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Marketing channels, their effectiveness and perceived constraints in milk processing in NCR

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ABSTRACT

Major concern of today's agriculture and allied sector is to tumble wastage and increase farmers' income. Post harvest operation and value addition of the farm products is one important way to attain this goal. Even if Indian dairy sector has a well renowned position in the world milk market in terms of production, processing and value addition percentage at the farmer level is not in a recognisable stage. Marketing channels, marketing efficiency and price spread of the identified marketing channels among milk producers and milk processors have been analysed here. Comparative study of the producers share in consumer's rupee of value added milk products and liquid milk showed a significant difference. It was more than 96% in processing of milk and nearly 85% in raw milk. Marketing efficiency analysis showed that channel I (Producer –Consumer) was the most efficient in both group. Price of value added food (Mean Ranks of Friedman's test is 9.10) was the most important factor which attracts the milk processors to take value addition and post harvest management decisions. Infrastructure related constraints (Mean Rank of Kruskal-Wallis test 28.70) were the major constraint faced by the dairy processors. Under that lack of power and electricity and non-availability of machineries in local places (Mean Ranks of Friedman's test is 7.70) were identified as the major constraints in the study area. As per the milk producers, technical inhibiting factors (Mean Rank of Kruskal-Wallis test 40.25) prevent them from undertaking the post harvest operations and value addition in raw milk.

Key words: Constraints, Inhibiting factors, Marketing efficiency, Post harvest decision, Price spread

The recital of the Indian dairy sector has been fairly remarkable. India, world's largest milk producer, accounting for more than 16% of world's total milk production, is the world's largest consumer of dairy products. Milk production in India increased from 17 million tonnes in 1950–51 to a production capacity of 137.7 million tonnes in 2013–14 (Dairy Universe India 2015). Dairy contributes to 16% of consumer spend on food (18% in Urban, 15% in rural) and estimated market value is 3.6 lakh crore. Approximately 80% of the retail price of the liquid milk went back to the farmers leading to low operating margins of 4–5% (India microfinance 2014). Population growth, increased availability and awareness of milk and dairy products through retail shops, consumers rising concern about the nutritive and quality diets and especially the increased disposable income in peoples hand had resulted in growth in demand and consumption of milk and milk products. A commercial dairy farming has good potential for employment generation both in rural and peri-urban areas besides being a source of liquidity and insurance against crop failure (Raut *et al.* 2014). Dairy farming can also be taken as entrepreneurial activity on commercial basis as a main livelihood around peri-urban centres, wherein the demand for milk and milk products is high. In India only less than 35% produced milk is being processed for making value added products (FICCI 2013). The profitability in liquid milk ranges from 4–5%, whereas the profitability in value added dairy products ranges from 12% to 18% (India microfinance 2014). Although India is the largest producer of milk in the world, it is a very minor player in the world dairy market, accounting for a miniscule 0.08% of the world dairy exports (Deepa 2012). Dairy farmers who ever processing and value adding the milk are also very few in number regardless of the high market margin obtained in the value added dairy products. Post harvest decision process as a market led extension technique in value added products of dairy in peri-urban area for increased income are very important aspect which needs attention. In this context present study was undertaken in peri-urban area to identify different marketing channel followed by milk producers and milk processors and examine its efficiency. An attempt had also done to identify factors for post harvest decision making, the constraints faced by dairy processors and the inhibiting factors for processing and value addition

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of milk among the dairy farmers.

MATERIALS AND METHODS

The present study was conducted in peri-urban area of NCR. Uttar Pradesh is the largest milk producing state contributing 17% of the total milk production of India. While analysing the available data of milk production over the years it was found that Uttar Pradesh state is in first position in total milk production in India consistently over more than 20 years with 22.556 mT in 2011–12, 23.330 mT in 2012–13 and 24.194mT 2013–14 (NDDB 2015). Based on this data study was conducted in Meerut and Ghaziabad districts of Uttar Pradesh state purposively. To study the determinants of milk processors and milk producers a random sample of 20 respondents comprising of 10 respondents from each category were selected. Primary data on dairy production and dairy processing were collected with the use of reliability and validity tested semi structured interview schedule. Data collected were analysed with the help of SPSS 20 software to draw valid conclusion. For analysing the marketing efficiency in different channels identified in the study area Shepherd's marketing efficiency index and Acharya's marketing efficiency index were used.

1. Shepherd's marketing efficiency index

$$\text{MEI} = \frac{\text{V}}{\text{I}} - 1$$

Where, MEI, marketing efficiency index; V, value of goods sold/consumer price of goods; and I, total marketing cost present in particular channel.

2. Acharya's Marketing Efficiency Index

$$\text{MEI} = \frac{\text{Net price received by Farmer}}{\text{TMM + TMC}}$$

Where, MEI, marketing efficiency index; TMM, total marketing margin; and TMC, total marketing cost.

For the identification of motivating factors to take post harvest decision by the dairy processor, constraints faced by them and factors inhibiting the dairy farmers from undertaking processing of milk, validity and reliability tested Likert like rating scale was adopted. Different dimensions under each variable were identified through careful literature reading, and consulting experts of the field of extension, economics and post harvest technology. Items relevant to the each different dimension were collected, modified and developed based on review of literature, consultation with the experts and results of the pre testing of the initially developed schedule. Data collected under these variables were analysed and interpreted on the basis of nonparametric tests viz., Kruskal-Wallis one-way ANOVA and Friedman's two-way ANOVA.

Description of non-parametric tests used in present study

Kruskal–Wallis one-way analysis of variance: It is a non-parametric method for testing whether samples originate from the same distribution. It is used for comparing more than two samples that are independent, or not related. The parametric equivalence of the Kruskal-Wallis test is the one-way analysis of variance (ANOVA). The factual null hypothesis is that the populations from which the samples originate have the same median. When the Kruskal-Wallis test leads to significant results, then at least one of the samples is different from the other samples. The test statistic (for large sample) is $K = \frac{12}{N(N+1)} \sum_{i=1}^{g} n_i \left(\frac{\sum_{j=1}^{n_i} r_{ij}}{n_i} - \frac{N+1}{2} \right)^2$ which follows a χ^2 distribution with (g-1) degrees of freedom, where g is the number of groups n_i, the number of observations in i^{th} group; r_{ij}, rank (among all observations) of j^{th} observation from group *i;* and *N*, total number of observations across all groups.

Friedman's test for related samples: It is a non-parametric statistical test for testing whether samples originate from the same distribution. It is used for comparing more than two samples that are related. When the Friedman's test leads to significant results, then at least one of the samples is different from the other samples. The test statistic is given by $Q = \frac{SS_k}{SS_e} \sim \chi^2_{(k-1)}$, where k is the number of related groups, $SS_k = n \sum_{j=1}^{k} \left(\frac{\sum_{i=1}^{n} r_{ij}}{n} - \frac{\sum_{i=1}^{n} \sum_{j=1}^{k} r_{ij}}{nk} \right)^2$ and $SS_e = \frac{1}{n(k-1)} \sum_{i=1}^{n} \sum_{j=1}^{k} \left(r_{ij} - \frac{\sum_{i=1}^{n} \sum_{j=1}^{k} r_{ij}}{nk} \right)^2$, r_{ij} represents the rank of j^{th} observation from group *i*.

RESULTS AND DISCUSSION

Marketing channels and marketing efficiency: Study results showed that total of four (two in each group) different type of marketing channels were present in the study area in marketting of liquied milk and value added products from the milk. But there was a quite remarkable difference in the marketing efficiency of the existing marketting channels. This was due to variations in marketing costs and marketing margins present in the different channels.

Mainly two different marketing channels were identified in the study area for liquid milk and for value added dairy products. Channel I for the liquid milk was the direct marketing channel of producer to consumer. Channel II for the liquid milk was producer -wholesaler (cooperative society) – processor- retailer - consumer. Channel I for the value added milk products was also similar to the liquid

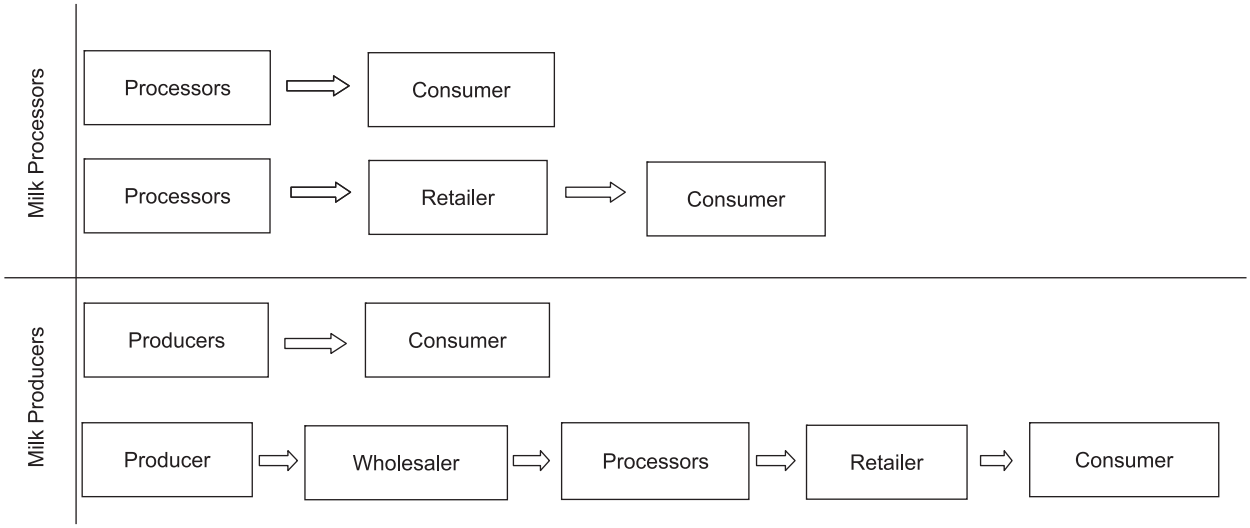

Fig. 1. Existing marketing channels identified among milk processors and producers

milk i.e. direct selling. Channel II for the processed products of milk was found as producer –wholesaler (local traders) –consumer.

In both the cases (milk producers and milk processors) channel I is efficient than channel II with higher marketing efficiency index (Table 1). Channel I is giving 100% share in producers price by consumer. In value added milk products Channel II (producer –retailer (local traders) – consumer) has been have 93.76% of share by the producer in consumers' price. But in the case of liquid milk producers share in consumers' price in channel II was only 83.75%. These results are in consistent with the findings of Rangaswamy and Dhaka (2008). Singh *et al.* (2012) reported that on an average, 58.81% of selling price of processed fluid milk was paid to milk producers as price of raw milk and 41.19% was retained with milk unions as expenditure incurred on transportation, processing and marketing of milk. In cases of total cost till marketing among milk processors and milk producers group, it was observed that 2 groups had all most equal divide with an average of 27.61 ₹/L in milk processors group and 24.88 ₹/ L in milk producers group. While comparing both groups (milk producers and milk processors) it was observed that benefit to the farmer was more in milk processors group with an average of 96.88% whereas benefit to the farmer in producer group was only 91.875%. A huge difference in marketing margin among channels of milk processors and milk producers was observed. 2.2 ₹/L was the average marketing margin in milk processors group while it was observed as an average of 6.45 ₹/L in milk producers group.

Table 1. Price spread in different marketing channel of liquid milk and value added milk products

Particulars	₹/1,000 L			
	Milk processors		Milk producers	
	Channel I	Channel II	Channel I	Channel II
Cost of production	27767.8	27453.5	25526.5	25526.5
MC incurred by producers	57.00	0.00	3.75	3.75
Gross return to producer/processor	39305	39305	33500	33500
Net return to producer/ processor	11480.2	11851.5	7969.75	7969.75
MC incurred by wholesaler	0.00	0.00	0.00	0.00
MM of wholesaler	0.00	0.00	0.00	0.00
Processors share	0.00	0.00	0.00	34000
MC incurred by processor	0.00	0.00	0.00	1.00
MM incurred by processor	0.00	0.00	0.00	6495
Retailer's share	0.00	0.00	0.00	0.00
MC incurred by retailer	0.00	64.7	0.00	0.00
MM incurred by retailer	0.00	2225.3	0.00	0.00
Retailer sale price	39305	41918.5	33500	40000
Producers share in consumers price	100%	93.76%	100%	83.75%
Marketing efficiency (Shepherd's formula)	688.56	646.89	8932.33	8420.05
Marketing efficiency (Acharya's formula)	3.40	2.77	4.20	2.31

Table 2. Average net income and average production cost of dairy processors and dairy producers

Cost/returns (₹/1000l)	Dairy	Mean	Std. error of mean	Levene's test for equality of variances	t-test for equality of means (equal variances)	t-test for equality of means (unequal variances)
				F(Prob. F)	t, DF(Prob. t)	t, DF(Prob. t)
Total cost	Processor	27453.50	2259.88	12.320(p=.003)	0.847, 18(p=.408)	0.847, 9.37(p=.418)
	Producer	25519.00	324.71			
Net returns	Processor	11851.50	892.89	0.853(p=.368)	3.580, 18(p=.002)	3.580, 15.90(p=.003)
	Producer	7981.00	609.79			

It was due to the less scope of retailers to add additional cost in value added products of milk. This has resulted in more share of producer in consumers' price.

Net income and average cost of dairy processors and dairy producers: Total cost of production of value added milk products (₹/10,001) was 27453.50±2259.88, whereas the same for raw milk was about 25519.00±324.71. Average cost incurred for dairy processors and producers (Table 2) did not differ significantly ($t = 0.847$, $P < 0.05$) whereas the net return for the dairy processors (11851.50±892.89 ₹/10,001) was significantly higher than the net return of the milk producers (7981.00±609.79) ($t = 3.580$ $p < 0.05$). From these results it was inferred that processing of the milk resulted in high net return to the dairy farmers.

Factors for post harvest decision making among dairy processors: Broadly 13 different factors which are relevant to the present study were identified. Processors were asked to rank their preference with respect to identified factors, on a 3 point continuum scale (Reliability = Cornbach alpha coefficient is 0.767) starting from 1 = least important to 3 = most important. These factors were compared using Friedman's two-way ANOVA. As the computed p-value is less than the significant level at five% ($P < 0.05$) with test statistics Chi-Square = 35.16 and df = 12, it can be inferred that the level of influence of different factors to the post harvest decision making among dairy processors is different according to dairy processors perception.

Table 3. Comparison of identified factors for post harvest decision making among dairy processors based on mean ranks of Friedman's test

Factors for post harvest decision making	Mean rank
Price of value added food	9.10
Skilled labour availability	8.85
Consumer satisfaction and loyalty	8.80
Market margin obtained due to elimination of middle man	8.25
Rising disposable income in hand	8.20
Branding and new look of products	7.25
Marketed and marketable surplus availability	7.10
To avoid distress sale	7.05
Changing consumer needs and choice	6.80
To minimize wastage	5.70
Increasing food demand in urban areas	5.40
Transportation facilities to market	4.55
Competition from the market	3.95

The mean rank (9.10) corresponding to the price of value added food was greater than all other factors (Table 3). Farmers were more profit oriented and the economic price what they were getting from the value added products attracted them to take the post harvest decisions. Availability of the skilled labour for the processing purpose with the mean rank 8.85 was identified as the second most important component in post harvest decision making. Whereas, competition from the market was rated with least score of 3.95, since farmers were getting assured market for milk even if they were not doing the value addition. Hence, market competition identified as, not an important factor which makes their mind up to take the post harvest decisions. Since, the respondents of the present study were from urban and peri-urban areas, transportation facilities to market (4.55) and increasing food demand in urban areas (5.40) were as less imperative factors in post harvest decision making of dairy farmers. Study results showed that dairy processors were more concerned about the consumer satisfaction and loyalty (8.80) and satisfaction they got from the acceptance of their products in turn make them to take processing decisions further. From the farmers' response it was well apparent that market margin obtained due to elimination of middle men (8.25), rising disposable income (8.20) and branding (7.25) also influenced them in a great extent to take decision on post harvest management of the milk.

Major constraints of existing post harvest management mechanism in dairy: Generalized category of 4 different constraints which were relevant to present study (technical and capacity building related constraints, infrastructure related constraints, financial constraints and market related constraints) were identified. A scale for measuring severity of identified constraints was developed. Reliability of this scale was tested with split half method. Coefficient of internal consistency (Spearman's rho) of this scale is 0.843. The constraints compared, using Kruskal-Wallis one-way ANOVA (Chi-Square = 23.314, df = 3, $P < 0.05$), revealed that there existed a significant difference among the level of influence of different constraints to existing post harvest management mechanism in dairy according to milk processors' perception. The mean rank corresponding to infrastructure related constraints (28.70) is more and hence

Table 4. Severity comparison of different components of constraints based on mean ranks as per Friedman's test

Particulars	Mean rank
Technical and capacity building related constraints	
Lack of training programmes	7.55
High cost involved in purchase of suitable machineries	7.25
Lack of knowledge about trading options (future and forward)	6.75
Low cohesion in groups	6.65
Non availability of improved machineries for processing	6.50
Lack of proper knowledge about harvesting time	3.05
Lack of feedback/success stories in media	2.50
Inadequate technical capacity	2.45
Lack of motivation	2.30
Infrastructure related constraints	
Lack of power and electricity	7.70
Non availability of machineries in local places	7.70
Lack of proper packaging facilities	5.60
Lack of proper grading facilities	5.55
Poor infrastructure for storage	5.20
Lack of marketing yards/places	4.60
Lack of cold chain management	4.45
Non availability of skilled labour	2.10
Lack of proper roads and transportation	2.10
Financial Constraints	
Lack of awareness about government support policies	7.70
Lack of price policy by the government	7.35
High cost of skilled labour	7.25
High rate of interest for credits	6.90
High payback period in investment	5.30
Distress sale of produce due to need of immediate liquid cash	3.30
Lack of awareness about credit availability	2.80
Lack of finance	2.20
Lack of banking facilities near by	2.20
Market related constraints	
Less knowledge about marketing strategies	8.25
Lack of market intelligent and market facility	7.10
Large numbers of middlemen	5.90
Inability to meet standards as prescribed	5.50
Lack of appropriate marketing channel	4.55
Inability to find market for value added produce	3.90
Difficulties of contract enforcement with processors	3.70
Produce has low market value due to poor appearance	3.05
Price risk and uncertainty (market value vary widely between the time of harvest and the time of local shortage)	3.05

it was the major constraint to existing post harvest management mechanism in dairy. Least affecting constraint was market related constraints (mean rank 6.55), whereas financial constraint was also identified as a rigorous constraint with mean rank of 27.65. Technical and capacity building constraints were moderately severe (mean rank 28.70) in milk processors' perception. Further analysis of the each category of the constraints was conducted using the Friedman's test. From the test statistic value and its significance it is clear that each component in each category varied in processors view.

Friedman's test statistic for technical and capacity building constraint is Chi-square = 63.831, df = 8, $P < 0.05$. The major technical and capacity building constraint *was lack of training programmes* for the post harvest management or value addition of the milk with mean rank 7.55 (Table 4). Even if the processors were doing milk processing with their own indigenous and farmer developed technologies in the study area, they were not getting any training on various cost effective, improved and quality method of value addition of milk. This was followed by high cost involved in purchase of suitable machineries (mean rank 7.25); lack of knowledge about trading options (mean rank 6.75) and low cohesion in groups (mean rank 6.65). Even if processors knew well about the benefits of group activity and group marketing, they perceived that it was very difficult to maintain the cohesion among members. Since, there was no any stable group activity, they were following individual processing and marketing. It was identified as a factor to reduce the profit which actually they could get. Least important thing was lack of motivation (mean rank 2.30). It was clear from the mean rank that lack of technical capacity and knowledge about processing of milk were rated as moderately severe constraint.

As per the Friedman's test statistic (Chi-Square = 48.787, df = 8, $P < 0.05$) infrastructure related constraints among the milk processors vary significantly. Most important infrastructure related constraints identified were lack of power and electricity and nonavailability of machineries in local places with mean rank of 7.70. These 2 were quite prominent than other factors. Lack of proper packaging facilities, lack of proper grading facilities and poor infrastructure for storage was identified as moderately severe infrastructure related constraints. Lack of marketing yards/places and lack of cold chain management were identified as less severe because the produce whatever they were making was sold to the consumers and local market without any delay. Nonavailability of skilled labour and lack of proper roads and transportation were nested together and identified as least important constraints with a mean rank of 2.10.

Friedman's test statistic for financial constraint is Chi-square = 67.204, df = 8, $P < 0.05$. Based on the results presented in Table 4, lack of awareness about government support policies (mean rank 7.7) and lack of price policy by the government (mean rank 7.35) were identified by the dairy processors as most important financial constraint. According to farmers' opinion government is not supporting the farm level milk processing and hence there was not any price supporting policy from the government side. It was inferred that there was less information penetration among the dairy processors regarding the government support policies. High cost of skilled labour for the milk processing was also identified as a severe constraint among the dairy

processors (mean rank 7.25). Since, our nation is well connected with network of banks and present study area is in peri urban region, lack of awareness about credit availability, lack of finance and lack of banking facilities nearby were identified as the least severe constraints by the milk processors.

Study results and analysis showed that market related constraints among dairy processors also differed significantly (Friedman's test statistic for market related constraints is Chi-square = 45.955, df = 8, $P < 0.05$). Since, majority of the respondents were selling their products either directly to the consumers or to the retailers without any particular brand name, major market related constraints present in the study area was less knowledge about marketing strategies of the value added products (mean rank 8.25). Lack of market intelligence and market facility for the high profit earning was also identified as major constraint in the study area with mean rank of 7.10. It was mainly due to the individual marketing and lack of any organized group among milk processors. As per the dairy processors perception price risk and low market value of the processed products were identified as least severe constraints (mean rank 3.05), because the processors were getting assured market place for their products among the consumers.

Major factors inhibiting dairy farmers from undertaking processing of milk: Five different dimensions of major inhibiting factors (socio-psychological factors, technical factors, financial factors, marketing related factors and infrastructure related factors) were identified. Under each dimension, 7 statements were selected finally for constructing 5 point summated rating scale. Reliability of this scale was tested with split half method. Coefficient of internal consistency (Spearman's rho) of this scale is 0.760. Kruskal-Wallis one-way ANOVA test (Chi-Square = 37.012, df = 4, $P < 0.05$) revealed that the level of influence of different inhibitors were differed significantly. The mean rank corresponding to technical factors (43.85) is more and therefore it was the most important inhibiting factor among the dairy farmers. It was followed by the financial factors with mean rank of 31.4. Least inhibiting factors for milk processing among dairy farmers were marketing related factors (mean rank 7.1) and socio-psychological factors (mean rank 17.45). Whereas infrastructure related factors were identified as moderately severe in inhibiting capacity to undertake processing of milk by the producers (mean rank 27.7). Further examination of the each group of the inhibiting factors were did using the Friedman's test. From the test statistic value and its significance it is lucid that each component in each category differed in producers view.

Friedman's test statistic for socio–psychological inhibitors, Chi-square = 34.958, df = 6, $P < 0.05$, indicated the differential level of influence of different components. Lack of tolerance to ambiguity was identified as the major socio –psychological inhibiting factors among the dairy farmers (Table 5). It was mainly due to the fear of failure

Table 5. Severity comparison of different components of inhibiting factors based on mean ranks as per Friedman's test

Particulars	Mean rank
Socio-psychological inhibitors	
Lack of tolerance to ambiguity	6.35
Negative attitude of the society	4.95
Lack of independence in decision making	4.70
Lack of proper direction	3.80
Lack of internal locus of control	3.50
Lack of education	2.90
Lack of urge for social status	1.80
Technical inhibitors	
High cost of processing activities	6.00
Unavailability of suitable machineries in local place	5.75
Lack of skilled labour	4.40
Lack of knowledge about processing standards	4.15
Unavailability of processing technologies	3.95
Lack of knowledge about processing activities	2.55
Unavailability of raw materials year round	1.20
Financial inhibitors	
Lack of awareness about government support policies	5.95
Lack of price policy by the government	5.70
High payback period in investment	5.05
High initial investment	4.05
High cost of raw materials	3.65
Lack of awareness about credit availability	1.80
Unavailability of credits	1.80
Marketing related inhibitors	
Lack of market intelligence	5.55
Lack of appropriate marketing channel	4.5
Large number of middle man in marketing of value added products	4.35
Lack of market facilities in local place	4.00
Price risk and uncertainty	3.95
Inability to find market for value added produce(lack of demand	3.00
Distress sale of produce due to need of immediate liquid cash	2.65
Infrastructure related inhibitors	
Lack of cold storage for keeping the raw products	6.30
Lack of proper supply of electricity	6.05
Lack of space and building for processing	4.55
Lack of storage facilities by own/in locality	3.80
Lack of proper waste utilization/recycling facility	2.70
Lack of good transportation facility	2.45
High cost involved as *mandi* charges	2.15

and high cost involved in the dairy processing unit establishment. Whereas, lack of urge for social status (mean rank 1.80) and lack of education (mean rank 2.90) were identified as least severe factor which was inhibiting the dairy producers from starting value addition and processing of milk.

Friedman's ANOVA statistic (Chi-Square = 39.899, df = 6, $P < 0.05$) technical inhibitors showed that there is a significant difference in influence of various components. Major identified inhibiting technical factor to undertake milk processing was high cost of processing activities and unavailability of suitable processing machineries in the study area with mean rank 6.00 and 5.75, respectively. Least severe inhibiting factor was unavailability of raw materials year round (mean rank 1.20), because of the year round production of milk. Lack of skilled labour, lack of knowledge about processing standards and unavailability of processing technologies were identified as moderately severe inhibiting factors.

Friedman's test statistic for financial inhibitors is Chi-square = 41.493, df = 6, $P < 0.05$. Lack of awareness about government support policies was identified as the major financial factor (Table 5) inhibiting the farmers to do processing of milk. It was followed by lack of price policy by the government with mean rank 5.70. Whereas unavailability of credits and lack of awareness about credit availability were ranked by the dairy producers (mean rank 1.80) as least severe inhibiting factor for doing post harvest operations in milk.

Data analysis showed that market related inhibitors showed a significant difference of influence among milk producers (Chi-square = 17.592, df = 6, $P < 0.05$). Milk producers identified lack of market intelligence regarding the processed milk products and lack of appropriate marketing channel were 2 important markets related inhibiting factors in milk processing (mean rank 5.55 and 4.5, respectively). Whereas, distress sale of produce (mean rank 2.65) and inability to find market for value added produce/lack of demand of products (mean rank 3.00) were identified as least severe market related inhibitors among milk producers.

Friedman's ANOVA statistic (Chi-square = 42.752, df = 6, $P < 0.05$) for infrastructure related inhibitors showed that there is a significant difference in influence of various components. It is clear that (Table 5) lack of cold storage for keeping the raw products (mean rank 6.30) and lack of proper supply of electricity (mean rank 6.05) were identified as major inhibiting factors to undertake milk processing by the dairy farmers. Lack of space and building for processing and lack of storage facilities by own/in locality were identified as moderately severe inhibiting factor among the dairy producers. As per the producers perception lack of good transportation facility (mean rank 2.45) and high cost involved as *Mandi* charges (mean rank 2.15) were the least severe inhibitors.

Dairy sector in peri-urban region has a great potential for further adding its impact on Indian economy by adopting post harvest operations and value addition in the farm level. Since, these regions are nearer to the cities and demands of dairy products are increasing day to day there is no any severe marketing problems in this sector. Creating infrastructure like cold storage and low cost processing technologies, giving training programmes on improved and quality production of value added milk products, giving proper awareness about the government support policies etc. are some of the way to increase post harvest value addition in the dairy sector. Single window delivery system for providing all the information and facilities to start processing enterprises is the need of hour. Besides giving all the technical and infrastructure facilities, it is also very much important to motivate the producers to become a processor or entrepreneur.

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REFERENCES

Dairy Universe India. 2015. www.dairyuniverseindia.com/Marketdate.html.

Deepa I. 2012. A study of international trade of Indian dairy industry. *Indian Journal of Applied Research* **1** (12): 127–28.

FICCI. 2013. Feeding a Billion: Role of the Food Processing Industry. www.ficci.com/spdocument/20312/Feeding-a-Billion_Role-of-the-Food-Processing-Industry.pdf.

India microfinance. 2014. *Indian Dairy Industry Report*. http://indiamicrofinance.com/indian-dairy-industry-report–2014-pdf.html.

NDDB. 2015. www.nddb.org/English/Statistics/Pages/Milk-Production-States.aspx.

Rangasamy N and Dhaka J P. 2007. Marketing procurement cost for cooperative and private dairy plants in Tamil Nadu: A comparison. *Indian Journal of Agricultural Economics Research Review* **62** (4): 679–69.

Raut A A and Gopal Sankhala. 2014. Entrepreneurship among commercial dairy farmers in Maharashtra. *Indian Journal of Dairy Science* **67** (6): 535–40.

Singh K M, Meena M S, Bharati R C and Abhay Kumar. 2012. An economic analysis of milk production in Bihar. *Indian Journal of Animal Sciences* **82** (10): 1233–37.