RESEARCH PAPER

Role of members' participation and satisfaction in cooperative success

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Abstract : Member-owned business organizations, such as cooperatives (or co-ops), are engaged in various economic activities that touch our everyday lives. In developing countries like India, there are various advantages for small farmers in joining a cooperative, including lowering costs of marketing, purchasing inputs, bargaining, etc. Agricultural cooperatives are common in India but studies focusing on member commitment, participation, and satisfaction are not available to the best of our knowledge. Research has shown that cooperatives rely on their members' commitment, participation, and patronage for success (Bhuyan, 2007; Sexton and Iskow, 1988 and Fulton and Adamowicz, 1993). Therefore, successful managers and directors try to understand their members' characteristics, values, needs, satisfaction, and goals, among other factors to manage their cooperative business (Bhuyan and Leistritz, 2001). The principal goal of this pilot study, therefore, is to examine members' participation and satisfaction with their cooperatives in a large dairy cooperative from Assam, India (Sitajakhala Dairy Cooperative Society). This dairy cooperative currently has over 1,000 member-owners and it processes fluid milk as well as limited number of milk-based processed products for the retail markets. We use both parametric and non-parametric statistical analyses to fulfill our study objective. Results of the pilot study shows that a large majority of members were satisfied with how the Sitajakhala Co-op was being managed. Similarly, a large majority of members also participated in cooperative activities and exercised their rights (voting). We also find that member satisfaction and participation were uniform across members' demographic and economic characteristics.

Key Words : Dairy cooperative, Member participation, Satisfaction

INTRODUCTION

Member-owned business organizations, such as cooperatives (or co-ops), are engaged in various economic activities that touch our everyday lives. Such member-owned businesses are unique because they are user-owned and user-controlled businesses that return net income (or benefit) to users or patrons based on their patronage, whereas other business firms return net income to investors on the basis of investment (Bhuyan and Liestritz, 2001). Cooperatives are often formed to counter market failure, that is, to provide goods and

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services that were not available or were available only at an unacceptable cost. Cooperatives are found in a wide array of activities, in both agricultural (e.g., food processing) and non-agricultural (e.g., retailing, childcare, health care) sectors. In developing countries like India, the advantages in joining a cooperative for a smallholder farmer (or rancher) include lowering their transaction costs because many of the activities can be done cheaper and more effectively by the collective organization - such as marketing, price negotiating, or upgrading product quality through better production practices.

Cooperatives rely on their members' patronage for success which is why one of the keys to success of member-owned organizations such as cooperatives, is the active participation of its members without which such organizations are very likely to fail (Bhuyan, 2007). Member participation as well as member satisfaction are necessary for continued success of cooperatives. If cooperative businesses do not meet the expectations of their members, they are likely to fail, that is, without active members' participation and members' satisfaction, cooperatives cannot survive in the long run. Sexton and Iskow (1988) concluded that one of the reasons for cooperative failure is the lack of sufficient membership and volume, as well as poor management. Fulton and Adamowicz (1993) have shown that the survival of any cooperative ultimately depends on the commitment of its members. Therefore, smart managers and directors try to understand their members' characteristics, values, needs, satisfaction, and goals, among other factors to improve their management skills (Bhuyan and Leistritz, 2001).

Agricultural cooperatives are common in India but studies focusing on member commitment, participation, and satisfaction are not available to the best of our knowledge. The principal goal of this pilot study, therefore, is to examine members' participation and satisfaction with their cooperatives. We selected the largest dairy cooperative from Assam, India for this pilot study to fulfill our objective. This dairy cooperative business currently has over 1,000 members and processes fluid milk as well as limited number of milk-based products for consumers in the retail markets.

The dairy sector in India:

Government policies that encouraged dairy farming and excess demand for fluid milk led to both substantial growth of the dairy sector, including the establishment of many dairy cooperatives throughout the country by the end of the nineteenth century. A restrictive trade policy for milk products that discouraged import of milk and milk products, and the emergence of large and successful farmer-owned cooperatives (e.g., Amul; http://www.amuldairy.com/) has changed dairy farming practices in the country.

Improved technology in the breeding of dairy cows also contributed to India's increased milk production. For example, the crossbred technology has further augmented the viability of the dairy units by increasing the milk production per animal (Murthy *et al.*, 2012). The "Operation Flood" programme, which was launched in 1970 by the Government of India, and its follow-up programs have helped organizing dairy farmers' cooperatives in rural areas and linking them with urban consumers; that system created a strong network for procurement, processing and distribution of milk over hundred thousand villages in rural India by the end of 1970s. For example, following the successful conclusion of the "Operation Flood" program, the Government of India launched another massive programme called "Technology Mission on Dairy Development (TMDD)" in August 1988 and has been in effect since 1989. The objective of this programme was to accelerate the growth of rural incomes and employment through dairy development.

In addition to sponsoring programmes mentioned above, the Government of India also instituted minimum price support programs to ensure remunerative prices round the year for dairy farmers in India. Thus, the government helped milk production in India reach 74 million tons (1 ton = 1030 liters) in 1997, and by 2006, India has emerged as the largest producer of milk in the world with a production volume of almost 101 million tons (Petare, 2013). India's milk production increased from 84.4 million metric tons in 2001-02 to 176.3 million metric tons in 2017-18 and per-capita availability of milk increased from 222 grams per day in 2001-02 to 375 grams per day in 2017-18 as shown in Fig. A. This was possible due to India's "White Revolution" in milk production. Presently India ranks first in the world in milk production, accounting for 18.5 per cent of world production. Milk production in the country grew at 6.62 per cent to 176.4 million tons in 2017-18 as against 165.4 million tons in 2016-17, which was more than double the growth of world milk production (NDDB, 2017-18) (Fig. B).

Unlike the large-scale commercial milk enterprises that characterize many countries, milk production in India is dominated by smallholder producers with a few water buffaloes or dairy cows, in systems closely integrated into agricultural production through use of crop residues such as straw of rice and wheat. The marginal and small landholders account for about 69 per cent of the total milk production (Birthal, 2008). The success of the dairy industry has resulted from the spread of dairy cooperatives which is involved in the collection, transportation, processing and distribution of raw milk and sharing their profits with their farmer-members who in turn may use such funds in their dairy operations. Some of these dairy cooperatives also process milk to milk powder and other milk products thereby minimizing seasonal impact on suppliers and buyers. The dairy cooperatives have improved retail distribution of milk and milk products across the country.
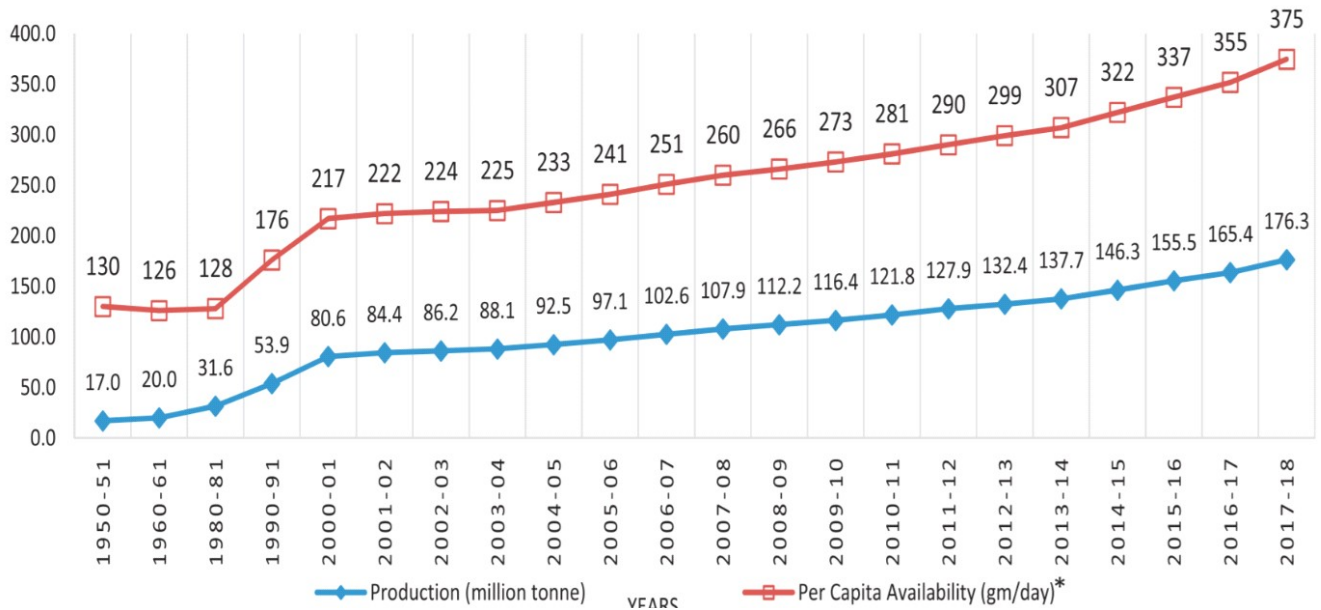
* Based on 2001 Human Census projected population
 (Source: Basic Animal Husbandry and Fisheries Statistics, 2018)

Fig. A : All India Milk Production and Per capita Availability
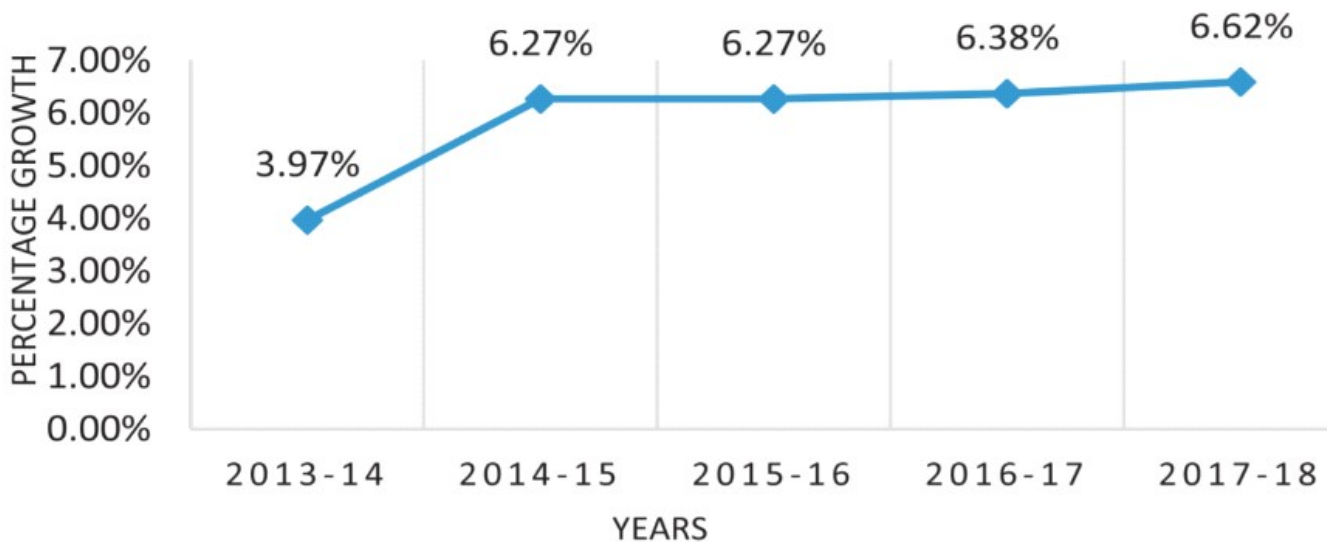
(Source: Basic Animal Husbandry and Fisheries Statistics, 2018)

Fig. B : Annual Growth rate of Milk Production in India

Indian Dairy Association (IDA; http://indairyasso.org/), established in 1948, is the apex body of the dairy industry in India. The members of IDA are from dairy cooperatives across the country, corporate bodies, including MNCs (multi-national corporations), educational institutions, private institutions and government. The IDA functions by working very closely with dairy producers, professionals and planners, scientists, educators, and institutions and organizations associated with the development of the dairy sector in India. In addition to the IDA, there are government or semi-government entities that also support the dairy sector in India, e.g., National Dairy Development Board (NDDB), Indian Dairy Corporation (IDC), National Co-operative Dairy Federation of India (NCDFI), and National Dairy Research Institute (NDRI).

Milk being a perishable, bulky, and non-storable (in fluid form) commodity, the importance of the efficient functioning of the dairy supply chain is a key for the Indian dairy industry to thrive and succeed beyond government support. In addition, due to the increased competition from the import of non-fluid dairy products and the high levels of service expectations that Indian consumers have developed, efficient management of dairy supply chains have increasingly more important in India. Not surprisingly, the nation's milk supply chains are very concerned with controlling of milk quality and managing supply fluctuations which are unique to this sector. An on-going aim of various government programs and dairy focused institutions is to address such concerns of the dairy industry in India.

Cooperatives in the dairy sector in India:

The Government of India sponsored "Operation Flood," launched in 1970, introduced cooperatives into the dairy sector with the objectives of increasing milk production, augmenting rural income, and providing fair prices for consumers (Rajendran and Mohanty, 2004). Most of the dairy co-operatives in India are based on the principle of maximization of farmer profit and productivity through cooperative effort. The cooperative development efforts in India, commonly known as the "Anand pattern," is an integrated cooperative organization that procures, processes, and markets milk and milk-based products. The institutional infrastructures start at the village level through village level dairy cooperatives (also called PACS or Primary Agricultural Cooperative Society), then onto single or multi-district unions of cooperatives, and then onto a state level or apex level cooperative federation. The village level cooperatives or PACS are owned and operated (managed) by the farmer members while the cooperative unions are managed by representatives from the PACS (which are members of such unions) and state government deputized administrators. The apex or state level cooperative federation is managed by representatives from its member unions and state government deputized administrators.

Both village level and district (or multi-district) level cooperatives adopt and utilize modern milk handling and processing methods to process raw milk to milk and milk products, use marketing methods to reach urban consumers. The village level cooperatives also provide dairy farming related services (e.g., veterinary) to their members who are unable to access consumer markets on their own or receive such services on their own. The Anand pattern considered successful in India because it involves dairy farmers for their own development through cooperatives which are farmer-owned and farmer-managed through leaders elected by farmer members.

According to the National Dairy Development Board of India, in 2013 there were 155,634 dairy cooperatives in India which were owned by about 15.1 million farmer members of which more than 4.3 million were women (NDDB, 2019). Most of these dairy cooperatives focus on selling their members' fluid milk in bulk or semi-processed. In Assam, where we select the largest dairy cooperative for our pilot study, there were 341 primary or village level dairy cooperatives in 2015-16 covering about 16,000 dairy farmer members (Kakaty and Das, 2017). Given the growing demand for value-added dairy products, particularly by urban consumers, some of these village level dairy cooperatives that mainly collects raw milk from its members and sale to large buyers, including larger dairy cooperatives, may be able to merge to form larger cooperatives to benefit their members by extending their operation downstream to tap into the value-added market.

While cooperatives appear to have substantial potential as a tool for economic growth in rural (farm-based) areas, it would be helpful to know what factors affect the success or failure of a cooperative businesses. However, the existing knowledge on how member and management characteristics and market environment impact Indian cooperative's performance is limited because most studies on cooperatives focus on their

financials. Better understanding of these additional non-financial factors (aka the "people" factors; Bhuyan, 2007) should enhance the ability of cooperative ventures to succeed as well as benefit those interested in using the cooperative model for business and community development. In this study, we take a small step in understanding what factors influences members' satisfaction and participation in dairy cooperatives in India.

Target of our pilot study: Sitajakhala co-op
Background:

The Sitajakhala Dugdha Utpadak Samabai Samiti Limited (Sitajakhala Dairy Producers Cooperative Society Limited; hereafter "Sitajakhala Co-op") was established in 1958 by 17 dairy farmers from several villages in the Amlighat and Jagiroad region of the Morigaon district of Assam to collect milk from its members and act as a bargaining association to receive higher raw milk prices for its members. The members felt that the middlemen (itinerant traders who collected milk from individual dairy farmers and sell to bulk fluid milk sellers in nearby cities) were taking advantage of individual dairy farmers and that forming a bargaining association (aka the cooperative) will eliminate or reduce such a potential market failure. The structural foundation of the Sitajakhala Co-op mimicked that of Amul (*i.e.*, the Anand pattern), where fundamental building block or component was a village level milk producers' cooperative owned by producer-members who desire to market their milk collectively.

The Sitajakhala Co-op has been functioning to fulfil three important goals since its establishment (Sharma, 2018) and they include increasing milk production in the Morigaon district through a network of Anand pattern cooperative infrastructure, increasing the supply of scientifically and hygienically processed wholesome milk to the consumers in the locality and neighboring urban areas through integrated function of production, procurement, processing and marketing, and generating employment avenues for local youth and dairy farmers, especially the small and marginal farmers. Through rigorous quality control, the cooperative also assures consumers that its milk and milk products are of high quality and safe to consume.

The present:

Sitajakhala Co-op provides a platform where individual dairy farmers (most of who are small farmers and many of them are illiterate) can unite to bargain for higher prices for their milk as a team. Sitajakhala Co-op was able to penetrate and expand into urban markets by consistently thriving to provide quality products to its customers. The cooperative strives to provide a fair price to its members and provide patronage refund based on use. It currently has slightly over 1,000 members in and around the Morigaon area.

At present, the Sitajakhala Co-op collects more than 20,000 liters of milk daily from its members. The cooperative has fulfilled the fluid milk demand in the Morigaon region and in nearby urban areas, including the largest city in the region, Guwahati. For instance, during the 2018-19 financial year, the Sitajakhala Co-op processed about 19,000 liters of milk per day.

Prior to November 2018, Sitajakhala Co-op was mainly selling fluid milk to the West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)[1] Sitajakhala Co-op's also had some low-tech, low-volume value-added processing operations focusing on making locally demanded value-added milk products, such as cream, plain yogurt, *Paneer* (similar to Ricotta cheese), *Rasgulla* (a type of sweet snack), *Channa* (cottage cheese), etc. As the number of members continued to grow, the raw milk handling capacity and its low-cost processing facility reached its limits. The cooperative management, with approval of its members, established a modern milk processing unit at Amlighat, Morigaon district of Assam. That modern plant was inaugurated in 14th November 2018. After this modernization in the fall of 2018, the cooperative began packing of homogenized, pasteurized milk in portable plastic pouches under the brand name "Sitajakhala," and also expanded its operations to produce value-added dairy products mentioned earlier and few new items, such as sweet yogurt, *Ghee* (clarified butter), *Paneer khurma* (dried square-shaped sweet prepared with fresh cheese), *pera*

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[1]Established in 1976, WAMUL (https://purabi.org/index.php) is a union of all dairy cooperatives in the following districts (similar to counties) in Assam: Nagaon, Morigaon, Goalpara, Nalbari, and Kamrup. WAMUL collects fluid milk from its member cooperatives and sells about 50,000 liters of fluid milk and 7,000 liters worth of milk products in Guwahati and other small and medium size cities in Assam. While most people, including those involved in the dairy sector may not recognize the acronym WAMUL, they will recognize "Purabi." Purabi is the brand name for milk and dairy products manufactured by WAMUL

(button shaped sweet prepared with milk thickened by heating), and *Mawa barfi* (rectangular-shaped sweet prepared with dried whole milk or milk thickened by heating).

In addition to providing and accomplishing this primary purpose, Sitajakhala Co-op provides additional services to its members. These services are designed to help its members improve their dairy farming (animal husbandry) practices which ultimately benefits the cooperative, e.g., how to keep the diary barns and milk cows clean so that it effectively reduces the bacterial count in raw milk. Examples of such services include but not limited to: organize regular trainings and seminars on animal husbandry for its members as well as other dairy farmers (non-members) in Assam, provide breed specific information to its members on the best management practices of milk production yielding consistent quality and safe milk, train its members on how to raise milk cows using modern technology, provide animal feed, some of which are brought in from out of state, at a discounted price; such feed is not available in Assam, offer vaccination and veterinarian services to its members' animals (both milk cows and other cattle), either free of cost or at a reduced price, and linking its farmer members with financial institutions for loans and to avail government sponsored projects geared toward dairy farmers.

The cooperative also provides direct or indirect employment to more than 6,000 families in the region.Along with the dairy farmers, they have been benefitting the agricultural farmers of the nearby districts by continuously purchasing the ingredients for animal feeds such as maize, rice polish, pulses etc. Therefore, the Sitajakhala Co-op has made tremendous positive impact on the dairy farmers in the region while providing consumers with safe dairy products, particularly homogenized fluid milk for consumption.

MATERIAL AND METHODS

Our goal is here to address member satisfaction and participation of the members of the Sitajakhala Co-op, and also examine if member satisfaction and participation varies across members' demographic and economic characteristics. We hypothesize that,

– Members are satisfied with how the cooperative is being managed at present andthat such satisfaction does not vary (*i.e.*, is uniform) across members regardless of their demographic and economic characteristics;

– Members of this cooperative participate in the cooperative's activities (such as voting, selling their raw milk to the cooperative, etc.) and that such participation does not vary (*i.e.*, is uniform) across members regardless of their demographic and economic characteristics; and

– Member participation is influenced by member satisfaction.

This analysis is important because an examination of the link between members' attitudes and their behaviour is expected to reveal information that is crucial to understanding members' behaviour and improving the management of cooperative membership. We use both descriptive as well as multivariate statistical tools to analyze the data and report accordingly.

Collecting primary data :

A member survey was designed with the primary goal of obtaining the information necessary to fulfill our research objective. We targeted members of the Sitajakhala Co-op as respondents for the survey. In addition to obtaining information on the usual demographic variables, the survey solicited information from respondents on their attitude toward their cooperative and its management, their behavior in terms of participation in cooperative's activities (voting, selling raw milk, etc.), their opinion on management decisions made, their opinion on what they think their cooperative should do as well as their dairy farming characteristics.

In order to collect the necessary primary data from the members of the Sitajakhala Co-op, the first author contacted the cooperative's management seeking cooperation which was easily granted. The draft survey was pre-tested in among few selected farmer members in late August/early September, and necessary adjustments were made to improve the flow of the survey as well as to remove ambiguity in questions. Primary data was collected in September-October 2019 from 50 members of the Sitajakhala Co-op who lived in seven villages in the vicinity of the cooperative's physical location in Jagiroad, Assam. Sitajakhala Co-op management provided the contact numbers of the village leaders of these seven villages. The data collection team then contacted these village leaders prior to visiting these villages for data collection. There were a total of about 250 dairy farmers in these seven villages. The village leader showed the data collection team where the dairy farmers lived in his village and then the data collection team randomly selected dairy farmers from each village

and went to their homes to collect the data using face-to-face interview technique.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Member characteristics: Demographic:

Based on the response from farmer-members, 32 out of 50 (44%) members were 50 years or younger, however, no one was below 25 years old; among the rest, 9 were over 60 years old. In terms of education, almost 56% (19 out of 34 members who responded to the education question) were either illiterate (cannot read or write; uses thumb print to consent) or semi-literate (can barely read or write; can sign); of the remaining 15 respondents only 4 (about 27%) were college graduates.

The family size of most members (42 out of 50) ranged from 4-6 members. For most members (almost 82%), it was a family or generational tradition to be a member of the Sitajakhala Co-op.

Member characteristics: Economic:

Members of the Sitajakhala Co-op were experienced dairy farmers; 88% (44 out of 50) had been dairy farmers for at least 10 years. Additionally, most of these farmers (42 out of 50 or 84%) were long-time members of the cooperative and sold their raw milk to the cooperative. Although dairy farming income was the major source of income for majority of the respondents, most earned less than Rs. 100,000 (1 USD = Rs. 71) annually from their farm. However, one fifth of the respondents had non-dairy farm income from rice and vegetable farming and poultry farming.

The number of cows owned by members varied

Table 1 : Satisfaction of farmer members with the cooperative management in connection with demographic variables

Satisfaction	Age (years)				Education						Family members (Nos.)			Family practice	
	≤40	41-50	51-60	>60	Illiterate	Some school	HSLC passed	HS passed	College grad	Post grad	≤3	4-6	>6	Family business	Income source
Yes	8	22	8	5	5	10	6	4	3	1	1	38	4	9	3
No	2	0	1	2	2	1	0	0	1	0	1	3	1	1	0

Note: 1. χ2 = 6.019, p = 0.111; 2. F stat = 2.103, p = 0.114
Note: 1. χ2 = 4.532, p = 0.476; 2. F stat = 0.858, p = 0.522
Note: 1. χ2 = 4.272, p = 0.118; 2. F stat = 2.198, p = 0.123
Note: 1. χ2 = 0.325, p = 0.569; 2. t stat = 0.531, p = 0.606

Table 2 : Satisfaction of farmer members with the cooperative management in connection with economic variables

Satisfaction	Length of dairy farming (Years)				Length of cooperative member (Years)				Income (Rs.)			
	≤10	11-20	21-30	>30	≤10	11-20	21-30	>30	≤50000	50001-100000	100001-150000	>150000
Yes	5	24	6	8	6	29	2	6	2	8	4	2
No	1	1	0	3	2	1	1	1	0	0	0	0

Note: 1. χ2 = 5.401, p = 0.145; 2. F stat = 1.860, p = 0.150
Note: 1. χ2 = 5.237, p = 0.155; 2. F stat = 1.796, p = 0.162
Note: 1. χ2 = --, p = --; 2. F stat = --, p = --

Contd. Table 2

Satisfaction	Number of cows (Nos.)				Availability of pasture land		Size of farmer based on milk production		Milk production efficiency (Liter/cow)		
	≤5	6-10	11-15	>15	Available	Not available	Large	Small	≤3.5	3.51-7	>7
Yes	3	21	10	9	39	4	21	22	12	19	12
No	2	2	0	1	3	2	1	4	1	4	0

Note: 1. χ2 = 5.927, p = 0.115; 2. F stat = 2.066, p = 0.118
Note: 1. χ2 = 3.859, p = 0.049; 2. t stat = 2.005, p = 0.051
Note: 1. χ2 = 1.500, p = 0.221; 2. t stat = 1.218, p = 0.229
Note: 1. χ2 = 2.698, p = 0.260; 2. F stat = 1.340, p = 0.272

from 6-10 for almost half of the respondents (46%). The most popular breeds of milk cows that members owned and raised included the following: Holstein Friesian, Sahiwal (an Indian breed), and Jersey. In terms of milk production, 70% respondents had milk production of around 25-75 liters per day and only six respondents of more than 75 liters/day. In spite of having good cow breeds, milk production efficiencies were lower (a max of 8.75 liters per cow/per day) for all the farmers. This can be attributed to farmers' economic inability to provide enough nutrition-rich feedstuffs to the animals.

Most of the respondents (86%) had pasture lands which were mainly used for cultivating high yielding grass varieties for meeting the green fodder requirements of the milk cows (open grazing practice was not followed by the respondent dairy farmers). Those members who do not own pasture land had to purchase green fodder from local laborers which added economic hardship to these members.

Member satisfaction:

If cooperative businesses do not meet the expectations of their members, they (cooperatives) are likely to fail. Member satisfaction is important for cooperatives because most members, if not all, will be abandoning their cooperatives sooner or later unless they (members) are satisfied with their cooperatives. Thus, cooperatives cannot survive in the long run without caring about member satisfaction and addressing how to achieve that.

In this pilot study, we try to gauge member satisfaction using respondents' response to questions that solicit information from the respondents on whether they were satisfied with the current cooperative management, or whether they were satisfied with the benefits they received from the recent expansion, or whether they were satisfied with help and assistance (service) received from the cooperative to become better dairy farmers (with respect to animal husbandry), or satisfied with the help and assistance they received from the cooperative to become innovative dairy farmers (with respect to adoption of technology). A strong affirmative ("Strongly Agree") to any of these questions by the respondents is designated as Satisfaction = 1 (*i.e.*, satisfied), and 0 otherwise.

Among the 50 respondents, 43 respondents expressed satisfaction with the Sitajakhala Co-op while five respondents were not satisfied (2 respondents did

not answer any of these questions). The demographic and economic characteristics of those members who were satisfied with the cooperative and those who were not were very similar (Tables 1 and 2).

Not surprisingly, we were not able to reject our hypotheses that irrespective of their demographic and economic characteristics, there was no statistically significant difference between those members who were satisfied and those who were not (we used means difference tests, including one-way ANOVA), and that there were no statistically significant association or relation between member characteristics (demographic and economic) and their satisfaction status (chi-square test). So, member satisfaction across different spectrum of member characteristics was uniform.

Member participation:

Members' participation is the core of successful governance of a cooperative. Survival of any cooperative ultimately depends on the commitment of its members. If members do not participate in a cooperative's processes and functions, they (members) may not fully understand how their cooperative is managed and how and why certain decisions are made by their cooperative management. Lack of members' participation may also lead to slack in monitoring of the cooperative management (agency problem) thereby impacting cooperative performance.

In this study, we define member participation in terms of four criteria: whether members participated (voted) in consenting to the recent (fall 2018) expansion, or whether members vote regularly to elect the board of management, or whether members believe they have a voice in the cooperative's management (i.e., providing input in their cooperative's management), or whether they (will) defend their cooperative against criticism by others (i.e., being a vocal supporter of their cooperative). A strong affirmative ("Strongly Agree") to any of these questions by the respondents is designated as Participation = 1 (*i.e.*, participated), and 0 otherwise.

Among the 50 respondents, 41 respondents showed participation while eight respondents did not show participation (1 respondent did not answer any of these questions). Tables 3 and 4 shows that the demographic and economic characteristics of those members who were satisfied with the cooperative and those who were not were very similar.

Not surprisingly, we were not able to reject our hypotheses that irrespective of their demographic and

economic characteristics, there was no statistically significant difference between those members who participated and those who did not (we used means difference tests, including one-way ANOVA), and that there were no statistically significant association or relation between member characteristics (demographic and economic) and their participation (chi-square test). So, member participation across different spectrum of member characteristics was uniform.

Does member satisfaction impact member participation?

Here we address our third and final hypothesis – that member satisfaction impacts member participation. We posit that if members are satisfied with how their cooperative is managed and see real benefits of a member, then members will willingly or voluntarily participate in their cooperative's activities mentioned earlier, such as regularly attending meetings, voting regularly on cooperative matters, etc. With that argument in mind, we propose the following hypothesis:

Hypothesis :

Member satisfaction (as defined earlier) positively and significantly impacts member participation

This hypothesis gives us an opportunity to examine the impact of cooperative member satisfaction on their participation in cooperative matters. The alternate hypothesis is that member satisfaction does not influence member participation (local and global null, $\beta=0$). We propose a simple structural model which takes the following form: Y=a + bX, *w*here Y= member participation (*PARTICIPATION*) and X = member satisfaction (*SATISFACTION*).

Table 3 : Participation of farmer members with the cooperative management in connection with demographic variables

Participation	Age (years)				Education						Family members (Nos.)			Family practice	
	≤40	41-50	51-60	>60	Illiterate	Some school	HSLC passed	HS passed	College grad	Post grad	≤3	4-6	>6	Family business	Income source
Yes	8	20	6	7	6	8	5	4	2	1	1	34	6	8	4
No	1	2	3	2	2	3	1	1	1	0	0	8	0	2	0
	Note: 1. $\chi2 = 3.157$ p = 0.368 2. F stat = 1.033 p = 0.387				Note: 1. $\chi2 = 0.755$ p = 0.980 2. F stat = 0.127 p = 0.985						Note: 1. $\chi2 = 1.593$ p = 0.451 2. F stat = 0.773 p = 0.467			Note: 1. $\chi2 = 0.933$ p = 0.334 2. t stat = 0.926 p = 0.373	

Table 4 : Participation of farmer members with the cooperative management in connection with economic variables

Participation	Length of dairy farming (Years)				Length of cooperative membership (Years)				Income (Rs.)			
	≤10	11-20	21-30	>30	≤10	11-20	21-30	>30	≤50000	50001-100000	100001-150000	>150000
Yes	4	23	5	9	5	27	3	6	2	7	4	2
No	2	1	2	3	2	4	1	1	0	1	0	0
	Note: 1. $\chi2 = 5.297$ p = 0.151 2. F stat = 1.818 p = 0.157				Note: 1. $\chi2 = 1.276$ p = 0.735 2. F stat = 0.401 p = 0.753				Note: 1. $\chi2 = 1.067$ p = 0.785 2. F stat = 0.286 p = 0.835			

Contd. Table 4

Participation	Number of cows (Nos.)				Availability of pasture land		Size of farmer based on milk production		Milk production efficiency (Liter/cow)		
	≤5	6-10	11-15	>15	Available	Not available	Large	Small	≤3.5	3.51-7	>7
Yes	4	19	9	9	37	4	19	22	11	20	10
No	1	4	2	1	6	2	3	5	2	4	2
	Note: 1. $\chi2 = 0.389$ p = 0.942 2. F stat = 0.120 p = 0.948				Note: 1. $\chi2 = 1.448$ p = 0.229 2. t stat = 1.196 p = 0.238		Note: 1. $\chi2 = 0.212$ p = 0.646 2. t stat = 0.451 p = 0.654		Note: 1. $\chi2 = 0.011$ p = 0.994 2. F stat = 0.005 p = 0.995		

We use econometric techniques to estimate the structural model to analyze the impact of the hypothesized factor *SATISFACTION* on member participation (*PARTICIPATION*). We propose a binary logistic model where the probability of an event (respondents participating in at least one of the activities defined earlier, then *PARTICIPATION*=1; otherwise=0) by fitting data to a logit function. The proposed discrete choice (logit) model takes the following form:

$$\text{logit}(p_i) = \log\left(\frac{p_i}{1 - p_i}\right) = \beta_0 + \beta' x \qquad (1)$$

where p is the probability of an event occurring (*PARTICIPATION*=1) in the population, β_0 is the intercept parameter, β' is the vector of the slope parameter, and X is the explanatory variable, *SATISFACTION*. The structural model takes the following logit model form:

$$\text{Logit (PARTICIPATE)} = \beta_0 + \beta_1 \text{ SATISFACTION} + \varepsilon, \qquad (2)$$

where dependent variable, *PARTICIPATE* = 1 or YES, if cooperative members participated in at least one of the activities defined as "participation" and 0 (or NO) otherwise. As mentioned above, we expect *SATISFACTION* to have a positive and statistically significant impact on *PARTICIPATION*. We use SAS 9.4 to estimate eq. (2) as a binary logit model. The variable definitions and descriptions are presented in Table 5.

The total number of observations used in the analysis was 47 out of which 39 were YES (=1) and 8 were NO (=0). The likelihood statistics rejects the hypothesis that the intercept only model is better than the model with one regressor (one explanatory variable), the concordance value (=36.5%) clearly shows, as expected, that this simple regression model's inability to fully explain member participation.

The co-efficient of the satisfaction variable is positive and statistically significant, showing that as member satisfaction grows their participation in their cooperative's matters also grows. For example, for every unit increase in the satisfaction, from "not satisfied (=0)" to "satisfied (=1)," members' participation in their cooperative's matters goes up by almost 35 percent (34.89%). For example, in case of the Sitajakhala Co-op, if the members were satisfied with the current cooperative management, or if they were satisfied with the benefits they received from the recent expansion, or if they were satisfied with help and assistance (service) received from the cooperative to become better dairy farmers (with respect to animal husbandry), or if they were satisfied with the help and assistance they received from the cooperative to become innovative dairy farmers (with respect to adoption of technology), then the members of the Sitajakhala Co-op are more almost 35% likely to participate in any of the following cooperative activities: voting, providing input in the cooperative's management, and be vocal supporters of the Sitajakhala Co-op.

Conclusion:

India currently ranks first in the world in milk production, accounting for 18.5 per cent of world raw milk production. Milk production in the country has grown from 165.4 mil tons to 176.4 million tons in 2017-18; the rate of growth was twice that of the world milk production. Despite the growth and development of Indian dairy sector in last few decades, mainly due to governmental efforts, the economic conditions and general well-being of Indian dairy farmers are not so satisfactory. The cooperative model a la Amul provides a very promising and well-tested economic model that allows dairy farmers, particularly small and medium sized dairy farmers, to gain the much needed bargaining power as well as to tap into the modern supply chain that services the growing urban market. Given that member satisfaction and participation are key to any cooperative's success, understanding what makes members satisfied and participate in their cooperative should benefit cooperative practitioners, cooperative managers, and policy makers. Our objective in this pilot study, therefore, was to examine member satisfaction and participation in the largest dairy cooperative in northeast India.

Table 5 : Estimated logit model showing the impact of member satisfaction on member participation				(n=47)
Variables	Estimated coefficient	Std. Error.	p-value	Marginal effect (absolute value at mean)
Intercept	-1.099	1.155	0.341	--
SATISFACTION	3.127**	1.249	0.012	0.3489

Model performance measures:
Likelihood Ratio: 47.470*** (p-value 0.006)
Percent concordant: 36.5%

Note: ***=99% level of significance and **=95% level of significance

We targeted dairy farmer-members of the Sitajakhala Co-op, the largest dairy cooperative in northeast India and located in Assam. For the purpose of this study, we collected data from only 50 randomly selected members of this cooperative. We found that the current members were middle-aged and mostly illiterate or semi-literate. Given the continued growth of the Sitajakhala Co-op, it seems that such member characteristics are not negatively impacting the continued expansion of the cooperative. However, it is not clear how such member characteristics may impact future plans of the cooperative which may require large investments and/or restructuring. Fortunately for the cooperative, it is a family tradition for most members to be a part of the Sitajakhala Co-op and that kind of goodwill is benefitting the current management.

In terms of member satisfaction and participation, we find that a large majority of the farmer-members were satisfied with how the cooperative was being managed. We also find that the members were also actively participating in the cooperative's activities and fulfilling their member obligations, such as voting. Although there were a few members where were not satisfied with the cooperative or not participating in the cooperative's activities, the demographic and economic characteristics of members were similar regardless of their satisfaction or participation.

The results of the simple logit regression show that member satisfaction does positively and significantly impact member participation in a cooperative. We conclude that if the cooperative management pays attention to what makes their members satisfied (may vary from cooperative to cooperative), then they can expect to have increased participation by members.

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