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# Business Performance of Selected Cooperative Milk Plants in Punjab

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**Abstract - Dairy cooperatives have played an important role in the dairy development in India. Milk cooperatives proved to be a proper organized system for the dairy development in the country. This movement was started from Gujarat and it had covered whole India through 'Operation Flood'. MILKFED is the dairy cooperative of Punjab, which had been developed on 'Anand' pattern. It had played an important role in the dairy development of the state. This study is an attempt to analyze the business performance of six cooperative milk plants affiliated to MILKFED. Sample size has been selected based on their turnover selecting two with highest turnover, two with medium turnover and two with least turnover. For achieving the purpose of the study, trend percentage and CAGR of sales and purchases have been calculated and one-way ANOVA and t-test have been applied on the gross profit and net profit margin of the selected milk plants for statistical analysis.**

**Keywords: Average Trend, Highest Turnover, Least Turnover, Medium Turnover, MILKFED.**

## I. INTRODUCTION

India is the largest milk producing country in the world and Punjab has an important place in the national milk production. Punjab is one of the smallest states in Indian union and ranked as a fifth largest milk producing state in India, and the state's average yield is much higher than the national average [1]. Punjab also has highest per capita availability of milk. The per capita availability of milk in Punjab is more than three times the average per capita availability of milk in India [2]. It has placed the state on the world map in milk production. Dairy cooperatives have played an important role in the dairy development in India. Milk cooperatives proved to be a proper organized system for the dairy development in the country. This movement was started from Gujarat and it covered whole India through 'Operation Flood' [3]. MILKFED is the dairy cooperative of Punjab, which had been developed on 'Anand' pattern. Dairy farming is a very old ancillary profession in the rural areas of Punjab and dairy as industry has catered both unorganized and organized sector [4]. Among organized sector, cooperatives are most important players which have developed very efficient and effective network to each nook and corner of the state and have also created a niche for themselves in the national and international markets.

| Year | Milk Production (mt) | | Per capita availability of milk (Gm.) | |
|---|---|---|---|---|
| | India | Punjab | India | Punjab |
| 2005-06 | 970.66 | 089.09 | 241 | 0943 |
| 2006-07 | 1025.80 | 091.68 | 251 | 0957 |
| 2007-08 | 1079.34 | 092.82 | 260 | 0956 |
| 2008-09 | 1121.83 | 093.87 | 266 | 0955 |
| 2009-10 | 1164.25 | 093.89 | 273 | 0944 |
| 2010-11 | 1218.48 | 094.23 | 281 | 0937 |
| 2011-12 | 1279.04 | 095.51 | 290 | 0945 |
| 2012-13 | 1324.31 | 097.14 | 299 | 0961 |
| 2013-14 | 1376.85 | 100.11 | 307 | 0980 |
| 2014-15 | 1463.14 | 103.51 | 322 | 1003 |
| 2015-16 | 1554.91 | 107.74 | 337 | 1032 |

***Source: Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, GOI (nddb.coop)***

***Table 1: Milk Production and Per Capita Availability of Milk in India and Punjab***

### Milk Cooperatives in Punjab

#### The Punjab State Cooperative Milk Producers Federation Limited (MILKFED)

The Punjab State Cooperative Milk Producers Federation Limited, popularly known as MILKFED Punjab, came into existence in 1973 with twofold objectives of providing lucrative milk market to milk producers in the state by value addition and marketing of produce on one hand and to provide technical input to the milk producers for the enrichment of milk production on the other hand. The setup of MILKFED organization is a three-tier system. It consists of primary milk producers' co-operative society at the village level, central milk unions of primary milk producers' cooperative societies at the district level and federation of

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these central milk unions as an apex body at the state level. Presently about 7000 village level societies are collecting milk (both times i.e. morning and evening) from about 4 lakh farmer members and are supplying fresh milk to MILKFED through concerned District Milk Producers Unions. The state of Punjab has 11 milk unions consisting of 9 milk plants affiliated to MILKFED. MILKFED is serving nationwide consumers through its network of regional offices and very strong distribution channels. MILKFED markets a wide range of **'VERKA'** products which includes liquid milk, whole milk powder, skimmed milk powder, butter, ghee, lassi, cheese, ice creams etc. [5].

## II. REVIEW OF LITERATURE

Kaur (2011) [6] has compared the operational performance of MILKFED and HDDCF based on various physical indicators like number of functional societies, number of unions**,** number of members**,** plants**,** chilling centers**,** average daily milk procurement, peak procurement of milk etc. by calculating annual growth rates and the compound growth rates and concluded that MILKFED was performing better than HDDCF. Singh (2014) [7], compared financial performance of MILKFED and DAIRYFED by calculating some financial ratios like debt-equity, current ratio, salary and wages to sales, return on investment, gross profit, stock turnover, return on assets, return on equity, earning per share, working capital turnover and quick ratio and concluded that financial performance of MILKFED was better than DAIRYFED. Kaur and Kaur (2016) [8] analyzed and compared the growth and performance of milk processing industry in the states of Gujarat and Punjab and examined the operational performance of GCMMF and MILKFED. The results indicated that the performance of Gujarat in the cooperative milk processing sector was better than Punjab during the period of study. Selvi (2016) [9] measured financial performance of milk cooperative in Kanyakumari by calculating various financial ratios and suggested measures to make it more competitive and effective.

After reviewing the available literature, it has been noted that no such study has been conducted to analyze the business performance of individual cooperative milk plants affiliated to MILKFED. So, this study is an attempt to fill the gap.

### Business Performance of Cooperative Milk Plants in Punjab

A milk cooperative business is owned, controlled and operated by the dairy farmers who benefit from its services. Members finance the cooperatives and share the profits. A dairy cooperative uses the milk produced by its members' cattle and makes various milk products to be sold in the market. Business of milk cooperatives consists of collecting milk and selling milk and milk products. Milk cooperatives were established to provide lucrative milk market to the milk producers and to provide technical services for increasing the quality and quantity of milk [10]. For studying the business performance of milk cooperatives, it is essential to study the contents of their business first. The business of milk cooperatives consists of procuring milk from the milk producer members to sell milk and processed milk products for the benefit of them. Business performance can be evaluated by observing the trends of purchases, sales, gross profit, net profit during the relevant period of study.

### OBJECTIVE OF THE STUDY

To study the business performance of selected milk plants of Punjab over a period of 10 years from 2005-06 to 2014-15.

## III. RESEARCH METHODOLOGY

This study is based on the secondary data collected from annual reports of the selected cooperative milk plants, annual report of MILKFED, The Economic Survey of India, NDDB of India reports and published articles from different online journals.

### Sample of Study

Sample size has been selected based on average sales turnover of last three years selecting two with highest turnover, two with least turnover and two with medium turnover basis. Milk plants refer to the cooperative milk plants in the study. Among the six milk plants in the study, Mohali and Ludhiana milk plants had highest turnover, Amritsar and Patiala milk plants had medium turnover and Gurdaspur and Hoshiarpur had the least turnover during the relevant period of study.

### Period of Study

The results of the study are based on the data of selected milk plants during the period 2005-06 to 2014-15.

### Data Analysis Techniques

The data has been analyzed by calculating average trend percentage and CAGR of sales and purchases of the selected milk plants and further by applying one-way ANOVA & independent sample t-test (using SPSS version 23) on the comparison of Gross Profit and Net Profit Ratios of selected milk plants during the relevant period of study.

## IV. RESULTS AND DISCUSSION

### Sales Turnover of Selected Milk Plants:

The data of average trends of sales turnover of various milk plants had clearly indicated the overall average growth of 365 percent during the study period. The Compound Annual Growth Rate (CAGR) of various milk plants was also different among the six milk plants under study. Milk Plant Mohali was leading by showing 17.83 percent of CAGR followed by milk plant Amritsar at a close difference of 17.65 percent. Milk plant Gurdaspur had 12.70 percent while Patiala and Ludhiana had 11.41 percent and 11.07 percent respectively. Milk plant Hoshiarpur had minimum

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CAGR of 8.37 percent. Overall CAGR of all the 6 milk plants was 13.81 percent *(Table 2).*

***Table 2: Sales Turnover of Selected Milk Plants (Amount in Rs. lakh)***

| Year | Mohali | Ludhiana | Amritsar | Patiala | Gurdaspur | Hoshiarpur | Average | Average Trend Percentage |
|---|---|---|---|---|---|---|---|---|
| 2005-06 | 13040.14 | 19412.60 | 2823.73 | 4703.67 | 2544.92 | 3045.84 | 7595.15 | 100 |
| 2006-07 | 15377.55 | 19790.03 | 3365.06 | 4999.67 | 2720.91 | 3320.27 | 8262.25 | 109 |
| 2007-08 | 19356.81 | 22268.67 | 4713.66 | 6549.99 | 3241.07 | 3919.67 | 10008.31 | 132 |
| 2008-09 | 23399.77 | 27680.99 | 6477.76 | 8374.31 | 3945.71 | 4696.09 | 12429.11 | 164 |
| 2009-10 | 29251.33 | 28380.91 | 7735.74 | 7605.25 | 4056.88 | 4682.56 | 13618.78 | 179 |
| 2010-11 | 37252.32 | 33428.19 | 8946.48 | 8869.38 | 5096.63 | 5665.72 | 16543.12 | 218 |
| 2011-12 | 48449.12 | 39351.42 | 10761.45 | 10511.34 | 6016.58 | 6169.21 | 20209.85 | 266 |
| 2012-13 | 50058.45 | 43773.60 | 12031.37 | 10917.38 | 7522.20 | 7355.83 | 21943.14 | 289 |
| 2013-14 | 59703.60 | 52535.13 | 12933.97 | 11440.70 | 7326.90 | 6683.13 | 25103.90 | 331 |
| 2014-15 | 67254.53 | 55491.04 | 14343.06 | 13858.75 | 8411.41 | 6801.93 | 27693.45 | 365 |
| Average | 36314.36 | 34211.26 | 8413.23 | 8783.04 | 5088.32 | 5234.02 | 16340.71 | |
| **CAGR** | **17.83%** | **11.07%** | **17.65%** | **11.41%** | **12.70%** | **8.37%** | **13.81%** | |

***Source: Annual Reports of Cooperative Milk Plants 2005-06 to 2014-15***

On analyzing the CAGR of Highest, Medium and Lowest Turnover milk plants, it is pertinent to mention here that one milk plant from each group has more CAGR than the other. Between the highest turnover milk plants, Mohali had higher CAGR than Ludhiana, between Medium turnover milk plants, Amritsar had higher CAGR than Patiala and between the lowest turnover milk plants, Gurdaspur had higher CAGR than Hoshiarpur. So, the pattern of CAGR in all the three groups based on sales turnover is same as shown in fig. 1. In the graph Milk Plants are shown on the X-axis while Sales and CAGR for ten years period are shown on the Y-axis.

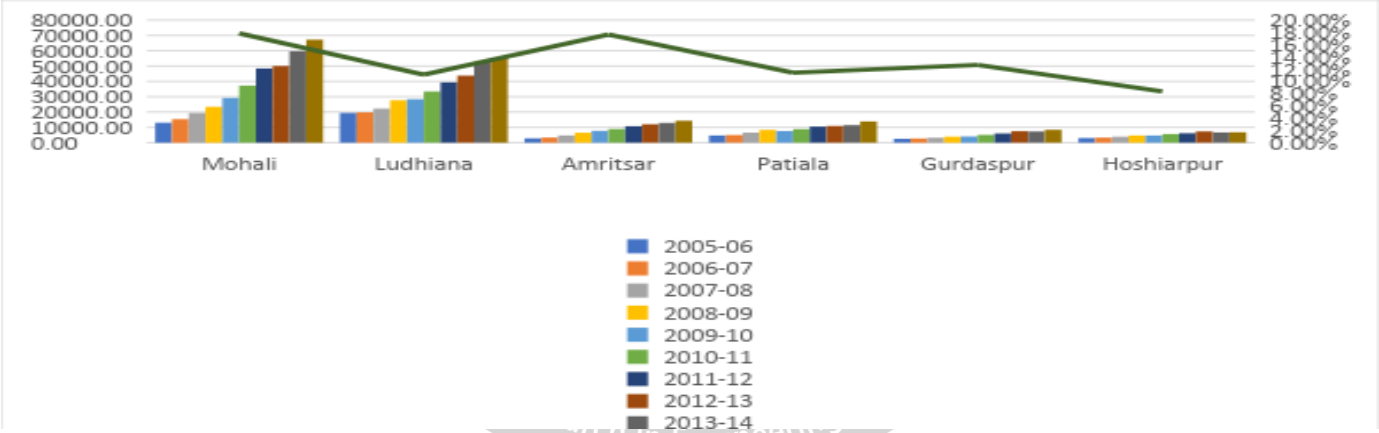


***Fig 1: Sales Turnover and CAGR pattern of Selected Milk Plants***

**Highest Sales Turnover Milk Plants:**

On analyzing the average trend percentage of Highest Sales Turnover milk plants, it has been observed that the average sales for these milk plants had shown an increase of 378 percent which was better than the overall average trend percentage of sales in six milk plants. CAGR of sales in milk plant Mohali was better than milk plant Ludhiana which was 17.83 percent and 11.07 percent respectively. Further the average sales of these two milk plants were 14.23 percent which was better among the six milk plants *(Table 3).*

***Table 3: Average Sales of Highest Turnover Milk Plants (Amount in Rs. lakh)***

| Year | Mohali | Ludhiana | Average | Average Trend Percentage |
|---|---|---|---|---|
| 2005-06 | 13040.14 | 19412.60 | 16226.37 | 100 |
| 2006-07 | 15377.55 | 19790.03 | 17583.79 | 108 |
| 2007-08 | 19356.81 | 22268.67 | 20812.74 | 128 |
| 2008-09 | 23399.77 | 27680.99 | 25540.38 | 157 |
| 2009-10 | 29251.33 | 28380.91 | 28816.12 | 178 |
| 2010-11 | 37252.32 | 33428.19 | 35340.26 | 218 |
| 2011-12 | 48449.12 | 39351.42 | 43900.27 | 271 |
| 2012-13 | 50058.45 | 43773.60 | 46916.03 | 289 |
| 2013-14 | 59703.60 | 52535.13 | 56119.37 | 346 |
| 2014-15 | 67254.53 | 55491.04 | 61372.78 | 378 |
| Average | 36314.36 | 34211.26 | 35262.81 | |
| **CAGR** | **17.83%** | **11.07%** | **14.23%** | |

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***Source: Annual Reports of Cooperative Milk Plants 2005-06 to 2014-15***

**Medium Sales Turnover Milk Plants:**

On analyzing the average trend percentage of Medium Turnover milk plants, it was observed that the average sales for these milk plants had shown an increase of 375 percent which was better than the overall average trend percentage of six milk plants and slightly less than the Highest Turnover milk plants. CAGR of milk plant Amritsar (17.65 percent) is better than milk plant Patiala (11.41 percent). Further the average sales percentage of these two milk plants (14.12 percent) was also better than the average of all the six plants but it was slightly less than the highest turnover milk plants *(Table No. 4)*

***Table 4: Average Sales of Medium Turnover Milk Plants (Amount in Rs. Lakh)***

| Year | Amritsar | Patiala | Average | Average Trend Percentage |
|---|---|---|---|---|
| 2005-06 | 2823.73 | 4703.67 | 3763.70 | 100 |
| 2006-07 | 3365.06 | 4999.67 | 4182.36 | 111 |
| 2007-08 | 4713.66 | 6549.99 | 5631.82 | 150 |
| 2008-09 | 6477.76 | 8374.31 | 7426.04 | 197 |
| 2009-10 | 7735.74 | 7605.25 | 7670.50 | 204 |
| 2010-11 | 8946.48 | 8869.38 | 8907.93 | 237 |
| 2011-12 | 10761.45 | 10511.34 | 10636.39 | 283 |
| 2012-13 | 12031.37 | 10917.38 | 11474.37 | 305 |
| 2013-14 | 12933.97 | 11440.70 | 12187.33 | 324 |
| 2014-15 | 14343.06 | 13858.75 | 14100.90 | 375 |
| Average | 8413.23 | 8783.04 | 8598.14 | |
| **CAGR** | **17.65%** | **11.41%** | **14.12%** | |

***Source: Annual Reports of Cooperative Milk Plants 2005-06 to 2014-15***

**Least Sales Turnover Milk Plants:**

On analyzing the average trend percentage of Least Turnover milk plants, it was observed that the average sales for these milk plants had shown an increase of 272 percent which was less than the overall average trend percentage of six milk plants i.e. 365 percent. CAGR of Gurdaspur milk plant was 12.70 percent while it was 8.37 percent in Hoshiarpur. Further, the average sales percentage of these two milk plants was 10.53 percent which was less than the average of six milk plants as well as the highest and medium turnover milk plants *(Table 5).*

***Table 5: Average Sales of Least Turnover Milk Plants (Amount in Rs. Lakh)***

| Year | Gurdaspur | Hoshiarpur | Average | Average Trend Percentage |
|---|---|---|---|---|
| 2005-06 | 2544.92 | 3045.84 | 2795.38 | 100 |
| 2006-07 | 2720.91 | 3320.27 | 3020.59 | 108 |
| 2007-08 | 3241.07 | 3919.67 | 3580.37 | 128 |
| 2008-09 | 3945.71 | 4696.09 | 4320.90 | 155 |
| 2009-10 | 4056.88 | 4682.56 | 4369.72 | 156 |
| 2010-11 | 5096.63 | 5665.72 | 5381.18 | 193 |
| 2011-12 | 6016.58 | 6169.21 | 6092.90 | 218 |
| 2012-13 | 7522.20 | 7355.83 | 7439.01 | 266 |
| 2013-14 | 7326.90 | 6683.13 | 7005.01 | 251 |
| 2014-15 | 8411.41 | 6801.93 | 7606.67 | 272 |
| **Average** | 5088.32 | 5234.02 | 4889.45 | |
| **CAGR** | **12.70%** | **8.37%** | **10.53%** | |

***Source: Annual Reports of Cooperative Milk Plants 2005-06 to 2014-15***

**Purchase Trends of Selected Milk Plants:**

On analyzing the average trends of purchases of various milk plants it has been observed that overall increase in purchases was 408 percent in the relevant period of study. The Compound Annual Growth Rate (CAGR) of various milk plants had shown that purchase percentage of milk plant Mohali was 18.38 percent the highest among the six plants while milk plant Hoshiarpur had the least (9.82 percent). Milk plant Amritsar closely followed the milk plant Mohali with 18.31 percent of CAGR.

***Table 6: Average Trends of Purchase of Six Milk Plants (Amount in Rs. Lakh)***

| Year | Mohali | Ludhiana | Amritsar | Patiala | Gurdaspur | Hoshiarpur | Average | Average Trend Percentage |
|---|---|---|---|---|---|---|---|---|
| 2005-06 | 10624.10 | 14933.63 | 2056.23 | 3647.05 | 1826.26 | 2153.61 | 5873.48 | 100 |
| 2006-07 | 12914.83 | 16153.46 | 2551.20 | 3944.16 | 1971.05 | 2392.41 | 6654.52 | 113 |
| 2007-08 | 15930.82 | 22115.52 | 3631.70 | 5260.54 | 2524.73 | 2964.91 | 8738.04 | 149 |
| 2008-09 | 19491.13 | 22160.92 | 4901.77 | 6951.73 | 2867.00 | 3458.73 | 9971.88 | 170 |
| 2009-10 | 24891.42 | 23710.67 | 5840.18 | 6140.80 | 3164.42 | 3622.79 | 11228.38 | 191 |
| 2010-11 | 32006.34 | 28291.57 | 6829.95 | 7286.51 | 3618.04 | 4140.57 | 13695.50 | 233 |
| 2011-12 | 42274.62 | 34103.35 | 8474.34 | 8679.94 | 5125.49 | 5420.03 | 17346.30 | 295 |
| 2012-13 | 42695.25 | 36995.15 | 8765.87 | 8409.63 | 5647.14 | 5308.96 | 17970.33 | 306 |
| 2013-14 | 50622.14 | 42969.59 | 9225.20 | 9098.32 | 5175.96 | 4450.34 | 20256.93 | 345 |
| 2014-15 | 57419.35 | 51752.86 | 11043.73 | 11331.25 | 6883.83 | 5493.51 | 23987.42 | 408 |
| **Average** | 30887.00 | 29318.67 | 6332.02 | 7074.99 | 3880.39 | 3940.59 | 13572.28 | |
| **CAGR** | **18.38%** | **13.23%** | **18.31%** | **12.00%** | **14.19%** | **9.82%** | **15.11%** | |

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*Source: Annual Reports of Cooperative Milk Plants 2005-06 to 2014-15*

Milk plant Gurdaspur had 14.19 percent followed by milk plant Ludhiana (13.23 percent), Milk plant Patiala had 12.0 percent and milk plant Hoshiarpur had 9.82 percent. Overall CAGR of purchases of all the 6 milk plants was 15.11 percent *(Table 6).* The pattern of CAGR of purchases is same in the Highest, Medium and Lowest turnover milk plants i.e. each group has one milk plant with more purchases than the other as shown in fig. 2. In the graph Milk Plants are shown on the X-axis while Purchases and CAGR for ten years are shown on the Y-axis.

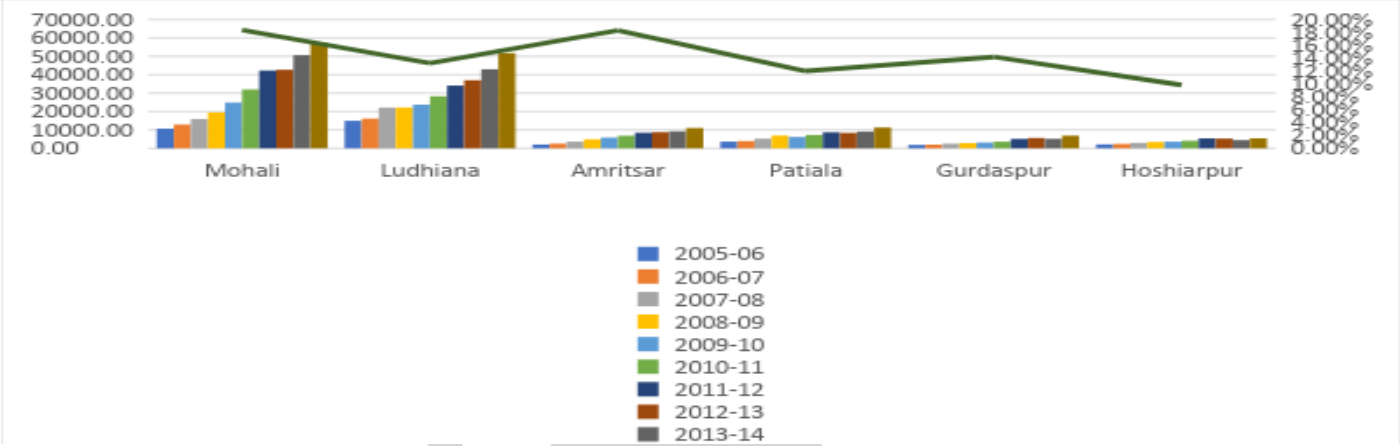


*Fig. 2: Purchase Trends and CAGR pattern of Selected Milk Plants*

**Purchase Trends of Highest Turnover Milk Plants:**

On analyzing the average trends of Highest Turnover milk plants, it has been observed that the average purchases for these milk plants had shown an increase of 427 percent which was better than the overall average trend percentage of six milk plants. CAGR of milk plant Mohali was 18.38 percent while it was 13.23 percent in milk plant Ludhiana. Further the average purchases of both the milk plants was 15.63 percent which was better than the average of all the six milk plants *(Table 7).*

***Table 7: Average Purchase Trends of Highest Turnover Milk Plants (Amount in Rs. Lakh)***

| Year | Mohali | Ludhiana | Average | Average Trend Percentage |
|---|---|---|---|---|
| 2005-06 | 10624.10 | 14933.63 | 12778.86 | 100 |
| 2006-07 | 12914.83 | 16153.46 | 14534.14 | 114 |
| 2007-08 | 15930.82 | 22115.52 | 19023.17 | 149 |
| 2008-09 | 19491.13 | 22160.92 | 20826.02 | 163 |
| 2009-10 | 24891.42 | 23710.67 | 24301.05 | 190 |
| 2010-11 | 32006.34 | 28291.57 | 30148.95 | 236 |
| 2011-12 | 42274.62 | 34103.35 | 38188.99 | 299 |
| 2012-13 | 42695.25 | 36995.15 | 39845.20 | 312 |
| 2013-14 | 50622.14 | 42969.59 | 46795.87 | 366 |
| 2014-15 | 57419.35 | 51752.86 | 54586.11 | 427 |
| Average | 30887.00 | 29318.67 | 30102.84 | |
| **CAGR** | **18.38%** | **13.23%** | **15.63%** | |

***Source: Annual Reports of Cooperative Milk Plants 2005-06 to 2014-15***

**Purchase Trends of Medium Turnover Milk Plants:**

On analyzing the average trends of Medium Turnover milk plants, it has been observed that the average purchases for these milk plants had shown an increase of 392 percent which was less than the overall average trend percentage of six milk plants i.e. 408 percent as well from highest turnover milk plants i.e. 427 percent. CAGR of milk plant Amritsar was 18.31 percent while it was 12 percent in milk plant Patiala further the average purchase of these two milk plants was 14.65 percent which was less than the average of six milk plants (15.11 percent) as well as from the Highest Turnover milk plants (15.63 percent) *(Table 8).*

***Table 8: Average Purchase Trends of Medium Turnover Milk Plants (Amount in Rs. Lakh)***

| Year | Amritsar | Patiala | Average | Average Trend Percentage |
|---|---|---|---|---|
| 2005-06 | 2056.23 | 3647.05 | 2851.64 | 100 |
| 2006-07 | 2551.20 | 3944.16 | 3247.68 | 114 |
| 2007-08 | 3631.70 | 5260.54 | 4446.12 | 156 |
| 2008-09 | 4901.77 | 6951.73 | 5926.75 | 208 |
| 2009-10 | 5840.18 | 6140.80 | 5990.49 | 210 |
| 2010-11 | 6829.95 | 7286.51 | 7058.23 | 248 |
| 2011-12 | 8474.34 | 8679.94 | 8577.14 | 301 |
| 2012-13 | 8765.87 | 8409.63 | 8587.75 | 301 |
| 2013-14 | 9225.20 | 9098.32 | 9161.76 | 321 |
| 2014-15 | 11043.73 | 11331.25 | 11187.49 | 392 |
| Average | 6332.02 | 7074.99 | 6703.51 | |
| **CAGR** | **18.31%** | **12.00%** | **14.65%** | |

***Source: Annual Reports of Cooperative Milk Plants 2005-06 to 2014-15***

**Purchase Trends of Least Turnover Milk Plants:**

On analyzing the average trends of Least Turnover milk plants, it has been observed that the average purchase of these milk plants had shown an increase of 311 percent

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which was less than the overall average trend percentage of six milk plants i.e. 408 percent as well as from Medium Turnover milk plants i.e. 392 percent. CAGR of milk plant Gurdaspur was 14.19 percent while it was 9.82 percent in milk plant Hoshiarpur further the average trend percentage of these two milk plants was 12.01 percent which was less than the average of six milk plants (15.11 percent) as well as from highest (15.63 percent) and medium turnover milk plants (14.65 percent) *(Table 9).*

***Table 9: Average Purchase Trends of Least Turnover Milk Plants (Amount in Rs. lakh)***

| Year | Gurdaspur | Hoshiarpur | Average | Average Trend Percentage |
|---|---|---|---|---|
| 2005-06 | 1826.26 | 2153.61 | 1989.94 | 100 |
| 2006-07 | 1971.05 | 2392.41 | 2181.73 | 110 |
| 2007-08 | 2524.73 | 2964.91 | 2744.82 | 138 |
| 2008-09 | 2867.00 | 3458.73 | 3162.87 | 159 |
| 2009-10 | 3164.42 | 3622.79 | 3393.61 | 171 |
| 2010-11 | 3618.04 | 4140.57 | 3879.31 | 195 |
| 2011-12 | 5125.49 | 5420.03 | 5272.76 | 265 |
| 2012-13 | 5647.14 | 5308.96 | 5478.05 | 275 |
| 2013-14 | 5175.96 | 4450.34 | 4813.15 | 242 |
| 2014-15 | 6883.83 | 5493.51 | 6188.67 | 311 |
| Average | 3880.39 | 3940.59 | 3910.49 | |
| **CAGR** | **14.19%** | **9.82%** | **12.01%** | |

***Source: Annual Reports of Cooperative Milk Plants 2005-06 to 2014-15***

**Gross Profit Margin:**

Gross Profit Margin is the ratio between gross profit and sales of the concerned milk plants and it is shown as a percentage of sales [8], [9]. Overall average gross profit margin was 10.33 percent which was highest in milk plant Patiala i.e. 19.52 percent followed by milk plant Amritsar (12.76 percent), milk plant Gurdaspur (9.54 percent), milk plant Hoshiarpur (7.60 percent), milk plant Mohali (6.36 percent) and least in milk plant Ludhiana (6.21 percent). Gross Profit Margin of all the milk plants was less than the required average minimum gross profit margin of 25 percent *(Table 10).*

***Table 10: Gross Profit Margin of Milk Plants in the Study (in Percentage)***

| Year | Mohali | Ludhiana | Amritsar | Patiala | Hoshiarpur | Gurdaspur | Average |
|---|---|---|---|---|---|---|---|
| 2005-06 | 8.14 | 8.08 | 13.93 | 21.00 | 10.96 | 16.22 | 13.05 |
| 2006-07 | 7.69 | 7.01 | 15.33 | 21.20 | 8.92 | 12.87 | 12.17 |
| 2007-08 | 6.80 | 6.34 | 15.03 | 17.89 | 8.17 | 15.90 | 11.69 |
| 2008-09 | 6.89 | 6.39 | 12.03 | 17.61 | 7.48 | 16.60 | 11.17 |
| 2009-10 | 5.98 | 6.71 | 10.42 | 17.45 | 7.12 | 7.88 | 9.26 |
| 2010-11 | 6.01 | 5.97 | 11.01 | 17.86 | 6.59 | 3.13 | 8.43 |
| 2011-12 | 5.75 | 5.52 | 12.97 | 19.03 | 6.46 | 6.51 | 9.37 |
| 2012-13 | 5.64 | 5.71 | 12.83 | 22.05 | 5.93 | 7.66 | 9.97 |
| 2013-14 | 5.31 | 5.49 | 12.14 | 21.20 | 6.02 | 5.19 | 9.23 |
| 2014-15 | 5.34 | 4.92 | 11.88 | 19.96 | 8.34 | 3.43 | 8.98 |
| **Average** | **6.36** | **6.21** | **12.76** | **19.52** | **7.60** | **9.54** | **10.33** |

***Source: Annual Reports of Cooperative Milk Plants 2005-06 to 2014-15***

For statistically analyzing the variance in the average gross profit margin among the six milk plants, one-way ANOVA has been applied and between the milk plants of higher, medium and least turnover in the study, independent t-test has been applied on the annual average gross profit margin of all the milk plants. For this purpose, the following null hypothesis has been framed.

Ho: There is no significant difference in the gross profit margin of selected milk plants.

$H_1$: There is significant difference in the gross profit margin of selected milk plants.

The results presented in table 11 indicated that there has been significant difference in the Gross Profit Margin among the six milk plants in the study ($p<0.050$) at 5% significance level. Moreover, in Medium Turnover milk plants, the p value has also found to be significant or in other words there has been significant difference in the Gross Profit Margin of Amritsar and Patiala milk plants. As a result, the null hypothesis has been rejected.

***Table 11: Statistical analysis of Gross Profit Margin of Milk Plants using One-Way ANOVA & t-test***

| One-Way ANOVA (Six Milk Plants) | | | | | |
|---|---|---|---|---|---|
| | **Sum of Squares** | **df** | **Mean Square** | **F** | **Sig.** |
| Between Groups | 1312.645 | 5 | 262.529 | **40.725** | **.000** |
| Within Groups | 348.107 | 54 | 6.446 | | |
| **Total** | **1660.752** | **59** | | | |

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| Independent Sample t-test | | | |
|---|---|---|---|
| Equal Variance Assumed | Highest Turnover Milk Plants | | |
| | t | df | Sig. |
| | .343 | 18 | .743 |
| | Medium Turnover Milk Plants | | |
| | -8.954 | 18 | .000 |
| | Least Turnover Milk Plants | | |
| | 1.099 | 18 | .286 |

So, it has been proved that there was significant difference in the gross profit margin of all the six milk plants as well as in the Medium Turnover milk plants. But in case of Highest Turnover and Least Turnover milk plants the p-value has not found to be significant (p>0.050). So, in this case the null hypothesis has been accepted. Hence it has been proved that there was no significant difference in the Gross Profit Margin of Highest Turnover as well as Least Turnover milk plants.

**Net Profit Margin:**

Net Profit Margin is the ratio of net profit to sales of the concerned milk plants and it is shown as a percentage of sales [8], [9]. The Net Profit Margin of all the six milk plants with their average has been presented in the table 12. Overall average Net Profit Margin was -0.82 percent which was highest in milk plant Mohali i.e. 2.06 percent followed by milk plant Ludhiana (1.88 percent) and milk plant Patiala (0.27 percent). Milk plants Amritsar, Gurdaspur and Hoshiarpur had shown negative average net profits for the given period. So overall average net profit margin of all the six milk plants was also negative showing average net loss. It has been further analyzed statistically by applying one-way ANOVA to the annual net profit margin of all the six milk plants and independent t-test on the category wise analysis of Highest, Medium and Least Turnover milk plants.

***Table 12: Net Profit Margin of Six Milk Plants (in percentage)***

| Year | Mohali | Ludhiana | Amritsar | Patiala | Hoshiarpur | Gurdaspur | Average |
|---|---|---|---|---|---|---|---|
| 2005-06 | 2.96 | 2.86 | -18.43 | -0.38 | 1.55 | -7.36 | -3.13 |
| 2006-07 | 2.85 | 2.91 | -13.41 | 0.18 | 0.20 | -13.13 | -3.40 |
| 2007-08 | 2.49 | 2.63 | -7.58 | 0.03 | 2.35 | -7.27 | -1.22 |
| 2008-09 | 2.26 | 2.12 | -5.56 | 0.82 | 2.33 | 4.54 | 1.08 |
| 2009-10 | 2.13 | 2.14 | 2.53 | -0.48 | 3.08 | -3.11 | 1.05 |
| 2010-11 | 1.92 | 1.25 | 1.09 | -1.56 | 0.18 | -5.73 | -0.47 |
| 2011-12 | 1.63 | 1.34 | 0.17 | 0.20 | 0.02 | 0.26 | 0.60 |
| 2012-13 | 1.61 | 1.26 | 0.22 | 2.01 | -5.38 | 0.23 | -0.01 |
| 2013-14 | 1.42 | 1.14 | 0.35 | 0.93 | -7.08 | -4.07 | -1.22 |
| 2014-15 | 1.30 | 1.13 | 0.36 | 0.91 | -4.31 | -8.53 | -1.52 |
| **Average** | **2.06** | **1.88** | **-4.03** | **0.27** | **-0.71** | **-4.42** | **-0.82** |

***Source: Annual Reports of Cooperative Milk Plants 2005-06 to 2014-15***

For this analysis the following null hypothesis has been framed.

Ho: There is no significant difference in the net profit margin of selected milk plants.

$H_1$: There is significant difference in the net profit margin of selected milk plants.

***Table 13: Statistical analysis of Net Profit Margin of Milk Plants using One-Way ANOVA & t-test***

| One-Way ANOVA (Six Milk Plants) | | | | | |
|---|---|---|---|---|---|
| | **Sum of Squares** | **df** | **Mean Square** | **F** | **Sig.** |
| Between Groups | 399.654 | 5 | 79.931 | **5.247** | **.001** |
| Within Groups | 822.683 | 54 | 15.235 | | |
| **Total** | **1222.338** | **59** | | | |

| Independent Sample t-test | | | |
|---|---|---|---|
| Equal Variance Assumed | Highest Turnover Milk Plants | | |
| | t | df | Sig. |
| | .602 | 18 | .555 |
| | Medium Turnover Milk Plants | | |
| | -1.894 | 18 | .074 |
| | Least Turnover Milk Plants | | |
| | -1.875 | 18 | .077 |

The results presented in table 13 indicated that there has been significant difference in the Net Profit Margin among the six milk plants under study (p<0.050) at 5% significance level. Moreover, between the milk plants of Highest, Medium and Least turnover milk plants the p-value was not

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found significant (p>0.050). In other words, the null hypothesis has been accepted while making category wise comparison of the milk plants, but the null hypothesis has been rejected while comparing all the six milk plants for net profit margin among each other.

## V. FINDINGS AND SUGGESTIONS

It has been observed that overall performance of all the milk plants under study had been improved during the period of study in terms of trends of sales and purchases. The pattern of CAGR among all the three groups based on Sales as well as in Purchases is same. Between the highest turnover milk plants, Mohali had higher CAGR than Ludhiana, between Medium turnover milk plants, Amritsar had more CAGR than Patiala and between the lowest turnover milk plants, Gurdaspur had higher CAGR than Hoshiarpur. The gross profit margin for all the six milk plants had been less than the minimum required standards of 25-35 percent. It might be due to higher cost of goods sold. So, for improving the gross profit margin there should be a proper control on the overall cost of goods sold. Further the average net profit margin for all the milk plants during the period of study had shown negative results. It was positive in milk plants Mohali and Ludhiana, but less than the required. It had been due to the over charge of operating expenses. So, for improving the overall profit performance of these milk plants overall expenses should be controlled.

## VI. CONCLUSION

The study has revealed that overall sales and purchases of six milk plants had shown a rising trend for the relevant period of study. It was highest in milk plant Mohali and lowest in case of milk plant Hoshiarpur. Highest and Medium turnover milk plants had been performing better in terms of Compound Annual Growth Rate (CAGR) than the Least Turnover milk plants. The pattern of CAGR in all the three groups in terms of Sales as well as in Purchases is same. Between the highest turnover milk plants, Mohali had higher CAGR than Ludhiana, between Medium turnover milk plants, Amritsar had higher CAGR than Patiala and between the lowest turnover milk plants, Gurdaspur had higher CAGR than Hoshiarpur. Average Gross Profit Margin of six milk plants was 10.33 percent, which was highest in Patiala followed by Amritsar, Gurdaspur, Hoshiarpur, Mohali and Ludhiana milk plants. But overall Net Profit Margin was not satisfactory as the average net profit margin of all the six milk plants had shown negative results. Highest Turnover milk plants Mohali and Ludhiana had shown average positive net profits. Medium Turnover milk plants Amritsar and Patiala were improving but showing average negative results. It has been noted that the negative profit performance of Hoshiarpur and Gurdaspur milk plants had worsen the overall average net profit performance of all the six milk plants. So, steps should be taken by the apex body for improving the overall performance of these cooperative milk plants.

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