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## Understanding Value Addition in Indian Dairy Sector: Some Perspectives

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### Abstract

Indian dairy sector has shown tremendous growth in terms of milk production, from 17 million tonnes (1950-51) to 112 million tonnes (2009-10). This transition from deficiency to sufficiency has been achieved by a series of policy interventions by the government. It has been found that in the first phase of 'Operation Flood', growth rate of value-added products was 0.93 per cent per annum, but in the third phase, it became 9.10 per cent per annum. Milk processing in India is around 35 per cent, of which the organized dairy industry accounts for only 13 per cent of the milk produced, the remaining 22 per cent is processed in the unorganized sector. To explore the diversity and market exploration for enhancing the value in milk, the study has identified the untapped demand of different dairy and dairy products in ethnically diversified rural urban groups. The paper has highlighted certain dairy development policies to encourage growth of the dairy sector. While value addition in milk is unavoidable if one has to enhance sector profitability, the same does not seem feasible unless the organized sector improves its penetration. Because, it is the involvement of the organized sector that will drive the growth by resorting to value addition in basic product and harnessing the consumer market. The mechanics of the organized sector penetration could be agency-specific as also area-specific.

### Introduction

India is the world's largest milk producing country. The total milk production has increased from 48 million tonnes in 1988-89 to 112 million tonnes in 2009-10. Dairying in India is more inclusive compared to crop production in the sense that it involves a majority of the vulnerable segments of the society for livelihoods. Nearly two-thirds of farm households in India are associated with livestock production, and 80 per cent of them are small landholders ( $\leq 2$ ha). The livestock, specifically dairying is a supplementary enterprise to crop farming and is highly integrated with crop production. More than 75 per cent of the farmers keep 2-3 milch animals for subsistence of their livelihoods. The structure of milk production is largely based on low input and low-to-moderate output which fits into

the resource endowments of small producers in terms of ownership of land, family endowment as also with common property resources. The farmers' perception about input use and its outcome is usually traditional. However, certain regions of the country as also certain segments of rural population, have taken up dairying progressively as a means of full employment. The traditional farms of dairy enterprises have given way to commercial farms with escalation in average production, bringing in modernity in farm practices and use of dairy farm power and mechanization.

India is one of those countries where cost of milk production at the farm-gate level is least. Though it is of great comparative advantage, it is also important that India has a huge domestic market to factor in. Nonetheless, geographical location of India coupled with its neighbouring countries being milk deficient, immense export potential of milk and its value-added products exists.

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Under this backdrop, this paper has assessed the need for value addition in the dairy sector, and has identified the kind of lessons that could be suggested for policy direction for the future growth of dairy sector. Data for this study were mainly sourced from various issues of National Sample Survey Organization, *Annual Reports* for different years of Department of Animal Husbandry and Dairying and National Industrial Survey.

## Results and Discussion

In order to capture the impact of 'Operation Flood' programme on milk production and value addition in milk, we have calculated compound annual growth rate (CAGR) for different sources of milk production and its utilization pattern, and the results are given in Table 1.

Table 1 clearly depicts how dairy development has been transformed from the earlier phase (1970-80) of slow growth rate of milk production and its utilization in the form of value-added in milk products to high growth rate of milk production and value-added milk products. It was due to the higher allocations under 'Operational Flood' programme in the Fourth Five-Year Plan, which is considered as the turning phase from deficiency to sufficiency in the Indian dairy sector. This programme aimed at replicating the Amul Model of Milk Cooperative, which essentially ensured a favourable price regime to milk producers and mode of disbursal of prices through a fair and transparent system. The impact of this programme was reflected in the annual growth rates of milk production; the growth rate increased from 2.80 per cent per annum in 1970s to 6.72 per cent per annum during 1980s but declined subsequently and at present the growth rate is at 4.04 per cent per year.

In India, milk is mostly produced by small farmers. According to the 59<sup>th</sup> Round NSSO data, marginal and small farmers constituted 58 per cent of all the holdings but accounted for as much as 71 per cent of the in-milk bovine stock in 2002-03. There has been a substantial increase in the percentage share of the marginal farm-size category in the in-milk bovine population during the past thirty years. It increased from 20 per cent in 1971-72 to 31 per cent in 1981-82, then to 44 per cent in 1991-92, and further to 52 per cent in 2002-03. It may be inferred that the future course of growth in the form of value-added products will be completely guided by the small and marginal holders.

## Transformation Phase in Value Addition to Milk

As world's largest milk producer, the Indian dairy sector can play a major role in food processing sector. It is slowly transforming from traditional to advanced form where more technological back up is being used to fulfill the increasing market demand. This transformation has enabled the manufacturers to supply the dairy products in different value-added forms like condensed milk, flavoured milk, health drinks, ice cream, milk powder, homogenized milk, pasteurized milk, etc. besides other milk products including a variety of sweet meats. In the food processing industry, the dairy sector has depicted high value addition (35%), whereas in the case of total agriculture, it is only 2 per cent.

Milk processing in India is around 35 per cent, of which the organized dairy industry account for only 13 per cent of the milk produced, the remaining 22 per cent is processed in the unorganized sector (GoI, 2010). The organized dairy sector uses 80 per cent of the liquid milk for pasteurization and the rest for butter,

**Table 1. Trends in milk production and utilization in India: 1970-80 to 1990-2009**

(in per cent)

Period	CAGR				
	Production		Total	Utilization	
	From cow	From other animals		Fluid milk	Value-added milk products
1970-1980	5.13	1.33	2.80	5.23	0.93
1980-1985	7.77	5.91	6.72	7.60	4.85
1985-1996	5.60	3.61	4.54	0.63	9.10
1996-2009	2.22	4.56	3.51	3.07	3.84
1990-2009	2.38	4.73	3.64	2.75	4.34

*Source:* Compiled by authors from the various statistics released by Department of Animal Husbandry and Dairying, Government of India, New Delhi

**Table 2. Trends in growth of organized dairy sector in India**

Period		Value of output	CAGR (%) No. of dairy units
1976-1980*	Operation Flood-I	5.02	9.72
1980-1985	Operation Flood-II	13.19	5.13
1985-1996	Operation Flood-III	10.96	6.55
1976-1996	Operation Flood-I,II,III	9.18	5.97
1976-1990	Pre-liberalization	8.24	5.85
1990-2004	Post-liberalization	12.43	5.12

Source: National Industrial Survey (various years from 1976-04), CSO, GOI

Note: \* Actual operation flood-I period was 1970-1980, but data availability was from 1976, therefore we have considered 1976-80 as operational flood I phase.

cheese, and milk powder. The organized dairy sector has registered capacity to process around 65 per cent of the country's rural marketable surplus and about one-third of national milk production.

During the initial phase of operational flood, though the annual growth rate of the dairy units was quite high (9.72%), its contribution to value addition was much lower (~5%), as this period was underlined as the phase of transition from subsistence to sufficiency. The effect of operational flood in terms of value addition was reflected in the period 1980-85 (operation flood-II) and 1985-1996 (operation flood-III) which helped in accentuating a growth of 13 per cent and 11 per cent per annum, respectively (Table 2).

Interestingly, in the operation flood era (1976-1996), the organized dairy units registered the highest level of average growth (~6%) and their contribution in terms of value addition was 9.18 per cent (at 1970-71 prices) per annum. But, in the post-liberalization era, organized dairy sector could not continue its momentum as has been reflected through the growth pattern (5.12%) of dairy units, whereas the value of output during this period increased at the rate of 12.43 per cent (Table 2), reflecting convergences of small and tiny units into larger units ensuring economies of scale.

During post-liberalization era, milk production increased at the rate of 3.64 per cent per annum but value addition increased much faster, at the rate of 4.34 per cent per annum. The processing of milk increased from 52 per cent to 58 per cent during this period. It could be due to the fact that peoples' preference towards quality milk increased with the changes in per capita income, urbanization and life-styles.

The traditional dairy products were mainly manufactured by the unorganized sector where the major manpower resource was from the family and the raw material was their own input. It should be noted that the unorganized sector utilizes low level of technology and also has low benchmark in quality control measures; but the value addition from this sector is of a great economic significance.

Though the percentage of entrepreneurs in the dairy sector is less than one per cent, its coverage has increased from 0.43 per cent to 0.88 per cent between 51<sup>st</sup> and 56<sup>th</sup> NSSO rounds. However, coverage of the unorganized dairy sector has improved significantly in terms of value addition. For instance, the unorganized cheese producers which were about 6 per cent in 1994-95, increased to 29 per cent in 2000-01 (Table 3). Similarly, the share of ice cream manufacturers jumped from 6 per cent to around 11 per cent during this period. On the other side, the percentage of butter manufacturing units decreased from 1.53 per cent to 0.64 per cent and of *ghee* making units fell from 13 per cent to 7 per cent during this period. Thus, the number of producers of newer value-added dairy products in the unorganized sector has increased while that of highly traditional products has decreased to meet the demand of new generation.

In India, dairy products are consumed in various forms, such as milk, butter, *ghee*, *curd*, cheese, ice-cream, besides fresh milk. On an average, a consumer spends 18.85 per cent of his food expenditure on milk and milk products in the urban area, while in the rural area, this expenditure is 15.47 per cent (NSSO-63<sup>rd</sup> round).

According to the NSSO-63<sup>rd</sup> round (2006-07), the average monthly expenditure per household on milk

**Table 3. Share of dairy entrepreneurs in the unorganized sector as per 51<sup>st</sup> and 56<sup>th</sup> NSSO round**

Product	NSSO-51 (1994-95)	NSSO-56 (2000-01)
Butter, %	1.53	0.64
Cheese, %	5.78	28.64
Cream, %	5.45	0.84
Curd, %	9.63	16.83
Ghee, %	12.85	6.64
Ice cream, %	5.92	10.54
Khoya, %	39.32	21.36
Butter milk, %	0.89	0.47
Dairy plant surveyed according to different products manufactured by dairy plants, No.	1058	1908
Dairy plants surveyed in dairy industries, No.	826	1337
Total enterprises surveyed, No.	192029	152494

Source: NSSO (51<sup>st</sup> and 56<sup>th</sup> round)

and milk products was Rs 270 in rural area and Rs 420 in urban area. During the period 1990-07, annual expenditure on food and non-food items has grown at the rate of 8.64 per cent per annum in urban areas and 7.23 per cent per annum in rural areas.

During the period 2003-07, when the economy witnessed one of the highest growth rate in India, the growth in consumption expenditure on milk and milk products was higher in the rural (5.41%) than urban (4.27%) areas. This indicated that economic growth influenced rural growth which in turn increased consumption expenditure (Table 4).

It has been estimated that the demand of milk will rise to 156 Mt by 2020 (Parthasarathy *et al.*, 2004), whereas the estimated figure from the Planning Commission of India is around 182 Mt by the year 2021–22 (Gautam *et al.*, 2010). To meet the projected requirements, it is necessary to enhance milk production by addition of 6 Mt per year over the next 12 years. But during the past 12 years (1997 to 2008), the annual increment has been to the tune of 3.64 Mt per year only (Department of Animal Husbandry and Dairying). It is estimated that the demand for dairy products is expected to grow at a healthy rate of 15-20 per cent over the next five years. The Indian dairy market grew by 9.4 per cent in 2006 to reach a value of US \$ 16.3 billion and it is expected that the value will reach to US \$ 22.2 billion in 2011 (Swiss Business Hub India, 2008).

According to Jain *et al.* (1998), expenditure elasticity for milk and milk products has been found positive, indicating that all the milk and milk products behave as normal goods and their consumption will increase with the increase in total expenditure on milk and milk products. Liquid milk as well as *ghee* and *butter* were expenditure inelastic, while other milk products were highly expenditure elastic.

On an average, the cost of milk production is around Rs 12-15/ litre. It varies from farmers to farmers, region to region and state to state. Cost of milk production is higher for buffaloes and indigenous cattle breed than cross-breed. To find how value of milk is changing with change in the form of dairy products, we used data of NSSO 56<sup>th</sup> round survey on Unorganized Manufacturing'. To workout value addition in milk, the price of product was divided by the value of raw milk. A perusal of Table 5 revealed that value addition was

**Table 4. Growth of expenditure on milk and milk products in rural and urban areas**

Period	Rural areas			Urban areas		
	Milk and milk products	Food items	Food and non-food items	Milk and milk products	Food items	Food and non-food items
1986-1990	11.22	9.71	10.40	8.58	8.70	9.86
1990-2007	6.20	5.79	7.23	6.21	6.02	8.64
2003-2007	5.41	4.86	5.64	4.27	4.40	6.16

Source: *Level and Patterns of Consumer Expenditure* (various issues) (42 to 63<sup>rd</sup> rounds), National Sample Survey Organization, Ministry of Statistics & Programme Implementation, Government of India, New Delhi



**Table 5. Value additions to milk in the form of different dairy products manufactured by unorganized dairy sector**

Products	Particulars	2000-01
Butter	Value added in raw milk (per rupee)	1.17
	Percentage contribution of raw milk in final product value	85.70
Cheese	Value added in raw milk (per rupee)	1.54
	Percentage contribution of raw milk in final product value	65.09
Cream	Value added in raw milk (per rupee)	1.19
	Percentage contribution of raw milk in final product value	84.28
*Curd/Yoghurt	Value added in raw milk (per rupee)	1.29
	Percentage contribution of raw milk in final product value	77.51
Ghee	Value added in raw milk (per rupee)	1.21
	Percentage contribution of raw milk in final product value	82.48
Ice cream	Value added in raw milk (per rupee)	5.95
	Percentage contribution of raw milk in final product value	16.81
Khoya	Value added in raw milk (per rupee)	1.45
	Percentage contribution of raw milk in final product value	69.20

Source: NSSO (2000-01)

highest in ice-cream as compared to other milk products and was least in the case of butter. It does not reflect that the maximum fluid milk will be converted to ice-cream and least in butter making, as value addition was more in ice-cream than in butter. In fact, each product has its own value, consumer preference and market demand and these vary from consumer to consumer, region to region and state to state. Therefore, value chain of different milk products from fluid to solid depends mainly on taste and preferences in different regions of the country.

To explore the proximity of diversity and market exploration, the scenarios of changing dairy products' market (in the organized dairy cooperatives) have been presented in Table 6. Products like cream, milk powder and SMP were decelerated over the past three years, whereas cheese, butter and ghee were increasing. This may be explained by the changing demand patterns which are mainly guided by the untapped demand pattern in ethnically diversified groups. The challenge before the sector is to produce quality products which may be acceptable as per international standards and competitive in the national and international market.

### Way Ahead for More Value Addition

In recent years, there has been a shift in taste and preferences of consumers. They have become more health conscious and quality conscious. Therefore, the industry or co-operatives that are collecting milk will

have to stand up to the expectations of the market and consumers. On the other hand, producers will have to bring in (i) new insights to understand the customers, and (ii) new and more customer-friendly products at reasonable costs while improving quality. If the scale of successful commodity processing is not feasible, then finding a market niche may be an alternative.

India being a leading milk producer, dairy cooperatives in the country have a lot to perform. But, most of the cooperative federations are not managed professionally. In fact, many of them, outside Gujarat, are being run like regular parastatals, invariably headed by bureaucrats. The success of dairy industry shall depend on the ability to build a strong milk procurement network which will give raw material cost advantage along with assurance of regular supply. Most of the MNCs failed in this sector due to inability to develop a strong network. Moga (Nestle) and Etawah (Levers) have remained laboratory cases while Anand (Amul) has got replicated. A strong backward integration in the form of cattle feed supply, vaccination, breed improvement programmes and profit-sharing with farmers are some of issues that none of the private sector companies could manage or amplify. The price paid for milk in India is highest in the world largely due to the strong presence of cooperatives.

As regards international market, India is under pressure to open up its market in dairy produce, especially for cheese from Europe. The EU is keen on

**Table 6. Dairy market in scenario in India: 2005-06 to 2007-08**

Products	('000 tones)		
	2005-06	2006-07	2007-08
Cream	45.82	38.90	36.90
Table butter	35.90	37.88	41.77
Ghee	69.59	70.35	72.29
Cheese	4.48	4.75	6.02
Milk powder	178.87	171.72	167.10
Skimmed milk powder (SMP)	105.27	98.47	92.73

Source: The World Dairy Situation 2008 (IDF).

Indian market opening outside in a bid to compensate the troubles facing milk farmers at home. On an average, dairy farms in the Europe get 18 per cent subsidy on the total output (Vrolijk *et al.*, 2010). As result of high subsidy, supply is excess of demand. In Europe, when the entire milk-procurement for production of cheese and value-added products is satisfied and profit is maximized, the remaining milk is processed into butter and SMP; it is often referred to as residual production. This is a distinct from the pattern of production and consumption of milk followed in India where priority is given to production and distribution of liquid milk for masses.

It has to recognized that Indian consumers in general have a clear preference for liquid milk in various forms of indigenous products and value addition is done to produce diversified milk products (skimmed milk, double toned milk, toned milk, standardized milk, high fat milk, flavoured milk, etc.). Similarly, manufacturing of various indigenous products, ethnic products and fresh milk products add value to the base product, i.e. milk. It is important that manufacturing of these products is standardized and hygiene as well as quality norms are adhered to for safety of human health and quality of life.

## Conclusions

While value addition in milk is unavoidable if one has to enhance sector profitability, the same does not seem feasible unless the organized sector improves its penetration. Because, it is the involvement of the organized sector that will drive the growth by resorting to value addition in basic product and harnessing the consumer market. The mechanics of the organized sector penetration could be agency-specific as also

area-specific. Clearly, the need is of putting in place a transparent milk collection and payment mechanism and creating village or intermediate level chilling facilities to improve product quality and also to improve confidence among the milk producers regarding their payment.

Buoyancy in the consumer demand for milk is a positive factor. This buoyancy has been felt for a sustained period signifying high potential for growth. These developments would trigger further demands for value-added products. Therefore, the sector would require investments in enhancing productivity, milk collection, milk chilling, processing and marketing through cool chain.

The milk production is beset with near stagnation in yield of milch animal. It has to start right at the producer level because unless the yield of milch animals is improved, there will be strong pressure on the demand for raw milk and the scope for surplus milk for value addition will have limited scope. Therefore, the organized sector needs to steer measures stimulating primary production of milk through enhancing yield of milch animals for ensuring sustainability in production and subsequent creation of further values in the milk marketing chain.

Food safety laws and their enforcement are important in the sense that without standardization of products and adherence to quality and hygiene, the basic tenet of value addition would be defeated. It would be feasible only if the dairy industry moves towards accountability and transparency and for this increased involvement of the organized sector is truly unavoidable. Therefore, while creating values from the products manufactured is important, without a regulatory mechanism such a value will be self-defeating.

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