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INITIATING SECOND WHITE REVOLUTION IN INDIA THROUGH PUBLIC PRIVATE PARTNERSHIP

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ABSTRACT

Milk production in India has come a long way over the years from a low volume of 110 million tonnes in 2009 to 112.5 million tons in 2010. Today, India is the world leader in milk production. The Indian dairy industry presently contributes about 15 % to the total milk production of the world. The Indian dairy market is currently growing at an annual growth rate of 7% at current prices. In today's context, a demand supply gap has become imminent in the dairy industry because of the dynamic demographic pattern, changing food consumption habits and the rapid urbanization of rural India. This requires an inclusive growth of the dairy sector along with the rapidly growing Indian economy. Though current Government Schemes for the dairy sector shows patronage to cooperative societies and small farmers by fostering growth in the sector, there still exist gaps in terms of maximizing the value involved in the entire chain. Though the Government has been promoting some large scale private investments in the food processing sector through the Mega Food Parks and Cold Chain Infrastructure schemes, there has been not much progress in the dairy processing sector. There are certain thrusts areas in the Indian dairy sector where the Public Private Partnership model could be taken up as a synergistic collaboration to achieve the social objective of percolating benefits to the last level of the supply chain and on the other hand provide lucrative proposition to the private agencies as well. Hence, in order to develop dairying sector in India this present article is developed with some key recommendations with regard to policy measures and incentives in terms of facilitating subsidy, grant-in-aid or in other terms to facilitate a healthy environment for the growth of a well-built symbiotic relationship which can provide a right platform for initiating White revolution II.

Key Words: *Dairying, Public Private Partnership and Recommendation for Policy Measures*

INTRODUCTION

Milk production in India has come a long way over the years from a low volume of 110 million tonnes in 2009 to 112.5 million tons in 2010 (Economic Survey report, 2009-10). Today, India is the world leader in milk production. The Indian dairy industry presently contributes about 15 % to the total milk production of the world. The Indian dairy market is currently growing at an annual growth rate of 7% at current prices (9th International Dairy Congress, 2004). In today's context, a demand supply gap has become imminent in the dairy industry because of the dynamic demographic pattern, changing food consumption habits and the rapid urbanization of rural India. This requires an inclusive growth of the dairy sector along with the rapidly growing Indian economy. The dairy industry in India has its base in the small holders and marginal farmers. The Operation Flood program might have brought in a plethora of changes in the dairy sector but there is still much to be reformed. This is because about 80% of the dairy industry is unorganized and the raw milk market is still dominated by the local milkman/dudhaiya and halwai in India. This leads to a complex supply chain that is compounded by a lack of proper cold chain facilities and logistics. The return of investment for the farmers who are a major stake-holder in the industry is on the downside and value percolation to the base of the chain has been minimal. Though existing Govt. schemes for the dairy sector shows patronage to cooperative societies and small farmers by

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fostering growth in the sector, still there are gaps in terms of maximizing the value involved in the entire chain. Though the Government has been promoting some large scale private investments in the food processing sector through the Mega Food Parks and Cold Chain Infrastructure schemes, there has been not much progress in the dairy processing sector. In India, the average milk yield per animal on a daily basis is 6.5 kg for crossbred dairy cows which is quite less in comparison to the yield of exotic varieties in temperate countries (Mahadevan A.P., 2008). This huge gap in the production standards presents for the need for an intervention to boost the overall yield and productivity parameters. It is hence important that the private sector investments get accelerated in this very important space.

The need to foster such arrangements in the dairy sector is corroborated by the public sector's inability to provide certain public goods and services entirely on its own in an effective and equitable manner because of lack of resources and management issues. There is an urgent need not only to improve the supply chain and quality parameters but also to remove the bottlenecks in the sector by fostering private sector participation in the areas of project financing, capacity building, operations and better integration of stakeholders. There are certain thrust areas in the Indian dairy sector where the Public Private Partnership model could be taken up as a synergistic collaboration to achieve the social objective of percolating benefits to the last level of the supply chain and on the other hand provide lucrative proposition to the private agencies as well. The potential thrust areas where the private sector can intervene are in Procurement and Processing, Infrastructure and logistics development, Operations Management, Implementing Quality parameters, Capacity building through training, Research and knowledge transfer, Marketing and Export. Keeping in view the above thrust areas, the perspective of the private as well as the public player should properly fit into each other so that there is a symbiotic understanding of potential risks and other modalities well in advance as in other sectors. The Indian dairy sector has a tremendous potential to set new benchmarks in the world dairy market having the largest milch animal base given persistent efforts to increase the productivity. PPP in this context is the best vehicles to achieve all round sustainable development in the dairy sector. There have been certain key recommendations with regard to policy measures and incentives in terms of facilitating subsidy, grant-in-aid or in other terms to facilitate a healthy environment for the growth of a well-built symbiotic relationship which can provide a right platform for initiating White revolution II.

The Indian Dairy Industry

The Indian dairy industry has been through an evolution right from the British era till today. It has come a long way over the years from a milk production volume of 17 million tons in 1951 to 112.5 million tons in 2010 (Economic Survey report, 2009-10). Steadily and firmly, it has cruised to become numero uno in the list of milk producing countries and this success story has been scripted by the small holder milk producers. Today, the Indian Dairy industry stands at a mammoth size of US\$ 70 billion. Given the highest milch bovine population of 115.487 million in the world, India exhibits tremendous potential to further strengthen its position in the world dairy market (Asish Rose, 2000). The operation flood program promoted and implemented by the National Dairy Development Board (NDDB) has been instrumental in bringing about a white revolution in India. Changing lifestyle, feeding habits and urban culture has somewhat effected the transition of the Indian dairy Industry into a more of a demand driven, highly diversified and exciting business proposition.

Despite being the world's largest milk producer, India's share in the world dairy trade is almost negligible. India exports various categories of milk products including milk powders, baby foods, butter and other fats, casein, milk and cream, cheese, and whey products. Milk powders and baby food exports constituted around 50 percent of the total dairy exports in volume terms during 2009-10, followed by butter and other fats, casein, milk and cream and other processed dairy products. India exported more than 50 percent of its total dairy products shipments to the United States, Bangladesh, U.A.E., China, Egypt, and Singapore (Aneja, 2010). 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

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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.

Indian imports of dairy products are not substantial in volume. More than 80 per cent 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. Dairy production is an important direct and supplementary source of income for around 75 million rural families (mainly comprising small farmers and landless labourers), which accounts for around 98 per cent of total milk production. The top ten milk producing states of Uttar Pradesh, Rajasthan, Punjab, Andhra Pradesh, Gujarat, Maharashtra, Madhya Pradesh, Bihar, Tamil Nadu, and Haryana account for more than 80 percent of India's milk production (Aneja R.P., 2010). The Ministry of Agriculture has identified an 11th five-year plan approach for the dairy sector to achieve an overall desired growth of five to ten percent per annum. Despite these goals, the Indian dairy sector is working to overcome challenges like low productivity of dairy animals, lack of effective quality and hygienic control systems, and creating an enhanced network of cold chain infrastructure from the producer to the consumer. The dairy cooperative network in India includes 177 milk unions operating in over 346 districts and covering 1, 33,349 village level societies are owned by around 13.9 million farmer members of whom 3.9 million were women (Achaya and Huria 1986). The Indian dairy industry contributes about 69 per cent to the entire bulk of output from the livestock sector. The dairy sector has grown robustly in the past years and has increased the per capita availability to around 256 grams (Aneja, 2010). The pattern of dairying in India has moved from a rural based location to a semi urban set-up where the cattle farms are located on the periphery of the larger cities and metros and so that they stay closer to the processing facility as well as the market.

Key Facts of Indian Dairy Industry

With the advent of better technology and penetration of organized retail into the Indian markets, the dairy industry in India has been able to bring in the ethnic as well as exotic product offerings to the markets. The demand for pure milk has moved a long way from bottled milk to high quality tetra pack UHT milk with increased shelf life and quality. Technological innovation has enabled consumers to choose from an array of milk products based on their calorie consciousness, may it be double toned milk or sugar free ice creams. 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 demand for milk and milk products. Liquid Dairy Products (LDP) represent almost one-fifth of all beverages sold worldwide. Emerging countries like India, Pakistan, China and the Middle East — which today account for 68 % of total LDP consumption are expected to continue to drive total LDP consumption worldwide over the next three years. Driven by steady population growth and rising income, milk consumption and production continue to rise in India – the world's largest dairy producer and consumer. In terms of milk consumption, India tops the charts, consuming 51.5 billion liters of milk and other LDP with a Compound Annual Growth Rate (CAGR) of 2.7% over the last four years. This is almost double the volume consumed by the number two milk consumer, China. India's dairy industry is growing at a 4.5 per cent annual growth rate which is much ahead of the world average rate of 1.35 per cent. If the Govt. can roll out appropriate policy measures and create avenues, then the private players' participation can be increased towards an inclusive growth of all the stake holders of the sector.

Issues and Challenges

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

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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. As a result, organized sector Indian style paneer cheese production is only estimated to be 22,000 metric tons. To this diverse consumption pattern is attached a fairly complex supply chain model in the Indian Dairy Industry. If we try look at it separately for the unorganized and organized section of the dairy industry then it would be rather easier to understand the intricacies of the entire trade.

Supply Chain of the Unorganized Market

The unorganized dairy market in India is about 80% and still the *dudhaiya* and *halwai* dominate this section of the market. In this traditional system the milk produced is directly sold to the consumers at the farm. The other mode is that milk is collected by the milkman from the farmers and then supplied to restaurants or *halwai* for further processing from whom the consumers take the value added processed milk products. These milkmen also sell and supply milk directly to the consumers at their door steps.

Supply Chain of the Organized Market

The organized sector basically pertains to the dairy cooperatives and private and Govt dairies which procure, process and market milk and milk products. In this channel, the milk produced is deposited by the farmers in the collection centres at the village level and then this milk is pooled and transferred to the chilling centres and bulk milk cooling units where the milk is cooled to 4°C. Then it is filled into insulated tankers and transported to the processing plants where the milk is tested and transferred into milk tankers. This milk received is then processed into various categories of liquid milk and value added products. Then the packaged milk is transported to the milk parlors or retail outlets from where it reaches the consumers. In case of the value added milk products having longer shelf life, they are transported to the distribution centres and carrying and forwarding agent (C&F agent). The C&F agent then supplies the required amount of stock to the various retail outlets and milk parlors from where consumers can buy the products.

Issues and Challenges at Small Holder Level

The entire dairy Industry in India has its base in the small holders and marginal farmers. These prime stakeholders of the entire value chain of milk are deprived of minimum resources of land, labour, capital etc. The other constraints at the grass root levels are

Inadequate Feeding of Animals

With burgeoning human population there is an increasing pressure on the land resources for cultivation of food crops and fodder crops are not preferred. This apart the small holders are not able to feed the animals with balanced diet of concentrates and roughages due to lack of financial support.

More Disease Incidence

Small holders who are not members of cooperative societies often get deprived of good animal health care facilities in terms of routine vaccination and prophylactic disease prevention measures. Financial constraints generally inhibit these farmers's access to the organized veterinary services and they still rely on the quacks and conventional treatment methods.

Low Genetic Potential of Animals

The stock of animals even if cross-bred has less percentage of exotic genes which lowers their milk production. There is indiscriminate artificial insemination without proper record keeping which leads to repeated inbreeding and decreased production potential of the animals.

Lack of Chilling Capacities

The farmers having high yielding varieties of the cattle and buffalo have a different issue all together. These farmers milk their animals 2-3 times in the day and every time they have to carry this milk to the distant collection centres where there is a cooling facility or else the milk goes waste if there is delay.

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Exploitation of Farmers

Those farmers who do not conform to any of the cooperative societies get exploited at the hands of the contractors of the private dairies with regard to payment of exact dues as per the fat content of the milk.

High Production Costs

Compared to the amount of efforts and maintenance costs being involved in the production of milk, the farmers do not get remunerative prices due to low market prices and lack of elasticity in the prices of milk.

Delayed Payment of Dues

The farmers are not only paid less according to the quality of milk but also their payment gets delayed from time to time. This comes in line with the sick and non performing milk cooperative unions which pass on the perils of mismanagement and marketing losses to these poor farmers.

At Collection Level

Milk Base Mainly Consisting of Small Holders

The majority of dairy farmers being small and marginal the average holding of animal comes to around 5 animals per farmer. This brings in the logistical challenge of collecting milk from each and every farmer twice on a daily basis. The farmer usually loses much time waiting in the queue to deposit their milk at the collection centres thus resulting in loss of net working mandays.

Involvement of Too Many Intermediaries

Keeping in view the large no. of intermediaries involved in the milk collection procedures the milk loses its quality in the process. This leads to increased microbial contamination and fluctuation in the volume of the milk before reaching the collection centers and bulk coolers.

Gaps in Information

In this era of information technology the dairy sector is pretty unorganized with respect to the support information. There is no record of the milk which is being collected from different milk producers at the collection centres. If anything goes wrong in terms of the discovery of zoonotic disease organisms at a later stage there is no scope of back tracking to the farmer. Though there has been a success in this regard with the e- governance project being implemented in AMUL with the help of IIM Ahmadabad, it has not been replicated by all the cooperative societies in the sector.

Absence of a Screening System

Milk before being pooled up at the collection centre from various farms and animals are not subjected to any screening for the zoonotic diseases and adulterants and contaminants in many of the cooperative societies. This often results in spoilage of the entire batch of the pooled milk if one of the milk cans goes undetected. Linking back to source as such is not possible in the absence of a database.

Lack of Infrastructure

When there is a thrust on increasing the milk production, then there should be ample amount of facilities to handle it. There is dearth of required infrastructure of chilling plants and bulk coolers due to which so much of milk goes waste due to spoilage.

Manipulation of the Quality of Milk by the Farmers

The farmers not being able to get fair and remunerative prices for the milk often tend to give adulterated milk at the collection centers. They often add additives to forge the fat content of the milk and get better price for the lot. Addition of vegetable fat, animal fat, starch, etc. has been quite frequent among the farmers to alter the fat and solid content of the milk.

At Processing Level

Seasonality of Production and Fluctuating Supply

India being a tropical country renders a hot and humid climate for the animals and thus fluctuations in the milk production. There is a flush season in the cooler parts of the year whereas the production goes down in the warmer months. Thus at times, the surplus of milk exceeds the processing capacity and milk goes waste whereas on the other hand the processing capacity goes underutilized in the lean period.

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Absence Quality Standards

There is absence of stringent quality standards like HACCP, Codex etc in most of the cooperative milk unions which bars Indian dairy products for exports into the foreign market.

Adulteration and Food Safety

The most important aspect of milk processing is its purity and wholesomeness. There has been an instance of cheap substitution of skimmed milk powder with below standard substances which is hazardous to health. Even though there are certain Food safety Acts but still every other day we get to know about various tankers of spurious milk being apprehended.

At Storage and Logistics Level

Lack of Cold Storage Facilities

Milk being a highly perishable product requires be processing or cooling as soon as possible after milking, so as to prevent spoilage and contamination. However to ensure this there is a need of refrigerated milk silos for storage which are not present at the village levels.

Gap in the Cold Chain and Transport Facilities

There are long distances to be covered to reach bulk milk coolers from the collection centre. There is a shortage of refrigerated vans and insulated tankers for ferrying the chilled milk to the processing plants.

At Cooperative Level

Less Number of Member Farmers

The cooperative model though successful has not been able to include all the farmers into the fold. There are still many potential farmers who use the informal channel of milk sale and delivery.

Lower Participation in the Decision Making Process

There is huge govt interference in many of the co-operative federation activities which leads to lesser say of the farmers in any crucial issues.

Losses

Poor management of the some of the village cooperatives have led to huge losses in the trade due to which farmers have lost faith in these entities.

Low Prices of Milk

The co-operatives declare low prices for procuring milk from the farmers which benchmarks the prices and forces other players to sell milk at the same prices.

Inefficient Services

The cooperatives have also failed in many parts of the country in providing the basic inputs in terms of quality feed, exotic germplasm and veterinary services.

Insufficient Infrastructure

Some of the co-operatives are lacking the cooling and milk testing facility at the village level collection centers.

At Market Level

Majority of the Market Is Still Unorganized

The milk market in India still faces the challenge of getting organized. The unorganized market makes it competes with the organized market in relation to prices.

Acceptability of the Consumer Base

A large fraction of the consumer base in India is yet to accept the clean and supple milk from organized dairies due higher costs. The mindset of buying fresh whole milk from the milkman is still prevalent in the Indian consumers.

Less Penetration to the Rural Market

Most of the milk produced by the dairy co-operatives goes to the urban market. The rural consumers are still dependent on the informal and unorganized market channels.

Lack of Transparent Milk Pricing System

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There is no specific minimum support price of the milk in the system which makes it unremunerated for the farmers.

PUBLIC PRIVATE PARTNERSHIP: A Win-Win Approach

Public private partnerships commonly called as PPP is long term formal agreement between government or public bodies and the private sector agencies specifically aimed at providing finance, design and implementation of projects for certain infrastructure facilities and services which were conventionally provided by the public sector agencies only. This type of collaborative ventures encompasses a formal agreement between the partners pertaining to dedicated allocation and utilization of resources, amount of decision taking power, risks and return. The PPP framework ensures that the private players finances, builds and operates the project with innovative technologies and professional expertise to attain maximum efficiency whereas the quality of service, price certainty and cost-effectiveness is taken care of by the Govt. agencies. One more important aspect of the PPP model is the amount of risk sharing in the agreement. The government assumes the responsibility for the social, environmental and political risks related with the project whereas the private partner undertakes the onus for the commercial and financial risks to some extent.

In this era of wide-ranging growth, PPPs can serve as a major step towards development of people and economy of India on the whole. The PPP models have been overwhelmingly successful in driving a major wave of urban infrastructure development but now the onus lies on the Government to expand the scope of these partnerships into new horizons of rural development (*Sukumar Chand, 2010*). The potential thrust areas in the Indian dairy industry where the private sector can intervene are

Procurement and Processing,
Infrastructure and logistics development,
Operations Management,
Capacity building through training and extension,
Research and Knowledge transfer

Procurement and Processing

The most vital part of the supply chain in the dairy sector is on the procurement side. The participation of private sector in improving the procurement and processing function in dairy can be envisioned through some of these possible interventions.

Identification of potential milk pockets,
Planning and development of strategic locations for milk collection.
Design, build, own and operate milk collection network and processing facility

The key aspects which can be considered for the promotion of the procurement and processing function are:

Assigning dairy industry a special priority sector status where various modes of assistance can be devised to promote sustainable development.

Provision of special budgetary allocation for capital and operating expenses for the processing function covered under PPP systems wherever applicable.

Ensure guidelines on the competitive procurement price of milk at the farm gate.

The Govt. can provide institutional finance at reduced rates of interest to kick start the projects.

Infrastructure and Logistics Development

The gap in infrastructure and support logistics is probably the most important cause for the minuscule share of processed and hygienic milk in India. The PPP in this area can be implemented by the private sector by:

Planning, Design and Development of Bulk Milk Coolers units (BMC) and chilling facilities for milk at strategic locations so that it can cater to a large milk zone. The cooling or chilling cost of milk can be transferred to the consumer through the processing cost and the farmers would not get taxed for the chilling facilities.

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Build Own and Operate and transfer laboratories and milk testing facilities to grade and ensure remunerative prices to the farmers.

Design, Build and operate Animal feed processing plants, Milk processing plants.

Build, own and operate a cold chain having a fleet of refrigerated vehicles and insulated stainless steel tankers.

Lease, Develop and Operate the defunct and sick cooperative milk plants.

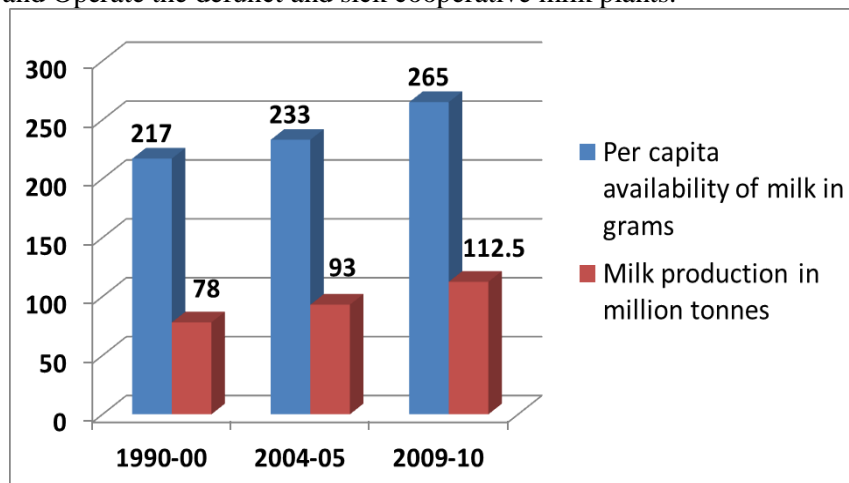


Figure 1: Graphical representation of Indian dairy export for the year 2009 – 10

Source: Technopak Analysis 2010.

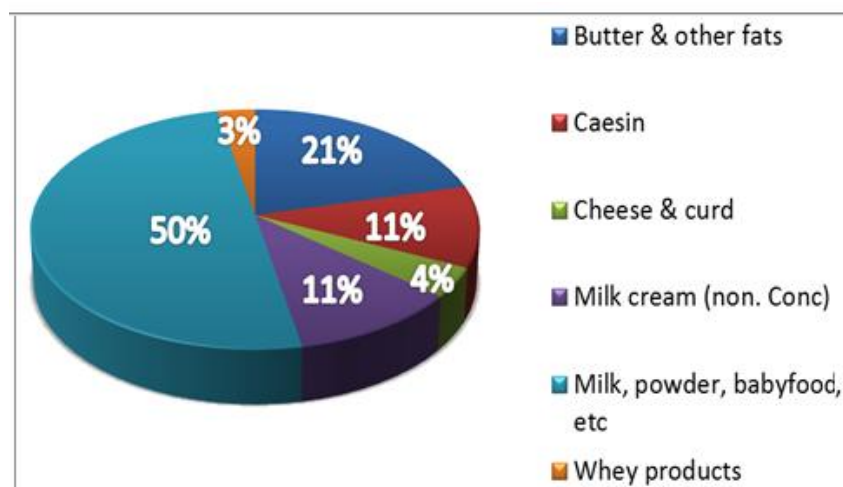


Figure 2: Average consumption of different dairy products by households in India

Source: Operation Flood report, NDDB

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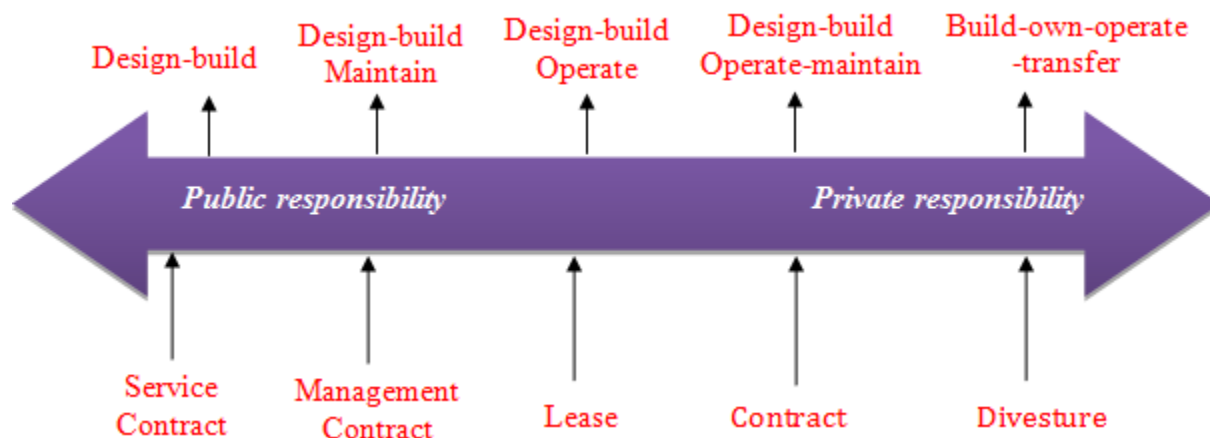


Figure3: The potential thrust areas in the Indian dairy industry for the PPP to intervene

Source: National council for PPP

Major areas where the Govt. can facilitate a conducive environment to foster infrastructure and logistics development in the dairy sector could be in

Providing land at a subsidized rate for building bulk milk cooling units and dairy plants to keep the project cost on the lower side.

Providing special category status to the land being used for the dairy activities so that the registration and other duties are reduced to a great extent.

Promulgate specific policy measures for including certain lucrative funding patterns and incentives. There should be 100% depreciation on all investments on physical assets and a 100% tax holiday on any 10 years out of 15 years of operation after inception of the facility to promote uptake of dairy ventures.

Provision of duty exemption on import of capital goods which are essential for setting up BCU and processing plants.

Facilitation of commercial lending by banks and financial institutions for the projects by assigning a priority status to dairy sector investment and reduced interest rates.

Provision of subsidized electricity supply to the Bulk cooling Units and milk chilling plants to promote more no. of takers for the project.

Operations Management

The key to the success in sustaining a dairy processing plant business is perfect management of its operations like manufacturing and production systems, plant management, equipment maintenance management, production control, industrial labour relations and skilled trade supervision, strategic manufacturing policy, systems analysis, productivity analysis and cost control, and materials planning. PPP in this context can help through contracting-in models which would entail hiring of one or more number of agencies to cater to an array of services such as:

Maintenance and upkeep of Infrastructure.

Quality testing and nutrient estimation at factory end.

Regular maintenance of cleaning in place systems and conformation to quality standards like ISO, HACCP etc.

Purchase of inventories and materials management

Transportation

Capacity Building through Training and Extension

Private players can play a key role in capacity building and training through PPP modes by working in synchronization with the public sector for the effective utilization of the already existing milk zones and cooperative structures. The govt. can facilitate this further by:

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Allowing corporate entities to set special vocational training institutes for the dairy processing technology where in the work force for the technology ridden milk processing plants can be trained and prepared to handle milk in a much more professional and scientific way.

The private sector can also arrange workshops for the training of all the stakeholders involved the supply chain to educate and sensitize the masses towards clean and hygienic milk production.

Providing subsidies for the private institutes for infrastructure building, running the courses, and to some extent bear half the fees burden of the students so that dairy education becomes affordable and lucrative.

Research and Knowledge Transfer

The intervention of private players in research in dairy technology renders tremendous potential. Creation of research facilities in dairy science by private organizations can go alongside the already existing Govt. Research Institutes like National dairy Research Institute etc. The Govt. can promote symbiotic research collaborations and knowledge transfer by:

Providing assistance to the private players to set up model farms where they can maintain certain standard practices and try out new research techniques. The farmers groups can be made aware about these best practices in Animal Husbandry and in turn can be motivated to emulate such practices.

Providing grants for installation of research equipment and setting up of infrastructure for the research institutions.

Providing assistance for building information kiosks and counseling desks at the particular locations not only to provide extension of best practices

CONCLUSION

Dairy development has been acknowledged as the most successful developmental programmes in India substantiated by the fact that the country has achieved the distinctive position of being the highest milk producer in the world with an estimated milk production of 112.5 million tonnes in 2010. India is viewed as one of the world's largest and fastest growing markets for milk and dairy products with an annual growth of 7.5 per cent in value terms. High expenditure elasticity of milk reveal conducive for the growth of dairy sector and diversification of Indian agriculture. In addition, per capita income and shift in consumption behaviour towards dairy products would lead to quantum shift in demand for dairy products in near future. The sector plays a significant role in supplementing family income and providing gainful employment to the rural masses. The above statistics reveal that the livelihood of such huge work force in livestock sector is greatly dependent on dairy farming. Hence, The banks and other financial institutions need to play the proactive role in providing easy and user friendly credit to the end users of each component viz production, procurement, processing and distribution across the milk value chain through development of area specific schemes and redesigning of their financial products. This will also enhance the agri advances portfolio and the customer base of the commercial banks. Finally I would like to conclude with some necessary steps that can be taken/considered for improving dairy further and march towards second White Revolution are as follows,

Per capita income and shift in consumption of dairy products would lead to quantum shift in demand for near future. The commercial banks can extend its credit to 40 per cent of their total net bank credit to priority sector as a whole. Loans to dairy should come within the "Direct Lending to Agriculture" category. To bring about structural changes in the unorganized sector, measures like milk processing at village level, marketing of pasteurized milk in a cost effective manner, quality up-gradation and up-gradation of traditional technology to handle commercial scale using modern equipment and management skills can be taken / considered. The banks and other financial institutions need to play the proactive role in providing easy and user friendly credit to the end users of each component. Government of India has to take some proactive steps to encourage the semi-formal Micro-Financial Institutions (MFIs) to play active role in financing dairy farming.

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REFERENCES

Chand Sukumar, Aneesh Saraiya and Sridhar V (2010). Public Private Partnership in Indian Dairy Industry Technopak Advisors Pvt Ltd, Gurgaon-122002.

Economic Survey (2009). Economics Division Ministry of Finance Government of India.

Asish Rose (2000). Demographic Diversity of India -1991 Census. A reference book on state and district level data Published by BR Publishing Corporation Delhi.

Proceedings of the Nineteenth International Dairy Congress India (2004). Report of the Technical Committee of Direction for Improvement of Animal Husbandry and Dairying Statistics Department of Animal Husbandry and Dairying Ministry of Agriculture Government of India **2**.

Aneja RP (2010). The Technology of Traditional Milk Products in India and Neighboring Countries including the Himalayan Region Paper presented for the FAO's World Survey of Traditional Milk Products.

Mahadevan AP (2008). Traditional Milk Plant and Product Technologies in Dairying Published in Annual Report of National Dairy Development Board Anand.

Achaya KT and Vinod K Huria (1986). Rural Poverty and Operation Flood. *Economic and Political Weekly* **21** 37.

PPP Mapping Project in India. National council for public-private-partnership. (Available at: <http://www.devex.com/-ppp-mapping-project-in-India>).

Operation Flood: A Reality from a Drop to a Flood Third Edition (2011). National Dairy Development Board Anand. National Dairy Development Board Annual Report Anand.