</td>
<td>Kilo Gram</td>
</tr>
<tr>
<td>KSD</td>
<td>Satellite Dairy, Khatrej</td>
</tr>
<tr>
<td>ml</td>
<td>Millie liter</td>
</tr>
<tr>
<td>MMTPD</td>
<td>Million Metric Tone per Day</td>
</tr>
<tr>
<td>NDDB</td>
<td>National Dairy Development Board</td>
</tr>
<tr>
<td>NFDM</td>
<td>Non-Fat Dried Milk</td>
</tr>
<tr>
<td>NPC</td>
<td>National Productivity Council</td>
</tr>
<tr>
<td>PSD</td>
<td>Satellite Dairy, Pune</td>
</tr>
<tr>
<td>Rs.</td>
<td>Rupees</td>
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<tr>
<td>SOP</td>
<td>Standard Operating Procedure</td>
</tr>
<tr>
<td>SP tubs</td>
<td>Special Tubs</td>
</tr>
<tr>
<td>TDS</td>
<td>Total Dissolve Solids</td>
</tr>
<tr>
<td>TPD</td>
<td>Ton per Day</td>
</tr>
<tr>
<td>UHT</td>
<td>Ultra high temperature</td>
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<tr>
<td>UNICEF</td>
<td>United Nations Children's Fund</td>
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Date: / /2011

Place: Anand (TILAVAT ASHISHKUMAR KESHAVDAS)
CERTIFICATE

This is to certify that the project entitled “To Study standard operating procedures to minimize the packaging material losses in AMUL Dairy plant” of M.B.A (International Agribusiness) embodies bonafide research work carried out by Tilavat Ashishkumar Keshavdas under my guidance and supervision and that no part of this project work has been submitted for any other degree. The assistance, guidance and help received during the course of investigation have been fully acknowledged.

Place: IABMI, Anand
Date: / /2011

(Prof. Y. A. Lad) Advisor
DECLARATION

I hereby declare that the project entitled “To Study standard operating procedures to minimize the packaging material losses in AMUL Dairy plant” Submitted for the M.B.A (International Agribusiness) degree is my original work and this has not formed the basis for the award of any degree, associate ship or other similar titles.

Place: IABMI, Anand                      Name: Tilavat Ashishkumar Keshavdas
1. INTRODUCTION

1.1 Rationale of the Project
The study done at AMUL Dairy plant in order to understand the overall operation of Amul Dairy and packaging of materials losses. The study will help the organization in reducing the in-house packaging material losses. Amul dairy is using more than 500 million rupees in a year for their packaging material purchase so minimizing the packaging material losses in Amul is the major challenge for production department.

Now a day’s packaging is also being considered as eighth “P” of marketing so it needs focus more attention because after realizing its important it come to know that it is a costliest input for the organizations. Packaging plays an important role in sort of reaching to a final step of finished products.

The processing is a course of action where the raw materials are transformed into the final goods. It is vital to carry and store the finished goods in proper manner. The carriage and storage of final products can be done by means of proper packaging.

Packaging is the technique of placing a commodity into a protective wrapper or container to protect, carry, identify and merchandize the product. Packaging materials provide a sort of inert barrier that prevents the interaction of food products with the external environment.

This project is a true management study though it does not include the market research. This project is undertaken to understand the overall functions of AMUL Dairy. This will provide opportunity to learn about Management practices followed in the Amul dairy which can ultimately groom one to be a manager in broad area of dairy management.
However the core problem suggested by the company is to study the Standard Operating Procedures (SOPs) to minimize packaging material losses in Amul Dairy. AMUL Dairy is divided into several sections via Process, Milk Packaging, Flavored Milk, Ghee and Milk Powder. These sections not only do the packaging of final products after processing of the products but it also incurred losses. Company wants to study the Standard Operating Procedures (SOPs) to minimize the Packaging material losses.

Finally, the company is expecting a set of modification in SOPs to minimize the Packaging Material losses, which is an outcome of the study.

1.2 Packaging of Milk and Dairy Products

Packaging is a technique of using the most appropriate containers and components to protect, carry, identify and merchandise any product. It establishes an important link between the manufacturer and ultimate consumer for the safe delivery of the product throughout the different channels. Packaging is a significant course of action in distribution process by which losses can be balanced to a great extent with adequate protective packaging to withstand the hazards of climatic changes, transportation, handling etc.

Innovative packaging technologies have become a necessity for the development of extended shelf life and value added milk and dairy products. Packaging materials provide a sort of inert barrier that prevents the interaction of dairy products with the external environment. The secondary role of the packaging material is to care for storage and distribution.
The packaging material should satisfy some of the conditions listed below:

- It must protect and preserve the commodity from the time it is packaged till the product is consumed.
- It must be suitable for the selected sales and distribution pattern.
- It must be attractive to the consumer.
- It must be easy to open, store and dispose.
- It must facilitate the handling, storage and distribution.
- It must protect against biological, chemical and distribution damages.
- It must inform the consumer through the medium of labeling.
- It must impart security to the product through a tamper evident design.
- It must act as a marketing and advertising tool.
- It must protect the environment by taking the responsibility of empty packaging material after its use.
- It must be economical i.e. it should neither burn the purse of the consumer nor the producer.
Packaging Materials for milk and dairy products

The packaging materials for milk and milk products include paper and paper based products (coated or lined), glass, tin plate, aluminum foil, plastics and laminates.

1.2.1 Paper and paper based products

The paper and paper based products form an excellent packaging material for milk and milk products. They may be kraft paper, grease proof paper, vegetable parchment paper, glassine paper, wax coated paper, plastic coated paper, paper boards, solid fiber boards, liner boards, box boards etc. The papers are used in the form of boxes, bags, wrappers, cartons etc.

The advantage of using paper is that it is weightless, capability for printing on the surface, low cost and easy disposability. The disadvantages include tear strength of papers.

1.2.2 Glass

The glass may be transparent or opaque. Glass is used in the form of bottles, tumblers, jars, jugs etc. The advantages for using glass as a packaging material include its strength, rigidity, ability to have a barrier for water and gas and inertness to chemical substances. The disadvantage is its heavy weight, and fragility.

1.2.3 Tin plate

It may be made up of a thin sheet (0.025 mm thick) of mild steel coated on both sides with a layer of pure tin. It is desirable to have an internally lacquered can, which provides better resistance to corrosion. The
advantages of tin containers as a packaging material include their good strength and excellent barrier properties.

The disadvantages are their high cost, heavy weight, difficulty in closing the lid of the container, and disposal. The containers are mostly used in the form of can.

1.2.4 Aluminum foil

The common thickness of the foil used is 0.012 – 0.015 mm. To increase corrosion resistance, it may be lacquered (coated with lacquer) or a thin film of plastic can be applied for packing dairy products.

The advantages of these containers include good barrier properties, grease proof, non-absorption, shrink proof, odorless, tasteless, hygienic, non toxic, opaque to light, bright in appearance etc.

The demerits are its low tear strength, susceptibility to strong acids and alkalis. It is mostly used in the form of wrapper, carton and box.

1.2.5 Timber

The required qualities for the timber to act as a packaging material comprise its odorless properties, an attractive appearance and required mechanical strength. It may be treated with casein formalin, or sprayed with paraffin wax or plastics or to make it more water resistant and to avoid the passage of timber taint to butter. It is generally used in the form of a box, tub, cask or barrel.

1.2.6 Plastics

The use of plastics in packaging has made tremendous progress in recent years all over the world. A wide variety of plastics can be used as
thermoformed; injection molded or blow molded containers, such as bottles, cartons, cups, boxes etc.

The merits of rigid plastic containers are its low cost and ease of fabrication. The demerits are lack of product compatibility, low barrier properties, plastic deterioration, lack of resistance to high heat and fragility at lower temperatures.

Flexible plastic packaging films are used as wrappers or sachets or bags or pouches for packaging milk and dairy products. The flexible plastics can be classified into two types.

1.2.6.1 Low polymers

They include cellophane (coated with plain or nitrocellulose / saran / polyethylene) treated with cellulose etc.

1.2.6.2 High polymers

Polyethylene, polypropylene, polystyrene, poly vinyl chloride, poly vinyledene chloride (cryovac), rubber hydrochloride (Pliofilm), polyester, polyamide (nylon), saran (a mixed polymer), etc. form good packaging materials.

The advantages of flexible packaging films are that they can be easily applied and the packaging process can be readily mechanized; loss of moisture from the dairy product is practically nil in flexible packaging; it confers protection to dairy products against attack by microorganisms, insects etc.

The demerits are: not all technical problems in film packaging have been solved; failure to obtain a perfect seal and removal of all air before
packaging may lead to spoilage; the most careful attention to detail is necessary, else faulty production will result; etc.

Care has to be exercised in selecting grade plastics for packaging of milk and dairy products; otherwise toxicity, if any, from the package will be transferred to the products.

1.2.7 Laminates

They are formed by combining the complete surfaces of 2 or more webs of different films with the primary objective of overcoming the defects of single films.

Usually laminations are made to strengthen the film material, to improve barrier properties, to improve grease resistance, to provide a surface that will heat seal, etc. Some of the typical laminates available for packaging are paper-polythene, cellophane-polythene, aluminum foil-polythene, paper aluminum foil-polythene, polyester-polythene, etc.

There are different types of packaging materials available for packaging of dairy products. Packaging plays an important role in safety of food products so it needs a special attention. The packaging materials are decided on the basis of the requirement for the specific products.
1.3 Industry Profile

India is the highest milk producer in the entire globe and known as “Oyster” of global dairy industry. Milk production in India has come a long way over the years from a low volume of 17 MMTPD in 1951 to 114 MMTPD in 2010. The Indian dairy industry contributes about 15% to total milk production of the world. Today, the Indian Dairy industry stands at a mammoth size of US$ 70 billion. The level of processing in Dairy Industry is 36%. Indian dairy production is growing at an annual growth rate of 4% and Indian dairy market is currently growing at an annual growth rate of 7%.

![Figure 1: Key Facts of Indian Dairy Industry](image)

*Source: Global Trade Information Services*

India has also an added advantage of having the highest milch bovine population of 115.487 million in the world and thus has a tremendous potential to further strengthen its position in the world dairy market. In India about 55% of the total milk is produced by buffalo. The dairy industry in India has its base in the small holders and marginal farmers. A
huge base of around 11 million farmers organized into about 0.1 million village Dairy Cooperative Societies.

1.3.1 Structure of Indian Dairy

The country is the world’s largest milk producer and this industry plays a crucial importance to the country. India accounts for more than 15% of world’s total milk production (NDDB).

The Operation Flood program might have brought a revolution in the dairy sector but there is still much to be reformed. This is because about 80% of the dairy industry is unorganized. The organized sector still remains a minor stakeholder and handles about 20% of the milk whereas the unorganized sector of the dudhiyas and mithaiwallas still control about 80% of the industry.

In the organized dairy industry, the cooperative milk processors have a 60% market share. The cooperative dairies process 90% of the collected milk as liquid milk whereas the private dairies process and sell only 20% of the milk collected as liquid milk and 80% for other dairy products with a focus on value-added products. The Dairy Cooperative Network (As on March 2009) includes 177 milk unions which operates in over 346 districts and covers 1,33,349 village level societies which is owned by around 13.9 million farmer members of which 3.9 million were women. Milk is processed and marketed under Milk Producers' Cooperative Unions, which federate into 15 State Cooperative Milk Marketing Federations.

The annual value of India's milk production amounts to more than Rs.1430 billion in 2008-09. Dairy cooperatives generate employment opportunities for around 13.9 million farm families (NDDB).
The return on investment for the farmers who are a major stakeholder in the industry is on the downside and value percolation to the base of the chain has been minimal. It is estimated that for every liter of milk produced in India the farmer has an expense of about Rs 14 while the price he gets on every liter of milk sold is Rs 16 –18 which amounts to a margin of Rs 2 - 4 which is quite less if we consider the labor cost of the farmer himself.
1.3.2 Consumption Pattern

Dairy Cooperatives account for the major share of processed liquid milk marketed in the country. The demand for milk and dairy products is income-elastic and growth in per capita income is expected to increase the demand for milk and milk products.

In India, rural households consume almost 50% of India’s total milk production. The remaining 50% of milk production is sold in the domestic market. Of the share of milk sold in the domestic market, almost 50% is used as fluid milk, 35% is consumed as traditional products (paneer cheese, yoghurt and milk based sweets), and 15% is consumed for the production of butter, ghee, milk powder and other processed dairy products (including baby foods, ice cream, whey powder, casein, and milk albumin).

The organized dairy sector consumes 15% of India’s total milk production, which it uses primarily for the production of liquid milk, butter, cheese, and milk powder. Although some traditional products are manufactured by the organized sector, this market is dominated by the unorganized sector.

About 40 to 50% of Indian dairy farmers are associated with the organized sector, it is also estimated that approximately 65% of milk in India is consumed (in fluid or other forms) on farm or by the unorganized sector (local milk vendors, wholesalers, retailers, and producers themselves). Of the total milk distributed jointly by the organized and unorganized sector, approximately 46% of the milk is consumed in fluid form and the rest is processed into various milk products such as butter, yogurt, milk powder, etc. An account of India’s milk product mix based on industry estimates is given below:
Table 1: India's Milk Product Mix – 2009

<table>
<thead>
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<th>Variant</th>
<th>% Share</th>
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<tr>
<td>Fluid milk</td>
<td>46.0%</td>
</tr>
<tr>
<td>Ghee (clarified butter)</td>
<td>27.5%</td>
</tr>
<tr>
<td>Butter</td>
<td>6.5%</td>
</tr>
<tr>
<td>Yogurt</td>
<td>7.0%</td>
</tr>
<tr>
<td>Khoa (partially dehydrated condensed milk)</td>
<td>6.5%</td>
</tr>
<tr>
<td>Milk Powder</td>
<td>3.5%</td>
</tr>
<tr>
<td>Paneer (cottage cheese)</td>
<td>2.0%</td>
</tr>
<tr>
<td>Others including Cream, Ice cream</td>
<td>1.0%</td>
</tr>
</tbody>
</table>


### 1.3.3 Trade

#### 1.3.3.1 Exports

Despite being the world’s largest milk producer, India’s share in the world dairy trade is almost negligible. However, India is a net exporter of dairy products, export volumes of 2008-09 equating to more than 70,790 tons. India exports various categories of milk products including milk powders, baby foods, butter and other fats, casein, milk cream, cheese, and whey products. Milk powders and baby food exports constituted around 50% of the total dairy exports in volume terms during 2008-09, followed by butter and other fats, casein, milk and cream and other processed dairy products.
India exported more than 50% of its total dairy products shipments to the United States, Bangladesh, U.A.E., China, Egypt, and Singapore during the year 2008/09. The GOI has designated the National Productivity Council (NPC) and the Export Inspection Council (EIC), Ministry of Commerce and Industry, GOI as quality auditors for conducting periodic inspection of units registered under the MMPO to ensure compliance with sanitary, hygienic, and food safety measures. Registration of dairy plants with the EIC is mandatory for export quality certification.

1.3.3.2 Imports

Indian imports of dairy products are not substantial in volume. The volume of imports during 2008/09 was approximately 9,130 tons. More than 80% of dairy imports are butter and fats, whey and products, milk and cream, milk powders, and baby foods. However, increased lean
season milk supply shortages and rising demand for full-cream milk and milk fats are expected to lead to a rise in future imports of non-fat dried milk (NFDM) and butter oil.

India generally only exports a small percentage of its total production. Occasional Indian exports of NFDM (National Fat Dried Milk) and butter will occur when prices and regional demand create a market with neighboring countries. In 2011, Post forecasts exports of 15,000 metric tons of NFDM. Sufficient carry-over stocks from 2010 may increase NFDM exports from India in 2011. Overall 2010 NFDM exports have been revised down to 8,000 metric tons as India produced less NFDM due to imports of 30,000 metric tons. However, 2009 exports of NFDM are revised down by 50% to 15,000 metric tons due to strong domestic consumption of NFDM and high domestic prices.

On the import side, imports of milk powder in 2011 increased due to domestic stocks. Stocks grew due the March 2010 duty free import of 30,000 metric tons of milk powder to meet the requirements of state milk federations for making liquid milk during the lean/summer season of 2010. India imported 3,000 metric tons of milk powder at 5% duty in 2009 in order to meet a supply gap. In 2010 imports of butter increased to 15,000 metric tons following the government’s liberalization of duty free imports of butter oil (19,000 metric tons of butter equivalents) in March 2010. Duty free imports were allowed due to concerns of a deficient monsoon and resulting significant production drops which never materialized. In 2009 butter imports have been revised downward marginally by 2,000 metric tons at 28,000 metric tons.
Butter and other dairy derived fats constituted around 50% of total dairy imports in volume terms during the year 2009, followed by lactose (33%) and milk powder (8%). Import of milk and milk products is permitted without any quantitative limitations, although tariff rate quotas apply and import permits are required. In 2010, within-quota duty-free imports of milk powder and butter oil were allowed due to concerns that a possible deficient monsoon would lead to a difficult lean season (April-August) and further drive up prices. Quantities of NFDM imported above the assigned quota of 30,000 tons attract a basic duty of 60% while imports of butter oil above the assigned quota of 15,000 tons attract a basic duty of 40%.

Source: Global Trade Information Service Database (GTIS), 2009

Figure 4: India: Share of dairy products imports, 2009
1.3.4 Major Players in India

In India, the dairy industry is mainly dominated by cooperatives. In 2008-09, average daily cooperative milk marketing stood at 200.4 lakh liters; annual growth has averaged about 6.1% compounded over the last five years (NDDB). Dairy Cooperatives market milk in all metros, major cities and more than 2000 towns/cities. During 2001-2009 the daily milk supply by Cooperatives to each 1000 urban consumers has increased from 57.8 to 73.1 Kg per day (NDDB). The Dairy Cooperatives are one of the most successful cooperatives in India in this sector.

Gujarat Cooperative Milk Marketing Federation (GCMMF), which owns and markets the AMUL brand of milk and milk products, announced a record sales turnover of Rs. 6705 INR cr. GCMMF has registered a growth of 19.3%.

GCMMF has a wide product range. Of its various products, the Federation saw sales growth of 46% in Masti Dahi; ice-cream sales rose by 22%; Amul Cheese sales increased by 20% and fresh cream registered a growth of 39%. GCMMF’s Ultra high temperature (UHT) milk also grew strongly at 14%, along with beverage and chocolate sales, which grew by 25% and 30%, respectively. The Federation achieved sales growth in pouch milk by more than 21% and in value terms by 32% from existing markets only. GCMMF has achieved number one status in pouch milk sales in Delhi this year.

Nestle India has slashed the price at which it buys milk from farmers in Punjab. Nestle is the biggest buyer of milk in Punjab. Nestle India processes over 0.9 million liter milk per day at its Punjab unit, followed by Milk fed at 0.8 million liter per day, GlaxoSmithKline at 0.3 million liter per day and Lockhart at 0.25 million liter per day.
Apart from few, Private players are mainly focused on milk products other than packed liquid milk. There is a huge potential for processing and value addition in the organized sector, particularly in ethnic Indian sweets, which are largely sold in unbranded form in the market. The key differences between the organized and the unorganized sectors concern the level of investment in preserving the quality of milk, the technology used for processing and the compliance with food standards.
1.4 Company Profile

1.4.1 History

In pre independence era about six decades ago, the life of a farmer in Kaira was very much like that of farmers anywhere else in India. His income was derived almost entirely from seasonal crops. Many poor farmers faced starvation during off-seasons. Their income from milch buffaloes was undependable. The milk marketing system was controlled by contractors and middlemen. As milk is perishable, farmers were constrained to sell their milk for whatever they were offered. Often they had to sell cream and ghee at a throwaway price.

They were in general illiterate. But they could see that the system under which contractors could buy their produce at a low price and arrange to sell it at huge profits was just not fair. This became more noticeable when the Government of Bombay started the Bombay Milk Scheme in 1945. Milk had to be transported 427 kilometers, from Anand to Bombay. This could be done only if milk was pasteurized in Anand.

After preliminary trials, the Government of Bombay entered into an agreement with Polsons Limited to supply milk from Anand to Bombay on a regular basis. The arrangement was highly satisfactory to all concerned – except the farmers. The Government found it profitable; Polsons kept a good margin. Milk contractors took the biggest cut of the cake. No one had taken the trouble to fix the price of milk to be paid to the producers. Thus even under the Bombay Milk Schemes could not do betterment in the life of farmers of Kaira District. They were still at the mercy of milk contractors. They had to sell their milk at a price the contractors fixed. The dissatisfaction of the farmers keeps on growing. They went in delegation to Vallabhbhai Patel, who had advocated farmers’ co-operatives as early as 1942.
Vallabhbhai Patel reiterated his advice that they should market their milk through a co-operative society of their own. This co-operative should have its own pasteurization plant. His advice was that the farmers should demand permission to set up such a co-operative. If their demand was rejected, they should refuse to sell their milk to middlemen.

Vallabhbhai Patel pointed out that in undertaking such a strike there should be some losses to the farmers as they would not be able to sell their milk for some time. If they were prepared to put up with the loss, he was prepared to lead them. The farmers’ deputation readily accepted his proposal.

Vallabhbhai then sent his trusted deputy, Mr. Morarjibhai Desai, to Kaira District to organize milk co-operative – and a milk strike if necessary. Mr. Desai held a meeting in Samarkha village on January 4, 1946. It was resolved that milk producers’ co-operative societies should be organized in each village of Kaira District to collect milk from their member-farmers. All the milk societies would federate into a Union which would own milk processing facilities. The Government should undertake to buy milk from the Union. If this wasn’t done, the farmers would refuse to sell milk to any milk contractor in Kaira District.

The Government turned down the demand. The farmers called a ‘milk strike’. It lasted 15 days. Not a drop of milk was sold to the milk merchants. No milk reached Bombay from Anand, and the Bombay Milk Scheme almost collapsed. After 15 days the milk commissioner of Bombay, an Englishman, and his deputy visited Anand, assessed the situation and accepted the farmers’ demand.

Kaira District Milk Producers’ Union Limited, Anand. It was formally registered on December 14, 1946. Its objective was to provide proper
marketing facilities for the milk producers of the district. The Union began pasteurizing milk in June 1948, for the Bombay Milk Scheme – just a handful of farmers in two village co-operative societies producing about 250 liters a day.

An assured market proved a great incentive to the milk producers in the district. By the end of 1948, 432 farmers had joined village societies, and the quantity of milk handled by the Union had increased to 5000 liters a day.

In the early stages, rapid growth brought in its wake serious problems. Their solution provided the stimulus for further growth. For example, as the co-operative movement spread in the district, it was found that the Bombay Milk Scheme could not absorb the extra milk collected by the Union in winter, when buffaloes yielded an average of 2.5 times their summer yield. Thus by 1953, the farmer-members had no regular market for the extra milk produced in winter. They were again forced to sell a large surplus at low rate to middlemen.

The only remedy was to set up a plant to process the extra milk into products like butter and milk powder. The logic of this step was readily accepted by the Government of Bombay and the Government of India, except for a few doubt. The government of India helped the Union to get financial help from UNICEF and assistance from the Government of New Zealand under the Colombo Plan. Technical aid was provided by FAO. A Rs.50 lakh factory to process milk powder and butter was blueprinted. Its foundation stone was laid by the then President of India the late Dr. Rajendra Prasad on November 15, 1954. The project was completed by October 31, 1955, on which day the late Pandit Jawaharlal Nehru, the then Prime Minister of India, declared it open. The new dairy provided a
further impulse to the co-operative movement among milk producers. The union was thus enabled to organize more village co-operative societies and to handle more and more milk each year. This event also brought a breakthrough in dairy technology as the products were made processing buffalo milk for the first time in the world. Kaira Union introduced the brand “Amul” for marketing its product range. The word “Amul” is derived from Sanskrit word ‘Amulya’ which means ‘priceless’ or precious’. In the subsequent years Amul made cheese and baby food on a large commercial scale again processing buffalo milk creating a history in the world.

1.4.2 Amul Pattern

It is popularly known as ANAND PATTERN.
The Kaira District Co-operative Milk Producers’ Union (Amul) is headquartered at Anand. Planners, economists, administrators, dairymen, journalists have been visiting Anand to study the ingredients of its success.

The Anand Pattern is essentially an economic organizational pattern to benefit small producers who join hands forming an integrated approach in order to economy of a large scale business. The whole operation is professionally managed so that the individual producers have the freedom to decide their own policies. The adoption of modern production and marketing techniques helps in providing those services that small producers individually can neither afford nor manage.

It has succeeded largely because Anand Model involves people in their own development and because their interests are safe in their own hands. Under Operation Flood the entire institutional infrastructure set up at the village level, the district level and the state level is owned and operated by the farmers themselves. The Anand Model co-operatives have progressively eliminated middlemen, bringing the producers in direct contact with consumers.

The Anand Pattern succeeded because it gave a fair price to the farmer and high - quality milk and milk products to the consumer. What would have been middlemen’s profits in the earlier system got absorbed into development projects for primary producer or lower cost for the consumer. In short, the Anand Pattern meant the utilization of resources in the most profitable manner at grass-root level.
1.4.2.1 The Three Tier Structure

1.4.2.1.1 Primary Village Co-operative Society

The First Tier - Primary village Co-operative Society: An Anand Pattern
village dairy cooperative society (DCS) is formed by milk producers. Any producer can become a DCS member by buying a share and committing to sell milk only to the society. Each DCS has a milk collection centre where members take milk every day. Each member's milk is tested for quality with payments based on the %age of fat and SNF. At the end of each year, a portion of the DCS profits is used to pay each member a patronage bonus based on the quantity of milk poured. This also acts as a vital link for various productivity enhancement and development programs of farmer’s programmers’.

1.4.2.1.2 District Union

The 2nd Tier – District Union: District Union

A District Cooperative Milk Producers' Union is owned by dairy cooperative societies. It is a Union of primary village co-operative societies within a district. The Union buys all the societies' milk, then processes and markets fluid milk and products. Union also provides a range of inputs and services to village co-operative societies and their members: feed, veterinary care, artificial insemination to sustain the growth of milk production and the cooperatives' business. Union staff train and provide consulting services to support village co-operative society leaders and staff.
1.4.2.1.3 State Federation

The State Federation – 3rd Tier The

The cooperative milk producers' union in a state form a State Federation is an apex marketing body responsible for marketing of milk and milk products of member unions. The Federation also plays a role in the overall development of the district unions federated to it.

Maximizing farmer profit and productivity through cooperative effort is the hallmark of the Anand Pattern.

Millstones of Amul

- 1929 Shri Pestanji Edalji Dalal started polson dairy.
- 1945 Government of Bombay established Bombay Milk scheme.
- 1946 Meeting of Kaira District farmers was arranged by Shri M. Desai to organize co-operative society for milk.
- 1946 Union gets registered (certificate no. p.330/1946)
- 1954 Foundation stone laying ceremony was performed by Dr. Rajendra Prasad, the President of India.
- 1954 Opening ceremony the dairy was performed by Prime minister of India Shri Jawaharlal Nehru.
- 1964 Cattle feed factory was started at Kanjari Village.
- 1973 Production of high protein food and chocolate started at Mogar Complex.
- 1976 Production of Nutramul started at Mogar.
- 1981 Second plant of cattle food factory started at Kanjari.
- 1992 The foundation stone of the New Dairy Plant (Amul – 3) was laid by Dr.V.Kurien the chairman of National Dairy Development board
1994 The new cheese plant was established at Khatraj and chocolates plant established at Mogor with the help of NDDB.

2001 Amul Launch the new flavoured milk. This flavoured milk available in four Different tests.

2003 For expanding the market Amul launch the “Snowball” pizza and flavoured Lassie.

2004 Amul keeps on achieving new highs in this competitive world. It has launch CHOCOZOO [Chocolate], MUNCHTIME [Gathiya]. Amul also started the new Satellite dairy at PUNE and COLCUTTA. This will help Amul in expanding milk marketing in other state.

2008 Amul is going to launch the new product named AMUL MILK SHAKES in three flavors i.e. Banana, Mango, Strawberry.

2010 Amul has Collaboration with ANAND & KIRAN OIL COMPANY and start to sell ANAND EDIBLE OIL for only who give Milk to AMUL at reasonable price than market price. And in Short time AMUL will take over ANAND & KIRAN COMPANY.

This shows the whole evolution of the Amul Dairy starting from 250 litres up to 18 lack litres of handling capacity. This is enough to understand how the Asia’s largest milk brand grown.

1.5 Objective of the Study

The specific objectives of the study are:

- To study the SOPs to minimize the packaging material losses.
- To study the operation of AMUL Dairy, Anand & Satellite Dairy Pune.
2. REVIEW OF LITERATURE

According to Grusenmeyer David (2000), it was stated that the most important part in development of SOPs is to first realize that developing useful and effective SOPs requires time and commitment from all management and employee levels. The SOPs can be developed by employee orientation and training, refresher training, advanced training, work site reminders, cross training, performance appraisal, employee safety and accident prevention, food safety and bio-security, process improvement, quality control, environmental protection, or job description development. In order to have a command on development of SOPs the task should be to “control procedural drift” by ensuring that the SOP is followed consistently over time and establish an evaluation and review system to be certain that over time all the steps of an SOP are still correct and appropriate for the production system.

According to the National Fire Protection Association (NFPA) quoted in a report of FEMA (1999), SOP is defined as “an organizational directive that establishes a standard course of action.” In other words, SOPs are written guidelines that explain what is expected and required by personnel in performing their jobs. It was also mentioned in the report that SOPs don’t describe how to do the job (technical skills), they describe the department’s rules for doing the job (procedural guidance). As such, they provide a benchmark for personnel, an objective mechanism for evaluating operational performance, and a tool for promoting a positive organizational culture.

According to FEMA (1999), SOPs information helps standardize activities and promote coordination and communications among
personnel. SOPs also simplify decision-making requirements under potentially stressful conditions. SOPs clarify the department’s operational philosophy and recommended practices. As such, they may prove useful in communicating organizational intentions and requirements to outside groups, or enhancing the public’s understanding of the fire service.

It was mentioned in the report of FEMA (1999) that SOPs must be written clearly, concisely, and unambiguously. They should be organized and presented in a manner that is “user-friendly” and readily accessible during operations. All department personnel should understand that, with the exception of critical health and safety issues. The quality of SOPs will largely reflect the composition and leadership of the SOP Development Team, the level of support provided by the department, the team’s ability to establish realistic goals and acceptable procedures.
3. METHODOLOGY

3.1 Background of the study

AMUL is a unique and successful model of its own kind in the dairy industry. The study is conducted to know about the efficacy of Standard Operating Procedures (SOPs) at AMUL dairy plant in order to minimize the packaging material losses. Packaging is done at the final stage when the raw form of material is converted into finished goods and ready for final consumer use. Packaging is essential for the finished goods as it prevents the goods from external environment factors and protects it. The core problem specified by the company is to minimize the packaging material losses during the process of packaging which ultimately incurs losses along with overall briefing of overall operations being carried out at the Amul Dairy Anand and Satellite Dairy Pune. This project involves in-house observation and does not include the market research. Thus this study is oriented towards finding out the measures for reducing or minimizing the packaging material losses.

3.2 Nature of the data

The project work involves the observations on various Packaging Methods followed in AMUL Dairy and collection of data from various secondary sources. It is propose to be done as follows -

- **Primary data**: Observation on packaging methods.
- **Secondary data**:  
  - Company database: Material movement registers of dairy, Internet  
  - Publications: Manuals of machine manufacturer, other industry reports and Packaging Books.
3.3 Instrument of study

The different instrument used in the study and data collection is observation of the packaging procedures.

3.4 Area of the study

The study is conducted in the operation department at AMUL dairy plant, Anand and Satellite Dairy, Pune.

3.5 Scope of the project

1. It mainly focuses on the standardization of various Packaging SOPs to minimize the Packaging Material losses.
2. It will ultimately help to increase efficiency of packaging, which will also increase profitability.
3. This study provides opportunity to understand the overall functions of AMUL Dairy.
4. It provides understanding for communication, methods followed in Hierarchy and various departments of the dairy.

3.6 Limitation of the study

No survey is free from its limitation though it may be observational in nature. Even the present study is not an exception to this case. These are the few limitations of the study given below:

1. Time span is biggest limitation
2. As this research is base on secondary data, these data may not be collected or recorded properly.

3. Data may not be sufficient.

4. Modified or assumed data may be provided

5. Company may not like to provide all the details associated with policy matter, which may be a constraint for study.

6. Finding out cost association requires assumption, which may not be actual cost.

7. This study is restricted to only Standardization of SOPs, which is not the only cause of packaging material loss.
4. RESULT & DISCUSSION

4.1 To study the operation of AMUL Dairy, Anand & Satellite Dairy Pune

AMUL model is one of the most successful dairy cooperatives in India. AMUL is a co-operative Society Form. This industry or say society is a part of Kaira co-operative Society Act, 1912, strictly governs its working and operations. AMUL model of dairy co-operative has contributed India as the largest milk-producing nation in the world. This model helped the farmers to form a well established platform for milk trading.

This study also provided the opportunity to learn about overall operations of both dairies Amul dairy, Anand as well as Satellite dairy Pune. This study includes the head to head comparison between both the dairy.

Though both of the dairies, AMUL dairy, Anand and Satellite dairy, Pune is working as dairy under a management of AMUL but they have different cost centers and also working as different independent profit center. The basic difference between both the dairies lies in the scale of operation and their product profile range. These two basic differences create a point of differentiation between these two dairies in terms of their profit range and operational procedures.

The mode of operation of these two dairies are discussed in depth and detail in the further report

4.1.1 Study of Amul Dairy

As we have studied the company profile, so it had already been explained about Amul dairy, so this chapter is restricted up to operations of the dairy in brief.
4.1.1.1 Operational hierarchy

Amul dairy, Anand is divided into two major dairies Amul 2 and Amul 3 as it was commence as a part of expansion mode with time endurance. Amul 2 was established in the year of 1973 while Amul 3 was established in the year of 1983. With the time, Amul 1 is merged with Amul 2 and today collectively it is known as Amul 2.

Both the dairies are similar in its industry kind but major area where it differs are Amul 2 is labor oriented dairy while Amul 3 is technology oriented along with scale of operation also.

As Amul 3 is technology oriented it is fully equipped with automation. Milk processing, powder plant and butter manufacturing is the only three sections in Amul 3 and running over its installed capacity with shows the efficiency and cost effectiveness though it has passed more than three decades since starting.
While Amul 2 is the manually operating Dairy which is also partially automated to match the global emerging needs but yet not fully automated. This dairy is comprises of the six sections in which process section also includes can reception which is the major point of differentiation as can reception is not included in the Amul 3.

Flavored milk section is unique in its kind and taking leadership in product development as a part of AMUL brand development along with GCMMF. This section has both variety of packing of Amul flavored milk namely glass bottles and tin packing.

Amul ghee is the internationally known brand which is manufactured in Amul dairy along with all the member unions but ghee for export is manufactured in Anand itself due to quality awareness. Amul is also preparing ghee for own milk producer members and domestic customers.

Amul 2 has been also installed with two powder plant namely F 35 and F 60 these plants are utilized for conversion of flush seasonal surplus which is utilized in lean season. F 35 was assigned exclusively for drying whey which is the byproduct obtained during Cheese and Paneer production in Satellite Dairy Khatraj. In recent KSD is expanded with new whey drying plant so now a day’s both plants may be used for powder only. Its install capacity is also included in its name i.e. F 35 has 35 TPD and F 60 has 60 TPD installed capacity.

Milk packaging is the section ensures the day to day liquid milk supply to East Anand district. This section is partially automated for milk packing line which automated system has reduced the manpower requirement.

More over all us would be agree that Amul 2 has very good intelligent material movement system which is cost efficient and logically well designed one. Whole system including dispatch is using principle of
gravitational force. All the shop floor production stores are on the third floor and majority of the material is transfer to user department via inclined plain system.

### 4.1.2 Study of the operation of Satellite Dairy, Pune

Satellite Dairy Pune was purchased in the year 2003 and with the endurance Amul has equipped it with fully automated processing plant. This plant is installed in Chandoli village 5 km from Rajgurunagar on the way approximately 45 km to Pune. PSD is very small plant which is having only two varieties of market milk, butter milk and Masti Dahi packing.

#### 4.1.2.1 Production hierarchy

This dairy doesn’t have various sections like Amul dairy but it is having two pasteurizer and curd manufacturing plant. These all the equipments are run by the officers. This plant is automatically operating plant but one pasteurizer is not connected with automatic control panel.

In head to head comparison with Amul, Anand it has milk processing and milk packing plant. In processing plants PSD receiving standardized milk so it needs only re pasteurization. As it received only pasteurized milk, so its outgoing milk quality is very good compared to all other market milk plants. In case of milk packing section, Amul 2 has semiautomatic plant while in PSD has manual plant. More over all the support services is provided by head quarter so no separate Accounts, Purchase and HR department are functioning but one person for each department is assisting to corporate offices.

Dahi production is clubbed with milk processing section but still since beginning one Executive officer is specially assigned for continuous
improvement and close monitoring, though all production staff is equally responsible for the same. While in Amul dairy all sections have separate staff including section in-charges.

While comparing utility section, it is clearly observed in PSD that air compressor, refrigeration as well as maintenance department having very small capacity in comparison with Amul dairy. PSD is not using steam boiler but they have installed hot water generator which is sufficient enough for meeting demand for hot water in PSD. This is the major differentiation in case of utility comparison.

Water supply is ensured from own well and bore well in Anand but due to chemical contamination and high TDS contain in available ground water, PSD is purchasing the water from local sources. So water consumption is also point of attention in PSD as it also significantly affects the cost.

In Amul dairy clear responsibility delegation is done but it is not worth doing the same in PSD due to economy of scale. More over quality assurance department is also not fully developed in PSD so they have to send the milk samples to corporate quality assurance department for pathogen testing and other test which is not available in the PSD. PSD is not directly purchasing milk from outside so underdeveloped quality assurance department is sufficient enough to meet day to day needs.

Marketing is the responsibility of the KDCMPUL in Anand while GCMMF is responsible for marketing in PSD. Due to this PSD is giving leakage replacement which not usual practice in Anand. Leakage is sometimes play vital role in conflict so GCMMF and PSD have stated studding pattern and sources of leakages from April 2011 to control it.
4.2 Study of the SOPs to minimize the packaging material losses

This study is all about practical problem given by company. This study gives little exposure about current problem identified by the company. Amul is working since more than five decades with good quality concerns. They also have a set environment for continuous improvement so as a result of sincere efforts; top management including staff, Amul has developed Standard operating procedures for their day to day routine work. This shows that developed SOPs are came into existence with more than five decades hands on practice so it is not easy to suggest changes which can improve their efficiency but yet trial can be made to propose the possible changes in the existing system which may help Amul to revisit their ideas from the different angels.

Approximately Amul dairy annually consumes the packaging material worth 5.5 million rupees. This amount is very high so it can directly affect the profitability of the organization.

![Figure No 6. Packing Material Loss for Various sections studied.](image)

Figure No 6. Packing Material Loss for Various sections studied.
Above figure advocates that the automation has better control on operation losses which shows that butter looses @ 0.44% while all other sections are around 1%.

Generally in management study it is observed that management is focusing on one of the symptoms identified as problem which misled their efforts on wrong direction. This study also followed the same pattern which can be clearly identified from the following sectional studies.

**4.2.1 Study of SOP in Milk Packaging department**

As it has been already discussed in section 4.1.2 milk packing department is the semiautomatic type of the operation in nature so here one should focus on operational & management part.

![Figure No.7 Packing material Losses for Milk Packaging Department](image-url)

Figure No.7 Packing material Losses for Milk Packaging Department
Above data were collected from milk packing section Amul dairy, Anand. Data were collected according to theoretical yield expected from the pouches of different variants. In above data 500 ml data also include the data for Masti Dahi 400 gm as its yield expected is same.

Figure explains that loss is higher where the expected yield is higher and packaging material loss is comparatively lower.

During the study operating procedures found satisfactory but interpretation and implementation of the same is not done properly in the section. The study found following reasons for packaging material losses.

**4.2.1.1 Losses due to communication gap**

As Amul is very big organization there are many points which need strong communication to prevent the losses which includes packaging material losses, product losses along with other utility service losses.

**4.2.1.1.1 Communication gap with quality assurance department**

As per SOP after production line preparation packaging department before starting production for first pouch, packaging department get clearance of on line milk. Immediately after clearance of on line milk, packaging department is producing the 1st pouch and again give the same to the quality assurance department for quality clearance. As per the set of procedure when packing started before clearance of on line milk, it is observed that pouch would also get non clearance. It results into cut open of crates produced during adjustment of machine for the 1st pouch. More over result obtained out of the testing of online milk or 1st pouch is not communicated properly to the packaging department which sometimes leads to cut open of the milk pouches. This communication gap also leaves the possibility for substandard milk
pouches may get dispatched to market if it is not entertained immediately. This may have serious consequences on brand image along with legal issues.

Here one needs to follow the SOP strictly to avoid such problems. This may be solution along with clear communication assured by both the department. This gap has potential conflict source along with legal issues.

4.2.1.1.2 Communication gap with marketing department

This communication ensures the day to day demand and supply of market milk. When communication gap occurred it result into over or under production. Due to this miscommunication, under production in case of either dairy need to repack the market milk in night shift or market is under supply with their demand.

When due to miscommunication, production department does under packing which results into repacking the milk in night shift. This repacking is started to fulfill the short coming quantity of milk only this results into higher adjustment losses. This is increasing the packaging material losses to above the normal level.

While over packaging of market milk due to communication gap leads either dumping of the same milk to market or cut open of the same occurs. In case of the dumping dealers and distributors are facing problem to position that access quantity as self life is only 48 hours. Over packing also increase chances to dispatch of the market milk of old date which gives only 24 hours self life to retailers which can be a potential threat for sell of milk after the best before date prescribed.

When marketing department decides to avoid threat of nonpayment, dairy has to cut open the over packed milk which increases the packaging
material losses along with the product loss. More over that same recovered milk needs reprocessing which is also an additional cost to the company.

4.2.1.3 Packaging material loss due to internal communication gap

In packaging department one person assign duty to count the total production of market milk to ensure the demand of the market milk. When supervisor counts the milk crate and he found that the production is reached to a production level which is sufficient to fulfill the market demand he asked to stop the production of the market milk variant and switch to next variant. In case he is unable to communicate this message, it results into over packing and same consequences.

4.2.1.2 Packaging material loss due to leakage

The study suggests that during continuous operation of milk packing, due to many reasons packed pouches suffered from leakage. This leakage not only cause the packaging material loss but it also increase the product loss i.e. milk loss. Leakage is directly associated with the efficiency and economy of the department. Leakages are unavoidable but it can be controlled through close monitoring, fine adjustment and preventive maintenance scheduling.

Leakages also increase the human power requirement to short out leakage pouches produced, machine hours to mitigate the leakage pouches short coming and dispatch as leakage needs to be segregated at the time of dispatch. Ultimately it increases the operation time and cost. Considering this observation one should try to delivered it best to shop floor production to avoid such leakages.
4.2.1.2.1 Causes of leakages

- Thickness variation in the film role.
- Temperature variation in chilled water supply to milk packing machine.
- Variation in air pressure.
- Improper temperature adjustment in the set temperature of sealing heat adjustment.
- Delay in changing the Teflon tap, rubber strip or heating rod beyond its self life.
- Other machine adjustment problems etc.

4.2.1.2.2 Possible Corrective actions

- Film role should be inspected thoroughly to avoid thickness variation problems.
- Chilled water supply should be constant. There should not be much temperature changes in the constant chilled water being supplied to machine.
- Air pressure is most important part for pneumatic machine but it do have impotence in the mechanical machines.
- Temperature must be adjusted within the range required.
- Other consumable material should be changed according to their self life and consumption pattern.
• Machine should be adjusted according to manufactures prescription.

• Proper preventive maintenance should be done as per requirement.

4.2.1.3 Packaging material loss during initial starting

During the study it is observed that the initial machine starting causes the packaging material loss due to adjustment requirement. When machine is started in the morning operator generally consumes the unnecessary poly film in initial adjustment. This consumption is a great loss as far as the packing material productivity is concerned but it is necessary for initial adjustment and smooth running. If this loss can be minimized it will increase the yield of the poly film and certainly increase the profitability index of the section.

4.2.1.4 Packaging material loss during the Role change

It is observed that when one role is consumed operator is feeding the new role and during this time he is wasting some pouches. This is a part of SOP and it is unavoidable due to sealing problem.

It is also found that at this point of attention operator is trying to keep this loss to minimum level. One needs to encourage them to avoid such loss.

4.2.1.5 Packing material loss during the size change over

In Amul dairy, various variant of standardize milk and tea special milk are produced which includes SPM 200ml, SPM 500ml, TSP 500ml and TSP 1ltr. This variant production is necessary to provide variety of different products in market milk to customer, according to their choice and purchasing power. This product basket needs to switch over between
the various pack sizes for example from SPM 5000ml to SPM 200ml which needs readjustment which is causing losses.

This loss can be minimized by avoiding such change over but as the packing department is of semiautomatic type, it avoids the possibility of different pack size packing on same machine. This is the limitation of the automatic counter device.

4.2.1.6 Other observation during study

While study for packaging material loss, it is also observed that the product loss was very high which can be minimized but operators were not much aware about losses. Several times milk was draining in the section and sincere effort from operator or labor could have save such product losses.

Apart from the product loss they were misusing the utilities also. It is also observed that water was flowing out of the tap and no one was there to close the taps.

4.2.2 Study of SOP in Ghee department

Ghee department handles the costliest milk constituents i.e. milk fat so product losses are more important than packaging material losses but due to time constraint and objective provided for the study, it explain only packaging material losses.

Ghee department is having higher losses in comparison to other department because of manual mode of operation and old age technology but yet one should focus because packaging material consumption expense represents almost 30 million rupees.
Ghee department is doing retail as well as bulk packing. In ghee poly pouch Amul is packing various pack sizes of 200ml, 500 ml and 1 liter. While in case of tin packing it does for 1 liter, 2 liter, 5 liter and 15 kg tins.

Same as the milk packing department SOP in ghee department is found satisfactory but here one needs to take care of preventive maintenance and smooth adjustment of the machines.

![Figure No. 8 Packaging Material Loss for Ghee Department](image)

**4.2.2.1 Study of the SOP for 1 Liter Ghee Packing Machine**

Standard operating procedure is capable enough to control the packaging material losses. The 1 Liter machine is older than 5 decades and originally machine is designed to pack sweetened condense milk. Same machine without any modification serve the ghee packing. This machine is being utilized since very long and as its life span is over it and working condition is witnessing the good operating condition since installation.

Moreover this machine is having two head automatic type installed production line but with its age it is operating with only one head and automatic corking is turned to semiautomatic today. Though it is old age
technology, machine is packing entire exportable Ghee tins along with the domestic demand. This machine has highest usage hour machine which runs almost each and every day to serve the Amul customer since long.

Previous to previous year Amul has found the increase in their packaging material losses, they have put the same machine in the GMP and closely monitored and increased the frequency of the preventive maintenance and finally they have got control over the losses beyond the tolerance limit which shows the ability and strength of the Amul dairy.

Amul dairy efficiently utilizing this machine but still it occurs unavoidable product losses found during the can filling process. Though they are recollecting the product as much as possible but still it is a type of loss which is remarkable if converted into monetary terms.

Operators are manually reframing the repairable tins received but rusted and more damage tins are treated as scrap as it deserves. More over SOP operators are desperate toward losses but the question which is unanswered is, “Are these efforts sufficient enough to minimize the product and packaging material losses?”

4.2.2.2 Study of SOP for 2 liter and 5 liter Packaging Machine

This machine is mechanized and packing is done manually procedure but still losses are under control. During study this SOPs are found satisfactory as far as material losses are concerned.

Operator should take all possible care to minimize the losses because the operator only can control the losses in this machine. During seaming, if the tin is not placed properly; tin is going to scrap with product recovery
losses which also need to be reprocessed. In this production line one should be sincere enough to take care about losses.

4.2.2.3 Study of SOP for 15kg Ghee packing Machine

This machine is operating manually. Generally 15kg pack is considered as the bulk packing and it has been found that some retailers are purchasing the bulk pack for loose ghee retail sale. This operation opens the chances for the mixing of the low quality ghee with the Amul ghee and selling the mix with Amul brand; due to this reason Amul has introduced the heat sealed packaging.

This heat seal is manufactured with the objective that once it sealed, it will not be opened without damaging the tin. Due to this safety reason when the seal is being sealed operator should take care that seal should not leak or else same tin goes to the scrap.

This sealing is the main point of attention in sealing but one should also focused on the services being used which are electrical power, air pressure and preventive maintenance of the sealing machine to minimize the losses.

4.2.2.4 Study of SOP for Ghee pouch packing Machine

This machine is packing all pack sizes via 200ml, 500ml and 1 liter for Amul. This machine is also old age technology, yet pneumatically operated one. Today is the era of mechanically operated machine and which is also having very low operating cost so operating procedure needs to be monitored a lot.

This machine is pneumatically operated so it needs constant pressure without fluctuation or else it produces rework or scrap. More over sealing
temperature setting knob is also not digital which needs practice in adjustment.

It is also observed that the machine is having very high weight variation in continuous filling. More over sealing leakage is found high.

4.2.3 Study of SOP in Butter department

This study also includes the costliest milk constituent i.e. milk fat and it is automatic type of filling line having very high packaging capacity so it is most important department as far as financial contribution is concern. This study has much importance because this department produces highest amount of the packaging material loss.

This section is utilizing highest packaging material with fully automated packing line which consumes about 115 million rupees in a year. This is biggest amount in the Amul dairy. Variant vise contribution is explained in the figure 9.

Figure 9 indicates losses in butter department, it is directly associated with speed as well as the movement of the machines. In this case the 400 and 500 gm packing lines are having highest numbers of packages per hour so depreciation is higher which makes the machine more prone to losses. While the comparative lower movement found in 8gm packages so losses are lower.

This section is having several packing line with different packing sizes. But similar thing observed was SOPs were similar and laminated packaging materials were used. This lamination has deadheading property which causes resistance in the gumming process. Moreover due to over lamination automatic formed butter packs were opened and operator has to sort them out for redressing.
Majority of the time it is that sorted packages were having only gumming problem which could be redressed by manual gumming but the actual practice going on is, the operator was removed the outer packaging and again using butter with parchment paper for final packaging again.

Butter section is only section found were study could propose a minor modification apart from maintenance though section is having most enthusiastic and ownership loving staff. This modification also needs to study the cost of the packaging material losses vs. labor cost increased. Quality department must be concerned before implementation for this modification which is suggested in the chapter 5.
4.2.4 Study of SOP in Flavored Milk department

Flavored milk department is having step wise operation during its batch type of production cycle. This department is producing Amul flavored milk glass bottles as well as can also. This part of study is given somewhat higher weightage because all the tins are imported from Singapore and it is having delegate glass bottles as packing material.

Flavored milk section is producing 12.5 million flavored milk glass bottles as well as 13.5 millions of tin in a single financial year. This figure elaborates the mass production process. Annually packaging material budget for this section reaches to 150 million rupees in a single financial year.

![Figure No.10 Packaging Material loss in Flavored Milk Department.](image)

The graph represents that the automation, delegacy of the packaging material and latest technology is able to control the losses. Glass bottles are more prone to losses compared to tins. This is the only section which is having batch type of operation and it has also been divided in the various steps. So the study of the losses can be more effective if one would study operation wise.
This study throw more light that glass bottles breakage start from material procurement from basement to section while it is negligible in case of tins. While glass bottles have higher loss on filling and sterilization process because of advancement in technology. In case of handling delegate glass bottles, they are having higher losses. It needs no explanations why? Study was not limited to loss assessment so it continued to propose some suggestions to minimize it.

4.2.4.1 Study of Glass bottles procurement up to department

Flavored milk glass bottles are procured from vendors and directly unloaded to basement area of the flavored milk section and transferred to first floor as and when needed. It is obvious that if there is any mismanagement in transportation, it will results into accident. So operators are taking at most care but absolute zero breakage is not possible.
4.2.4.2 Study of SOP in Flavored Milk Filling Machine

Flavored milk glass bottles are packed in continuous filling machine. This process line is doing empty bottle washing, milk filling and corking. This machine is provided with a Variable Frequency Drive which is responsible for speed variation.

It is observed that when speed of bottle filling increases; the breakage is also increasing simultaneously. Operator should know the optimum speed and maximum possible speed to minimize the glass bottle breakage. This optimum speed can be fixed by studying breakage vs. speed. Due to time constraint and the objective of the study was fixed earlier; study could not include it.

It was observed that continuous cork feeder is unable to supply the cork continuously so it either leave uncork bottle or improper corking results and it may block the bottles which finally needs to be broken by operator to ensure continuous operation. Same way due to continuous working pistons leaves more space on the path which finally results into vibration in the operation so as the speed increases the breakage of glass bottles also increases.

During the continuous operation milk filling is done so it also needs to be monitored further but it is observed that operator ensures the filling by manual adjustment time to time by increasing or decreasing gasket. This needs proper maintenance to avoid over or under filling.

4.2.4.3 Study of SOP in Flavored Milk Sterilizer

Sterilization operation is necessary to ensure the self life. Amul dairy have installed three different semi automatic types of batch steam injection types of sterilizer. This sterilizer is a potential source of accident
so it has been converted to semiautomatic type to avoid accidents. It has also installed the data logger which continuously recording the temperature profile of each sterilizer. This data logger is installed to ensure the quality to safe guard the consumer’s health. So finally one can say that this sterilizer is equipped with both kinds of safety instruments i.e. operational safety and consumer safety.

Study finds that over filled bottles are broken during sterilization process. This operation includes the heating up to 120°C and cooling to atmospheric temperature which is potential source of the heat sock which ultimately results into breakage of glass bottles.

SOP for operation is seemed satisfactory but it has potential heat sock and manual movement so breakage is obvious for the operation but filling variation results into significant effect on sterilization breakage.

4.2.4.3 Study of SOP in Flavored Packaging (Dressing Operation)

This operation is the totally manual in nature which is done by the casual labors in the packaging section of flavored milk department. This operation includes the sleeving of the bottles as well as the tins followed by the cartooning.

This operation needs to be done precisely or else it will produce rework for the sleeves. This process requires the removal of old sleeve followed by the resleeving. Handling of the delegate glass bottles by unskilled labors leaves the chance for breakage which is the main cause of the loss for this operation.

4.2.4.4 Study of SOP for Can filling Machine

This machine is fully automated one which is comparatively easy to operate and having better operation control. This machine is equipped
with a few safety mechanisms to control operational losses in comparison with glass bottle filling. In addition to that it is filling metal tins which are not prone to breakage compared to glass bottles.

This is all about the results obtained by the study which can be utilized in a productive manner to minimize the packaging material losses.
V. SUMMARY & CONCLUSION

5.1 Summary of the Project
The study has been done at AMUL Dairy plant in order to understand the overall operation of Amul Dairy and to minimize the packaging of materials losses. The study will help the organization in reducing the in-house packaging material losses.

5.1.1 Operation of Amul Dairy, Anand & Satellite Dairy, Pune
This study has been done at both the places Amul Dairy, Anand & Satellite Dairy, Pune so it provided the opportunity to compare operation of both the plant.

5.1.1.1 Operation of Amul Dairy, Anand
It was very clearly appealed during the study that Amul Dairy Anand has developed very good system of operation. It has also established a communication system also provides greater control to top management.

In comparison to Satellite Dairy Amul dairy, Anand is having higher economy of scale and scale of operation as well as the product profile of the dairy is diversified to a greater extent. Amul Dairy can be considered as product dairy as it has variety of products. Amul dairy is also having capacity to handle seasonal surplus milk procured in flush.

Amul dairy is situated at corporate head quarter so it is continuously being visited by the farmers, visitors, academicians and own management so this dairy keeps on changing with the changing needs.

As mentioned earlier it is head quarter of Amul dairy so it has to manage all commercial services from Anand itself, this responsibility is also increases because of centralized purchase system followed in Amul.
5.1.1 Operation of Satellite Dairy, Pune

As the name suggests Pune plant is the satellite unit developed by Amul dairy as the part of geographical diversification in 2003. This plant is developed to target the potential liquid milk market in Pune city.

This plant can be considered as a true market milk plant as it does not produces products other than two variant of milk, butter milk and Masti Dahi. PSD do not receive any raw milk; rather it receives the pre-standardized- pasteurized milk from the Amul plant.

While comparing with Amul Plant, Anand is having advantage of the economy of scale while Pune plant is having very small processing capacity. This plant is having a semi automatic operating system which is an added advantage to plant.

In comparison to Anand plant, Pune plant is fully operated by the qualified officers which are the other reason for very good quality products. Operators are not performing up to the mark in Pune plant due to conflict. It was found that the work description is fixed by the labors association which was negotiated with the dairy. The same describe work is only part of their work in Pune. This can be considered as weak point of the plant.

Commercial services as well the purchase are controlled centrally. This plant has very small production and packing area so it can be controlled from control room itself. As discussed earlier labor management is beat difficult here.

5.1.2 Study of the SOPs to minimize the packaging material losses

Study conducted with a aim to help the organization in minimizing the packaging material losses with modification in SOPs. Study found that
development of SOP had included the work experience and specification manual prescribed by the manufacturer of the machines. In general all the SOPs are capable enough to minimize the packaging material losses but section wise observation and proposed suggestion may help the company to satisfy given objective.

5.1.2.1 Study of SOP in Milk Packing department

Milk packaging department developed good SOPs but communication with quality assurance department; marketing department and intra departmental communications can be improve the quality of the work along with packaging material losses.

Leakage plays an important role in packaging material losses so operator should stick to its SOP check list that will help in reduction in leakage which untimely decreases the packaging material losses.

Packaging material losses during role change, switch over and initial starting can be decreased by training the operator to use old role in adjustment will do the work

Other observation during the study which is not covered under main objective but very important for dairy management are: operators in milk packing section are not much concerned about the product & utility looses during the operation this practice may affect the profitability adversely.

5.1.2.2 Study of SOP in Ghee department

Ghee department is the one of the oldest department in dairy which is working efficiently since long with age old technology.
5.2.2.1 Study of the SOP for 1 Liter Ghee Packing Machine

This machine is very old and preventive maintenance is the only source for minimizing the packaging material loss as well as the product losses. It was also observed that the ghee is continuously coming out of the tins while tin filling.

5.1.2.2.2 Study of SOP for 2 liter and 5 liter Packaging Machine

This is semiautomatic type of packing machine which need more care while packaging going on thought it does not have much losses but any mistake in operation will result into losses.

5.2.2.3 Study of SOP for 15kg Ghee packing Machine

This machine is very sensitive toward its operator. Similar to the 2 liter machine any deviation from the desired parameter will result into the losses.

During study once the machine was running out of order which had produce almost 3 % of packaging material losses which shows that the machine should be taken care about its preventive maintenance. During operation as when it runs out of order one should pay attention toward its maintenance.

5.1.2.2.3 Study of SOP for Ghee pouch packing Machine

This machine is the pneumatically operated machine.

5.1.2.3 Study of SOP in Butter department

Butter department is fully automated and continuously running department which ultimately results into very low down time. This continuous operation leads to depreciation in the machine. Highly moving parts which plays important role in packing gets higher depreciation
which ultimately responsible for rework or scrap production. This is the one of the cause of the packaging material loss.

5.2.4.2 Study of SOP in Flavored Milk Filling Machine

Flavored milk department is one of the department which does very high value addition though it handles very less quantity of milk. This section is batch type of production line so here almost all the operation carried out is of batch type.

It is observed that the bottles procurement requires care because it has chance of accident.

Milk sterilizer is operated with semi automated mode and it needs to follow the set procedures for avoiding accidents.

During dressing process casual labor may be to trained to avoid any accidents.

In general it can be concluded that this study has provided a very good opportunity to groom a buddy manager which also yield a fruitful result for the organization in order to minimize the packaging material losses along with the other third party observation which can be considered as unbiased.
5.2 Proposed Suggestions

It is not an easy task to find core solutions for problem identified in the study within three month time span so it would be better to propose possible course of suggestions to management. They may implement the suggestion based on their suitability.

- During studying about operation of Pune plant, opportunity to observe manual cleaning of curd milk pasteurizer was grabbed. It is observed that the nylon filter was removed earlier which leave the instance where foreign matter might seek entry with milk into the pasteurizer.
- Inter & Intra departmental communication process can be standardized for all departments especially for milk packing department.
- It can be advised to redesign the poly film role which can produce the milk pouches with length of 14.3 cm instead of 14.5cm which ultimately increases the yield of the milk pouches and directly affect the profitability.
- Amul can adopt new technology available in the market after analyzing financial feasibility.
  - Pneumatic Ghee pouch packing machine can be converted to the mechanically operated type of machine.
  - In Butter department, parts replacement should be proposed for depreciated parts.
- One extra casual labor can be hired for separating the reworkable scrap produced during the production. This requires calculation for amount to be spend on labor vs. the amount can be saved.
- Packaging material roles should have proper lamination for proper gumming process to minimize the packaging material losses.
• Bottle filling machine in flavored milk department is running satisfactorily at lower speed but as the speed of machine increases, the breakage ratio is increasing simultaneously. So it can be standardized.

• In flavored milk department cork supplying mechanism of bottle filler needs proper maintenance.

• Ghee filling machine for 1 lit tin can be monitored for product losses.

• Day to day loss calculation can be adopted to find out core problems which would help the organization in minimizing packaging material losses.

• Preventive maintenance schedule should be monitored by HOD.

5.2.1 Other Proposed Suggestions

• In case of tin filler machine in Flavored Milk Department, nut feeder may be modified so that each and every tin can filled with equal quantity of nuts.

• Training & development programs for work safety, hygiene, package of practices, product loss minimization, utility conservation and motivation can help the organization in achieving the overall organizational goal.

5.2.2 Proposed Suggestions for Satellite Dairy, Pune

• It is proposed to go for automation of curd pasteurizer along with application of magnetic control valve.

• Milk pasteurizer also proposed to be provided with magnetic control valve to control hot water temperature in milk pasteurizer.