Chapter 2
Review of Literature

2.0 Introduction

The dairy industry of India has indeed witnessed significant and enviable progress in the last three and half decades with the inception of the Operation Flood Programme in 1970. Impressive gains have been made in the country's annual milk production. In order to sustain the high growth rate in milk production, it is essential to process and preserve it most effectively and economically. In India, there exists a huge variety of traditional dairy products specific to different regions across the country. The traditional dairy products enjoy mass appeal, give high profit margins and have export potential. However, most traditional products are produced and sold loose by local halwais, mithaiwalas, and characterized by inconsistent and unhygienic quality. Among various traditional dairy products, khoa and chhana are two very important products, which are used as base material for manufacturing of different popular sweets. Although efforts have been initiated towards the use of modern technologies in production of traditional dairy product and its organized marketing, organized sector holds a diminutive share in the segment.

In this chapter, an extensive review of the earlier studies undertaken in the relevant area has been presented briefly. This facilitated identifying gaps in the existing research and thus determining the scope of the present study. The review of literature has been presented in segment of Development of Dairying in India, Status of Traditional Dairy Products, Techno-economics of Traditional Dairy Products, and Modernization of Traditional Dairy Products Manufacturing. This helps to compare and contrast with result of other such studies undertaken elsewhere.
2.1 Development of Dairying in India

Aneja (1991) recorded the technological development in Indian dairy processing before the commencement of Operation Flood programme. He observed that milk production in India was dependant on the availability of crop residues which were in turn also dependant on the monsoon rains. During the dry summer season bulk of the milch animals used to go dry and the milk production was usually one-third the production in winter. Even when the country was importing large quantities of milk powder, there were seasonal surpluses of milk in winter. So, major technological innovation provided for the growth of the dairy industry before Operation Flood was the setting up of drying facilities for the conversion of the seasonal surplus milk into milk powder. He also observed that the setting up of milk driers in the good milk sheds areas before 1970 enabled the cooperatives to pay 40 to 50 per cent higher prices to the producers during winter months. This provided a significant incentive to produce more milk.

Aneja (1991) also studied various other developments in the Indian dairy processing industry before 1970s. In those days, the scientific investigations were concentrated on the composition and keeping quality of milk. The introduction of toned milk, to extend the supply of high fat buffalo milk by mixing it with cheap, imported skimmed milk powder, helped the Government dairies to continue feeding their markets. This was necessary due to absence of a positive response from the farmers to the dairy development programmes in the country. Industry oriented research work also helped in manufacturing ghee by dairy plants and in utilizing buffalo milk for manufacture of various western dairy products, namely, condensed milk, milk powders, infant milk food and cheese.

'Operation Flood', one of the world's largest dairy development programmes, which helped to create strong network and linkages among millions of smallholder producers, processors and urban consumers, was launched on a national scale by the National Dairy Development Board in 1970 (Kanitkar, 1996). The unique feature of the programme was that the milk powder and butter oil, received from the European Economic Community as
aid, was reconstituted into liquid milk and sold in the metropolitan markets. The money, generated from the sale of the gift commodities, was then used to set up a corpus fund. In the second phase, a national milk grid was set up, which ensured that major cities all over the country received their milk supplies by rail and road tankers from places often as far as 2000 km away. The third phase expanded the effort made to embrace the entire country. The technological development of dairy processing during this period was solely based on the requirement of the successful implementation of this programme.

Aneja (1991) observed that in the first phase of Operation Flood programme, the major technological development occurred in the Indian dairy processing industry was introduction of recombination technology. Large scale handling of butter oil necessitated development of necessary storage system. Appropriate technology was also developed to recombine skim milk powder, butter oil and white butter to produce liquid milk of quality acceptable to the Indian consumers. Another important innovation made during the initial years of implementing Operation Flood was the introduction of Bulk Vending Machines for distribution of liquid milk as against traditional system of distributing milk in glass bottles.

Baxi (1988) showed that in the second phase of the Operation Flood programme, for successful implementation of National Milk Grid, lot of efforts were put for long distance hauling of milk. The infrastructure required for moving milk across the length and the breadth of the country included the setting up of milk processing plants, long-distance transportation by road and rail tankers, and godowns and cold storages for storing conserved milk solids. As the milk production went on increasing with the success of the Operation Flood programme, efforts were initiated for developing process and packaging technology for manufacture of various value added dairy products in addition to the liquid milk (Baxi, 1988).

However, Punjrath (1991) noted that in spite of the fact that the dairy industry has made rapid strides through Operation Flood programme, the methods of manufacture of the traditional products remained essentially unchanged except for a few isolated products.
He also tried to find out the reason behind such phenomena and indicated that most of the developments in dairy sector in India were directed towards manufacture of western dairy products for which equipment and processes were readily available from industrially advanced countries.

Patel, 1991 reported that the momentous task of restructuring the unorganized sector of dairy industry in India began with the launching of Operation Flood programme. The pattern of development was mainly inspired by the western dairying in terms of equipments and processes. The products manufactured were, therefore, essentially western in concept and origin; for example dried milk products, cheese, butter, ice cream, etc. These products became integral part of the early development programmes because of the easier access to the western technology and availability of expertise.

2.2 Status of Traditional Dairy Products

The developments of traditional Indian dairy products date back to 6000 years when milch animal were domesticated. Over the centuries ways of preserving precious but perishable milk solids were found keeping local needs and conditions in the mind, culminating into an impressive range of traditional milk products. Mentioning of usage of milk and ghee was found in various ancient scriptures.

Mathur, 1991 and Aneja, et. al., 2002 elaborated the process of evolution of various indigenous dairy products. Recognition of the socio-economic eminence of milk in human nutrition instinctively led ancient Indians to conservation of nutrients into more stable products under the tropical climatic conditions. The methods employed were essentially suitable for the scale of operations involved in ancient times. The equipments employed were likewise simple in design and easy to fabricate. These processes indeed served the intended purpose very effectively to preserve and extend the use of milk solids until very recently because the production of milk remained small in scale and scattered over large areas. Invariably milk was converted into an intermediate product in the zones
of agricultural activities, and finished into value added final product at the marketing point to serve the needs of urban dwellers.

A variety of traditional dairy products are produced in India, most of which are region specific. Various workers classified these products on the basis of different criteria (Aneja, 1991; Parathasarthy, 1991; Patel, 1991; Punjrath, 1991; Aneja, et. al., 2002; Patil, 2002). However, depending upon the method of manufacturing the major three classes are as follows:

1. Heat Dessicated Products - Khoa and Khoa based sweets
2. Acid-Heat Coagulated Products - Paneer, Chhana and Chhana based sweets
3. Fermented Products - Dahi, Shrikhand, Chhas and Lassi

From the above classification, it is evident that ethnic milk sweets are the leading products among all the traditional dairy products. These sweets are inseparable part of the socio-cultural life of Indians. They are mainly prepared from two intermediate base products khoa and chhanna. Presently about one hundred and fifty types of milk based sweets are available in the country. The range of khoa based sweets include Peda, Gujabjamun, Burfi, Kalakand, Milkcake etc.; whereas, chhanna based sweets include Rasagolla, Sandesh, Rajbhog, Khirmohan, Cham-cham, Sita bhog etc. The regional preferences for sweets are often linked to availability of intermediate milk products. Thus, in North and West India khoa is used to make various sweets, whereas East India has a wide range of chhanna based sweets (Aneja, et. al., 2002).

Vaswani, 2002 studied the product portfolio in five metro cities of India, namely, Mumbai, Delhi, Bangalore, Ahmedabad and Kolkata, and developed a 'market based categorization' of the traditional milk based sweets of India along with the number of variants of each category. In terms of regional preferences, it was observed that khoa based sweets were more popular in Delhi, Mumbai, Ahmedabad and Bangalore while chhanna based sweets were popular in Kolkata. Besides Kolkata, chhanna based sweets were noticeable in Delhi, followed by Bangalore, but had low presence in shelf space in Mumbai and Ahmedabad. The number of end product variants in khoa was high as
compared to *chhana*. In case of *khoa* based sweets, 61 types of *burfi* and 34 types of *peda* were observed in all the 5 metro cities, whereas in case of *chhana* based sweets, only 2 types of *rasagolla* and 5 types of *sandesh* were observed.

### 2.3 Techno-economics of Traditional Dairy Products

The technological aspects of almost all the indigenous products were well attended by the scientists and researchers. The traditional technology for manufacture of indigenous milk products was discussed in details in three well written books (Rangappa and Achaya, 1974; De, 1980; Aneja, *et. al.*, 2002).

In the year of 1991, Food and Agriculture Organization (FAO) of the United Nation (UN) and National Dairy Development Board (NDDB), India organized a workshop on Indigenous Milk Products, where technology of indigenous milk products of Bangladesh, Indonesia, Nepal, Pakistan, Philippines and India were discussed in detail. In this workshop, Mathur, 1991 and Patel, 1991 discussed the status of technology employed for manufacture of various Indian traditional dairy products.

Patil, 2002 reported the general conditions of traditional manufacturing methods characterized by inefficient use of energy, poor hygiene and sanitation, non-uniform product quality, fatigue on the operator etc. Moreover, Parathasarthy, 1991 stated the problem of inadequate packaging for protecting nutritional quality and shelf life. Agrawala, 2003 observed that the equipments used in traditional methods of manufacturing indigenous dairy products have poor hygienic design and are labour intensive.

To overcome these inherent disadvantages, attempts have been made to develop batch, semi continuous and continuous equipments for the manufacture of these products. The institutions such as National Dairy Development Board, Anand; National Dairy Research Institute, Karnal; Indian Institute of Technology, Kharagpur and SMC College of Dairy Science, Anand are continuously carrying out researches related to development of
equipments for the manufacture of indigenous milk products (Agrawala, 2003). With their efforts the technological developments taken place in the field of traditional product manufacturing, have been well reviewed by various workers (De, 1980; Mathur, 1991; Patel, 1991; Punjrat, 1991; Aneja, et. al., 2002; Patil, 2002; Agrawala, 2003). The technological developments that have taken place specifically for manufacturing of khoa, khoa based sweets, chhana, and chhana based sweets are recorded below.

The first attempt to develop semi-continuous khoa making machine was made by Banerjee, et. al., 1968, which was followed by batch type semi-mechanized scraped surface heat exchanger developed by More, 1990; batch type mechanical conical process vat developed by Agarwala, et. al., 1987 and scraped surface continuous khoa making machines developed by NDDB (Punjarath, et. al., 1990), Dodeja, et. al., 1992 and Christie and Shah, 1992. Some of these machines were utilized for commercial exploitation in dairy plants. The contherm-convap scraped surface heat exchanger system developed by M/s Alfa-laval was also being commercially used for large scale manufacture of khoa in one dairy plant.

Successful attempts were also made to mechanize the methods of manufacture of khoa based sweets. Palit and Pal, 1999 developed mechanized manufacture of burfi involving khoa making by continuous machine followed by kneading and heating khoa-sugar mixture in Stephen kettle. The Sugam Dairy, Vadodara manufactures kesar peda by adopting a large scale mechanized process which involves manufacture of khoa by continuous machine, heating khoa-sugar mixture in planetary mixture, cooling, mechanical forming of peda and packaging (Patil, 2002). Similarly, Guiabjamuns are being manufactured commercially using khoa portioning and ball forming machines followed by deep fat frying, sugar syrup soaking lines and tin packing (Banerjee, 1997).

Aneja, 1977 developed a prototype continuous chhana making machine involving tubular heat exchanger, acid injection chamber, holding coil and strainer. A process has been developed on similar principle for the mechanized production of chhana at IIT, kharagpur, which involves indirect heating of milk in a tubular heat exchanger to 95° C,
cooling to 70 °C, continuous coagulation with hot citric acid in a vertical tube, holding milk-acid mixture to permit complete coagulation, separation of whey in a continuous flow employing double wall basket centrifuge and chilling to 4 °C by directly spraying chilled water on the layer of chhana (Singh, 1994).

Development has also been made in mechanization of chhana based sweets. Kumar, et. al., 1997 designed a screw conveyor for kneading of chhana and a cutter provided at the exit spit the chhana into lumps of 10 gram each. The lumps are made to fall on a spinning disc and stationary disc above, which converts lumps of chhana into round balls. Another machine has been developed at NDRI, Karnal, which involves kneading of chhana using screw conveyor, portioning chhana into lump of 10 g each with a cutting device, and ball formation in a revolving cylinder (Chaudhary, et. al., 2001). Kumar, 1993 developed a single screw vented extruder for continuous production of sandesh.

Economic aspects of traditional products manufacturing in India was reported in various publications. Dates back to 1976, Arora and Patel studied the economics of khoa production in North West India. They observed that the return from khoa business were double during the festival time, viz., dussehra and diwali. They also reported that fat per cent of khoa of marketable quality allowed the producers in selling the extra cream or ghee and adding to margin of profit.

Lohar and Killedar, 1997 also studied the cost of production and marketing of khoa, basundi, kunda and pedha in Western Maharashtra. They reported 3.9 per cent net profit on total cost of production for khoa, whereas the same was increased to 6.6, 13.2 and 19.6 per cent for basundi, kunda and pedha, respectively, after conversion to sweets.

In 1997, NDDB organized the International Dairy Federation Workshop on Small Scale Dairy Processing and Indigenous Milk Products (IDF, 1997), which studied the cost aspects of small scale processing of indigenous dairy products and suggested that energy, which constitutes the major cost element of small scale processing, should be reduced by using efficient technology.
Goel, 1998 studied the techno-economic feasibility of commercial production of *misti doi* and indicated that the additional investment on purchase of equipments for commercial production could be recovered within a year.

Chakraborty, 1998 studied the cost of production of *chhana* based sweets in Kolkata and reported that in all the products variable cost account for more than 98 per cent and fixed cost to less than 2 per cent of the total cost of production.

Patil, 2002 reported that the market for traditional dairy products was estimated to be Rs. 250 billion. This fact underlines the significance of these products in the national economy. Misra, 2000 quoted a GCMMF-TCS survey report, which gave the projected demand of *paneer, shrikhand, rasagolla* and *gulabjamun* to be 16.0, 5.7, 6.0 and 5.9 thousand metric tonnes, respectively, by the year 2009. Patil, 2002 observed that the market for traditional products far exceeds that for western dairy products.

The operating margin of traditional dairy products is much higher, mainly due to lower raw material cost. Aneja, *et. al.*, 2002 reported the raw material cost of various dairy products as percentage of their respective sales price. They observed that the raw material costs as percentage of sales prices of *dahi, rasagolla, gulabjamun, peda, paneer* etc. are much lower than those of butter and milk powder.

Aneja, *et. al.*, 2002 reported the milk utilization pattern for various milk products and found that in the year 2001, 50 per cent of country's total milk production were utilized for manufacture of traditional dairy products like *ghee, makkhan, dahi, khoa, chhana, paneer* and related products; whereas only 4 per cent were utilized for western products such as, milk powder, butter, cheese and ice cream.

Aneja, *et. al.*, 2002 also indicated the cost of manufacture of fourteen traditional dairy products for industrial scale production. They showed that the production of *chhana* based sweets improves profitability of composite traditional dairy products plant, as these products give higher margins.
Roy, 2002 studied the potential market for traditional dairy products over the fifteen major states of the country. He reported that the number of mithai / halwai shop per lakh population was ninety in West Bengal, which was highest in the country, and the average daily turnover per mithai shop was Rs. 1604.00 in West Bengal, third highest in the country.

Solanki, et. al., 2002 reported that traditionally, for khoa preparation, wood, coal or wood and kerosene are used at the village level. To make the system more efficient it was observed that steam jacketed open pan and diesel fired stoves are also being adopted. However, they reported that all these methods of khoa manufacturing suffer from major drawbacks, such as, batch-to-batch variation in product quality, small-scale batch process unsuitable for commercial adoption, and energy inefficiency. In order to overcome these problems, National Dairy Development Board, Anand has designed and developed a khoa Line consisting of Milk Condensing Unit, Inclined Scraped Surface Heat Exchanger (ISSHE), and Rapid Cooling System. In this study, they compared the cost of utility and labour of various conventional methods along with NDEB developed mechanized method of khoa manufacturing and concluded that the utility and labour cost of mechanized system of khoa manufacturing was considerably lower than conventional methods.

Sangu, 2004 studied to find out the extent of profit generation and break-even level of production of locally produced khoa, paneer and ghee in Western Uttar Pradesh. Study revealed that in the cost of the products, major share was of raw material (74.6 per cent in khoa, 87.7 per cent in paneer and 90.7 per cent in ghee) which followed by fuel (9.9 per cent in khoa, 2.9 per cent in paneer and 4.3 per cent in ghee) and labour cost (5.5 per cent in khoa, 5.4 per cent in paneer and 2.9 per cent in ghee). The actual production of all the study products was more than their break-even levels (952.8 per cent of EEP for khoa, 311.3 per cent of BEP for paneer and 302.9 per cent of BEP for ghee), indicating profit of the business.
2.4 Modernization of Traditional Dairy Products Manufacturing

The need for modernization of the traditional dairy products sector was first felt in the mid eighties. Since then, various reports suggested the need and scope for modernizing the traditional dairy products sector of India. In the workshop on Indigenous Milk Products, jointly organized by FAO and NDDB in 1991, various papers were presented emphasizing the requirements for modernizing the Indian traditional dairy product manufacturing (Aneja, 1991; Mathur, 1991; Parathasarthy, 1991; Punjrath, 1991).

Aneja, 1991 observed that the dairy industry has not shown much interest in indigenous products as its existing marketing systems do not permit the efficient distribution of short shelf life products. He opined that processing and marketing innovations are required to be made to ensure adequate returns and the assurance of a regular market to the producers.

Mathur, 1991, in the same workshop, suggested the development of mechanized processes for the large-scale production of traditional dairy products for accelerating the pace of restructuring of unorganized sector of dairy industry. Efforts for upgrading the traditional processes for manufacture of traditional milk products could be simulated by making use of emerging energy efficient equipments. He also felt the necessity of establishing and documenting the regional preferences for desirable sensory attributes of these products.

Punjrath, 1991 sensed an increased pressure for restructuring of the indigenous milk products industry. He commented that any innovation which could enable the organized sector to manufacture and market indigenous milk products on industrial scale would have far reaching impact on dairy industry as well as on social and economic condition of milk producers in the country.
In the above mentioned workshop, Parathasarthy, 1991 discussed the policy support required for production and marketing of indigenous milk products to aid the transition from low-level technologies of production and marketing to more efficient systems.

In the NDDB organized International Dairy Federation Workshop on Small Scale Dairy Processing and Indigenous Milk Products, problems of small scale dairy processors and manufacturers of indigenous milk products of various developing countries were studied in details (IDF, 1997). The workshop addressed increasing importance of small scale dairy processing, especially for the production of value added milk products. It was observed that the advent of convenience foods and their increasing acceptability gave a boost to the modernization of the traditional dairy products sector. Bringing ethnic dairy products into the mainstream of dairy foods would have a positive impact on the livelihood of the rural poor who form the bulk of millions of dairy producers in developing countries. The increasing involvement of women in these activities was also highlighted.

Verma, et. al, 1999 studied the productivity performance of dairy industry across the country and reported that the value addition as a proportion of output ranged from minus 4.79 per cent for West Bengal to 17.16 per cent for Punjab, against the national average of 7.22 per cent. The negative sign for West Bengal reflected excess use of inputs there. They also observed that density of dairy factories increased in almost all the states except Bihar, Kerala, Maharashtra and West Bengal, who could not recover the cost of resources, expended and incurred losses over a period of time. Management of inputs and product mix contributes significantly in productivity realization. Efforts should, therefore, be made to modify the product mix so as to make the industry more viable.

Patil, 2002 observed that the traditional dairy products enjoy mass appeal, give high profit margins and have high export potential. He suggested that there is an urgent need to modernize this sector to produce high quality products with long shelf life. As the expanding business prospects provided by these products and their accompanying value-addition call for a thorough revamping of this sector; Patil, 2002 and Misra, 2000 carried
out the SWOT analysis for this sector. They recommended that large-scale manufacture of these products in a hygienically safe manner with assured quality control and proper packaging will certainly do wonders for this sector.

Aneja, et. al., 2002 observed that a number of modern dairies started manual batch type production of popular milk products like burfi, gulabjamun, rasagolla, shrikhand, kheer, paneer, peda, dahi, mishti doi, lassi etc. The high growth rate of these products led few of these organized dairies to invest in mechanized mass production. Till now, such modernization is few and limited to products like dahi, paneer and khoa. However, this development is also having a trickle-down effect on the unorganized traditional dairy sector which has started showing interest for modernization of its age-old sweet-making methods.

The efforts for modernization of traditional dairy product manufacturing and marketing by organized dairies of the country were reviewed by few workers.

Aneja, et. al., 2002 stated that during 1980s, NDDB initiated such efforts by setting up of Sugam Dairy at Vadodara as an industrial unit for scaling up the technologies worked out under laboratory conditions of R&D lab of NDDB, Anand. This initiative also showed the organized sector a new growth avenue through production and marketing of indigenous milk products like Shrikhand, Gulabjamun and Paneer. This was the first system for large scale manufacturing, packaging and marketing of shrikhand, gulabjamun and paneer. The mechanized production process of shrikhand, gulabjamun and paneer followed at Sugam Dairy has upgraded its bacteriological quality and enhanced its shelf life significantly. Annual production of shrikhand at Sugam Dairy crossed 2000 MT in 2001. Almost 100 MT of Shrikhand, gulabjamun and paneer, valued at Rs. 18.1 million, was exported to USA, UK, UAE, Singapore and New Zealand under the brand name of ‘Amul’.

Patil, 2002 listed some other dairies who followed the modernization effort of Sugam Dairy, namely Sabar Dairy of Gujarat, Warna Dairy of Maharashtra. Aneja, et. al., 2002
also reported that commercial production of *Mishti Doi* through Mother Dairy, Calcutta was also started during that period. During 1990s, due to the availability of surplus milk, free flow of technology and increased competition, various dairies started mechanized production of traditional dairy products for diversifying their product range.

Roy, 2002 stated that in India there exists a huge variety of traditional dairy products specific to the different regions across the country. Most traditional products are produced and sold loose by local *halwais* / *mithaiwalas*. The organized sector holds diminutive share in the segment with only a few cooperative dairies marketing traditional products, for example, *Dahi* by Mother Dairy, Delhi and Nandini, Bangalore; *Masti Dahi* by Amul; Malai *Paneer* by Amul. However, after witnessing the success of these brands and to capitalize on the huge potential in the traditional market, MNCs are slowly venturing into traditional products. He stated the example of Nestle’s *dahi* and *gulabjamun*.

Of late, modernization of ethnic sweet making got a major push by various national brands like K.C. Das, Ganguram, Haldiram, Bikanervala, Bikaji and Chitales (Aneja, et al., 2002). Their concern for scaling up of the production volume and attention to the product safety, hygiene and consistent quality, led to technological up-gradation of sweet manufacturing.

Agrawala, 2003 observed that modernization of traditional dairy product manufacturing by Indian organized dairies followed the approach of adopting existing machineries to fit in the unit operations involved in the processing. The use of meatball forming machine and potato chips fryer, for manufacturing of *gulabjamun* at Sugam Dairy, Baroda is an example of such approach. He stated few more examples of this approach like adaptation of convap-contherm, which was meant for production of condensed milk, for producing *khoa* at Chitale Farm, Pune. Similarly, for production of *dahi* and *lassi*, yoghurt manufacturing equipments were adapted at Mother Dairy, Kolkata. Vidya Dairy, Anand is making *paneer* by employing cheese curdling Alpama Unit to achieve coagulation on a
continuous rubber conveyor and to obtain curd filtering on a rotary drum followed by centrifugal pressing in a revolving device.

Another example of adaptation of western technology at Sugam Dairy, Baroda was use of basket centrifuge, quarg separators and planetary mixers for manufacturing shrikhand (Gupta, et. al., 1987). These equipments were in use in the bakery industry.

In the technical session of XXXIV Dairy Industry Conference organized by Indian Dairy Association, Parekh, 2005 discussed the priorities of Indian dairy equipment manufacturers. He noted that process details and prototype equipments for production of traditional dairy products such as dahi, lassi, shrikhand, paneer, khoa, chhana and sweets, are already worked out by NDRI, NDDB, IIT and other institutes. Utilization of those technologies by Indian dairy machinery manufacturers would strengthen efforts of modernizing the traditional dairy products sector.

2.5 Summary

Based on the review of literatures it is clear that researchers have raised many issues and concerns regarding traditional dairy products sector. At the same time, they are in complete agreement of the huge potential of this sector in improving livelihood of milk producers of the country. It has been emphasized that the organized traditional dairy products sector is still in nascent phase in Indian dairying scenario. It is necessary to adopt new technology and practice improved system of dairy management to add value to the business of dairy industry. For development of technology, considerable R&D work has been carried out by various research institutes. Standardized processes and prototype equipments are available for almost all the indigenous milk based products. Economic aspect of traditional product manufacturing has also been studied to some extent, which showed that this has ample potential for economic viability. Hence, for effective turn around of this sector, a new integrated approach of management of production and marketing is need of the hour.
So far considerable progress has been seen in mechanized production and organized marketing of dahi and paneer, which are being marketed under various cooperative and private brands. As seen from the above review, khoa and chhana are two other major products of the unorganized traditional dairy products sector. Efforts have been initiated for modernization of khoa and certain khoa based sweets manufacturing, especially in the western part of the country. However, chhana and chhana based sweet industry, which is dominant in eastern part of the country, especially in West Bengal, is yet to be explored.

Therefore, it warrants a study of chhana sector in West Bengal to understand various technological and economic aspects of chhana manufacturing for its future up-gradation to a modern, organized business. An in depth study of traditional dairy products in general will help in understanding various problems and challenges for future development of this sector. So, an attempt has been made to explore the various features of traditional dairy products sector of India, its relevance in Indian dairying, techno-economic profile and market potential. Current practices and problems related to its production and marketing and the experience of Indian dairy industry towards modernization of the traditional dairy products sector have also been studied.