Research article

Assessing the factors and constraints for value chain development of dairy food products in Bangladesh

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ABSTRACT

The dairy sector in Bangladesh has shifted from subsistence to commercial and enterprise-driven due to the increasing demand of milk and milk products. In this context, this study was conducted to explore the different participants in dairy value chains and their role in the production, processing and marketing of dairy products. This study addresses the constraints faced by these participants and the factors influencing the value chain efficiency as a case study from Bogura districts of Bangladesh. The Bogura district was selected purposively considering the most potential geographical area of dairy farming. Face-to-face surveys were conducted to collect data during January to April 2019 using two sets of well-designed questionnaires. Multiple regression models were analyzed for the factors affecting the value addition of selected dairy food products. Moreover, Kendall's coefficient of concordance was applied for identifying the constraints faced by dairy products value chain actors. The empirical findings showed that processors of dairy food products added the highest value among all the actors involved in the value chain. Furthermore, the findings revealed that gender, education, purchase price, and sale price significantly influenced the value addition of processed dairy products (yogurt and ghee) value chain. The findings also revealed that the most untried constraints faced by the market actors were the lack of capital and credit facilities, insufficient storage facilities, lack of processing center, and lack of proper transportation facilities. The findings of this study can help the stakeholders to improve the policy measures towards developing a new market for the dairy food products which might result in high value added, domestic, and export oriented dairy industry.

1. Introduction

Around the world, dairy production and marketing are different because of the environment and nature of consumers. Although a country's economic condition largely impacts the form of the dairy industry, the perishable nature of this agricultural commodity made it unique from all others (Douphrate et al., 2013). Internationally, milk is traded in the form of processed dairy products. The European Union produces the highest amount of milk, whereas the United States has the greatest farm size in the world (Douphrate et al., 2013), but China is the most important country for importing dairy products in the world (OECD & Food and Agriculture Organization of the United Nations, 2021). In Asia, the dairy producers are mostly smallholder farmers (Oliveros, 2019), and the total milk production of this region can be distributed within three countries, India (the world's largest producer country), China (fastest growing dairy market), and Pakistan (Morgan, 2008). Bangladesh, a small country of South Asia has a livestock population of 412.24 million consisting of 24.39 million cattle, 1.493 million buffalo, 3.607 million sheep, and 26.4 million goats. The livestock of Bangladesh contributes nearly 1.47 percent of country's GDP and 13.46 percent of its agricultural GDP (DLS, 2021). Although the country has abundance in livestock feed and a good sub-tropical environment, the livestock sector, specifically the dairy industry fails to contribute enough in national earnings because of different socio-economic, technical, and infrastructural factors associated with livestock farmers which are common for many of the developing countries (Seifu and Doucshitz, 2014).

Bangladesh, with 166.5 million people (Bangladesh Bureau of Statistics, 2021) currently aspiring to achieve the least development country (LDC) status by 2026 permanently (The World Bank, 2021). Along with maintaining economic growth, the rational nutrition intake, or necessary
consumption of nutrients for good health (Kubicová et al., 2019) is now a hot-cake for the country as it aims to obtain SDG 2: Food security and improved nutrition and SDG 3: Ensuring healthy lives (United Nations, 2020). Milk and other dairy products consumption are good elements of constituting a rationally nutritious diet (Kubicová et al., 2019). Milk and other milk product consumption (per capita) in developed countries is significantly higher than in developing countries. With increasing income, dietary pattern, and urbanization, the gap between these countries are changing. In developing countries, liquid milk is mostly consumed and demanded in both urban and rural areas (FAO, 2021). The same holds true for Bangladesh, where the dairy industry is transitioning from a traditional to a commercial and enterprise-driven production and marketing system (Uddin et al., 2020) in order to fulfill the soaring demand for milk and milk products. Thus, the existing milk production in the country (106.8 lacs ton) is yet short to the total demand of the country (154.94 lacs ton) (DLS, 2021). In 2020, the per capita availability of milk per day was calculated at 175.63 ml (DLS, 2021) or 64.1 kg per year, indicating a lower medium consumption level (FAO, 2021).

Being perishable, the processed form of dairy products had more attraction at the consumer level along with raw products (Mila and Raha, 2012). Different market participants (actors) are involved in the marketing activities of dairy products, ensuring the supply of processed dairy products throughout the country. However, the consumer price for these products varies in space and time because of the multistage value addition of all these actors. Moreover, the value-adding performance of these actors is influenced by several socioeconomic and institutional factors. As Bangladesh imports a large quantity of dairy products (such as powdered milk) to meet national demand (Hamid and Hossain, 2014), understanding and finding ways to improve any (negative) impact of these factors on the existing market participants is more crucial to keep the existing processed dairy market as functional and efficient.

According to Department of Livestock Services (DLS), Bogura district has greater potential for dairy milk production (DLS, 2021). Yogurt and ghee manufactured from dairy milk in this district has high market demand all over the country because of its taste and texture (Islam et al., 2017). Earlier, in Bangladesh, several studies have been conducted relating to the value chain analysis, marketing system, and marketing efficiency of livestock, vegetable and fruit products (Omar and Hoq, 2014; Chowdhury et al., 2012; Khatun et al., 2016; Nasrin, 2012; Islam, 2014; Ranathilak and Andri, 2014; Mango et al., 2015; Kumar et al., 2005). These studies provided important information about the vegetable production and marketing system, value chain analysis and price integration of livestock, and vegetable and fruit products produced in Bangladesh. Although livestock is economically and socially significant, the value chain of yogurt and ghee, in particular, has not been examined and assessed in the selected study area (Bogura district), where a great potential for these products exist. Thus, the aim of this study is to identify the value chain of the most important processed dairy products, yogurt and ghee, in Bangladesh's prominent commercial dairy production area to reflect the exact scenario.

Furthermore, most of the country's livestock farmers are smallholders, with 1–5 livestock (DLS, 2021; Oliveros, 2019) constantly exhibiting different challenges. Identification of all the market participants and their role in the marketing of dairy products, the constraints faced by these actors, and the factors impacting their performance would help to improve the policy measures. In particular, increasing involvement of the private sector, different cooperatives, and government initiatives in the dairy sector would be more appropriate (Hamid and Hossain, 2014). Hence, this study analyzes various market constraints and associated factors affecting the value-adding activity of respondents. No research on the value chain analysis of processed dairy food products has been conducted to date. Moreover, This study will also assist the concerned stakeholders in focusing on strategies to create a new market for dairy food products. However, The present study focuses on developing a dairy food value chain, which could lead to a high-value-added and export-oriented dairy business in Bangladesh. The findings can serve as a foundation for national agricultural strategy as well as for future research.

2. Methodology

2.1. Study area

The study was conducted in Bogura district of Bangladesh (Figure 1), withSherpur sub-district as a resource-poor and constraint-facing area (Quddus, 2018). Most of the households in this region are mainly dependent on dairy farming and vegetable production. Bogura district was selected considering the most potential geological area of dairy farming. Rural Development Academy (RDA) has manufactured some processed food products under the brand name of “Pulii”. Among all the products, Pulii yogurt and Pulii ghee were selected purposively for the study because of their higher market demand. Moreover, yogurt (known as Bogura's Dohi) from Bogura is the most popular and famous dairy food product all over in Bangladesh. Some processors of other brands of dairy products who participated in some training programs conducted by RDA and Youth Development Centre were also selected for this study.

2.2. Method of data collection and analysis of data

Data were collected during the period from January 2019 to April 2019 from the selected areas of Bogura district. Stratified random sampling and purposive sampling were used in this study. A total of 100 respondents were stratified by their types of activities, where 50 respondents were milk producers, 10 processors, 15 distributors and 25 retailers. Hence, two types of questionnaires were prepared—one for producers and the other for traders of processed dairy food products. The questionnaires were pre-tested before finalization to remove all ambiguities of data collection. The research management committee (RMC) of Bangabandhu Sheikh Mujibur Rahman Agricultural University reviewed and accepted the incorporation of human participant responses for generating this research report and each respondent provided informed consent during the interview.

2.2.1. Assessing the value addition by the actors in selected dairy food products

The value addition of processed dairy products can be measured by determining the amount of money that an actor adds rather than the amount of money that an actor spends. The full costing approach is the method that can be used to measure it. According to this method, the full cost of running a firm is equal to the sum of the company's total fixed costs and its total variable costs (Maelah and Ibrahim, 2006; Clotey et al., 2020). The estimation of the additional monetary value that is added to an input along the value chain is used to measure the value addition. The rate at which an actor provides money in comparison to the expenditure is what determines whether or not there is a net incremental benefit or value created in the value chain. It is estimated using the method of absorption costing. This costing method implies that the relevant cost for a business is the sum of the entire variable cost and fixed cost. In this study, an actor adds value (cost) to the previous actor's production to generate the final result. Invariably, one actor's final product is the primary product of the other (Maelah and Ibrahim, 2006; Clotey et al., 2020). When calculating value addition, the absorption costing method takes into account both variable costs (such as human labor, green grass, feed and veterinary services, electricity, packaging cost etc) and fixed costs (such as Interest on working capital, cow value, cow sheds depreciation, milk processing and storage equipment and their depreciation cost, etc.). The formula for calculating an actor's net income from any produce is as follows (Rahman et al., 2020):

\[ \text{Net Income} = \text{Revenue} - \text{Total Costs} \]

Revenue includes all the income generated from the sale of the actor's products. Total costs include all the expenses incurred in producing and selling the products. The formula for calculating the net income is:

\[ \text{Net Income} = \text{Revenue} - (\text{Variable Costs} + \text{Fixed Costs}) \]
regression equations for the two products variables upon elimination of those insignificant variables from the model (Nazif et al., 2016). The regression equations for the two products were given below:

\[ P_i = a_0 + a_1 Q_i + a_2 Q_2 + a_3 Q_3 + a_4 Q_4 + a_5 Q_5 + a_6 Q_6 + a_7 Q_7 + a_8 Q_8 + \gamma_i \]  
\[ P_j = a_0 + a_1 Q_i + a_2 Q_2 + a_3 Q_3 + a_4 Q_4 + a_5 Q_5 + a_6 Q_6 + a_7 Q_7 + a_8 Q_8 + \gamma_j \]

where, \( P_i \) = Value addition of Yogurt and \( P_j \) = Value addition of Ghee, \( a0 \) = intercept, \( a1 \ldots a8 \) = regression coefficients, \( Q1 \) = gender, \( Q2 \) = age, \( Q3 \) = education, \( Q4 \) = purchase price, \( Q5 \) = sale price, \( Q6 \) = experience, \( Q7 \) = capital invested, \( Q8 \) = distance to market, and \( \gamma_i \) and \( \gamma_j \) = error terms for yogurt and ghee.

2.2.2. Determining the factors that affect the value addition of selected dairy food products

For exploring the factors that affect the value addition of yogurt and ghee, stepwise multiple regression analyses were used. The stepwise regression analysis aids to compute the contribution of the influencing variables upon elimination of those insignificant variables from the model (Nazif et al., 2016). The regression equations for the two products are given below:

\[ \pi = \sum_{i=1}^{n} (P_i \times Y_i) - \sum_{i=1}^{n} (P_i \times X_i) - TC \]  
(1)

where, \( \pi \) = Net Income; \( Y_i \) = quantity of output; \( X_i \) = quantity of input; \( P \) = per unit price; \( TC \) = Total Cost.

Value addition (VA) by independent producer

\[ = \text{Total Cost (TC)} - \text{Value of Primary Input (}V_p\text{)} \]  
(2)

Value addition (VA) by the traders

\[ = \text{Total Cost (TC)} - \text{Purchase price (}V_p\text{)} \]  
(3)

Value addition in percentage by the actors. \( VA \%) = (\frac{VA}{TR})*100 \)  
(4)

2.2.3. Analyzing the constraints faced by the actors in the processed food value chain

The constraints of the actors in the processed food value chain were evaluated by first identifying and tracking them, while respondents ranked them according to their importance (Clottey et al., 2020). The concordance analysis of Kendall was employed to determine whether the respondents’ rankings were consistent. Kendall’s coefficient of concordance (W) evaluates the concordance among a group of (k) judges who evaluated a given set of (n) variables (Lewis and Johnson, 1971; Clottey et al., 2020). W is an indicator that assesses the ratio between the observed variation of the sum of the ranks and the greatest variance conceivable for the ranks. This index equals the sum of the ranks for each ranked constraint. The Kendall’s concordance coefficient (W) is depicted below:

\[ W = \frac{125}{k^2(p^2 - p)} - k \]  
(7)

where \( S \) is a sum-of-squares statistic over the row sums of ranks, \( T \) represents the sum of ranks for each constraint being ranked, \( k \) represents the number of respondents, and \( p \) represents the number of rankings. The hypotheses were as follows:

\( H_0 \) = there is no agreement between the rankings of the constraint.

\( H_1 \) = there is agreement between the rankings of the constraint.

To assess the significance of Kendall’s coefficient of concordance (W), the chi-square test was performed. If the estimated chi-square value exceeds the chi-square critical value (at 1%, 5% and 10% level of significance), then the null hypothesis is rejected in favor of the alternative hypothesis that there is agreement among the constraints’ rankings.

3. Results and discussion

3.1. Socioeconomic characteristics of the respondents

Table 1 shows the socioeconomic characteristics of the respondents. The study selected a total of 100 actors, such as 50 dairy farm owners, 10
processors, 15 distributors and 25 retailers of the yogurt and ghee value chain. About 84% of the dairy producers were male whereas all the distributors (100%) and retailers (100%) were also male. On the contrary, about half (50%) of the processors were female that was a good sign of women entrepreneurship in the study area. The women processors participated in different training programs in the processing of food products. The training programs were arranged by the Rural Development Academy (RDA) and the Youth Development Centre of Bogura.

Among the yogurt and ghee value chain actors, 38% of the dairy producers were young age while 60% of the processors, 67% of the distributors and major portion (84%) of the retailers were middle aged in the study area. Most of the actors in the selected dairy food products value chain had secondary level education (i.e., 38% of the dairy producers, 40% of the processors, 60% of the distributors and 64% of the retailers). Moreover, 40% of the processors completed graduation which mostly influenced their value addition activities. Majority of the respondents belonged to the medium size family. Likewise, 76% of the dairy farmer and 70% of the processors had medium level experience in dairy farming and processing of dairy food products. On the other hand, all the distributors and retailers in the study area had low level of experience (in years) in adding value to dairy food products. Table 1 also reveals that most of the dairy food value chain actors had only one earning member in their family. Additionally, 42% of the producers had some other sources of income other than dairy farming whereas 50% of the processors, 27% of the distributors and 36% of the retailers had also income from some other sources.

### 3.2. Assessing the value addition by the actors in selected dairy food products

Table 2 represents the level of value addition by the actors at each stage in the yogurt and the ghee value chain per annum. From the table, it is clear that the processors of both yogurt and ghee added the highest amount of value to their products (34.15 and 33.95%) followed by the producers (22.95%), the distributors (13.41% and 2.90%) and the retailers (12.60% and 1.61%) respectively. While Eqs. (2) and (3) were used to calculate the quantity of value addition, the percentage of value addition was derived using Eq. (4). In addition, the net income of the dairy farmers by producing dairy milk was 10.51 Tk per litre in the study area, obtained using Eqs. (1) and (2). Furthermore, the net income of the processors of both yogurt and ghee found to be the highest (i.e. Tk 25.00 per kg and Tk 78.50 per Kg) followed by the distributors (Tk 21.50 and Tk 37.50 per Kg) and the retailers (Tk 6 and Tk 11.50 per Kg) respectively.

### Table 1. Socioeconomic characteristics of the respondents.

| Character         | Items            | Score     | Dairy Farm Owner or Producer (N = 50) | Processor (N = 10) | Distributor (N = 15) | Retailer (N = 25) |
|-------------------|------------------|-----------|--------------------------------------|-------------------|---------------------|------------------|
| Gender            | Male             | 1         | 42 84                                | 5 50              | 15 100              | 25 100           |
|                   | Female           | 2         | 8 16                                 | 5 50              | 0 0                 | 0 0              |
| Age               | Young age <30    | 19 38     |                                      | 3 30              | 2 13                | 4 16             |
|                   | Medium age 31-50| 15 30     |                                      | 6 60              | 10 67               | 21 84            |
|                   | Old age ≥50      | 16 32     |                                      | 1 10              | 3 20                | 0 0              |
| Education         | Illiterate       | 9 18      |                                      | 0 0               | 0 0                 | 0 0              |
|                   | ≤ Primary 1-5    | 11 22     |                                      | 0 0               | 1 7                 | 4 16             |
|                   | Secondary 6-10   | 19 38     |                                      | 4 40              | 9 60                | 16 64            |
|                   | Higher Secondary 11-12 | 7 14 |                                      | 2 20              | 2 13                | 3 12             |
|                   | ≥ Graduation 13-18 | 4 8 |                                      | 4 40              | 3 20                | 2 8              |
| Family Size       | Small 1-3       | 1 2       |                                      | 0 0               | 0 0                 | 2 8              |
|                   | Medium 4-6      | 45 90     |                                      | 10 100            | 15 100              | 23 92            |
|                   | Large ≥7        | 4 8       |                                      | 0 0               | 0 0                 | 0 0              |
| Experience (years) in this occupation | Low ≤10 Years | 10 20     |                                      | 2 20              | 15 100              | 25 100           |
|                   | Medium 11-20 Years | 38 76 |                                      | 7 70              | 0 0                 | 0 0              |
|                   | High >20 Years  | 4 2       |                                      | 1 10              | 0 0                 | 0 0              |
| No of working persons | 1               | 31 62     |                                      | 6 60              | 10 67               | 17 68            |
|                   | ≥2               | 19 38     |                                      | 4 40              | 5 33                | 8 32             |
| Income from other sources | 21 42 | 5 50       | 4 27                                 | 9 36              |

Source: Field Survey, 2019 (1 Tk = 0.01184 USD was in 2019 at survey time).

### Table 2. Value addition by different actors in the processed dairy food products value chain.

| Actors         | TFC  | TVC  | TC   | TR   | Vp   | Net Income (TR-TC) | VA (TC-Vp) | VA (%) = (VA/TR) *100 |
|----------------|------|------|------|------|------|---------------------|------------|-----------------------|
| Producer       | 6.07 | 24.47| 30.54| 41.05| 21.12| 10.51               | 9.42       | 22.95                 |
| Yogurt (Tk/kg) |      |      |      |      |      |                     |            |                       |
| Processor      | 40.50| 97.00| 137.50| 162.50| 82.00| 25.00               | 55.50      | 34.15                 |
| Distributor    | 1.50 | 189.50| 191.00| 212.50| 162.50| 21.50               | 28.50      | 13.41                 |
| Retailer       | 0.50 | 243.50| 244.00| 250.00| 212.50| 6.00                | 31.50      | 12.60                 |
| Ghee (Tk/kg)   |      |      |      |      |      |                     |            |                       |
| Processor      | 68.00| 909.75| 971.50| 1050.00| 615.00| 78.50              | 356.50     | 33.95                 |
| Distributor    | 4.60 | 1077.90| 1082.50| 1120.00| 1050.00| 37.50               | 32.50      | 2.90                  |
| Retailer       | 2.90 | 1135.60| 1138.50| 1150.00| 1120.00| 11.50               | 18.50      | 1.61                  |

Source: Field Survey, 2019 (1 Tk = 0.01184 USD was in 2019 at survey time).
Figure 2 explores the value chain of yogurt (a) and ghee (b) on the basis of volume of the products transacted (values within parentheses of Figure 2) by different value chain actors in Sherpur subdistrict, Bogura.

Dairy farm owners reared their livestock and sold 80% of milk to the processors and the remaining 20% milk was sold to other processors. The processing unit of RDA sold 75% of yogurt and 60% of ghee to the distributors whereas they sold 15% of yogurt and ghee to the retailers. The remaining 10% of yogurt and 25% of ghee sold to the ultimate consumers by the processing unit of RDA. Other processors of yogurt sold 55% of their produce to the distributor, whereas 30% sold to the retailers and the remaining 15% sold to the ultimate consumers. However, other processors of ghee sold half of the amount to retailers and the other half to the final consumers. The distributors of yogurt sold the whole amount of yogurt to retailers, whereas the distributors of ghee sold 80% of the produce to the retailers. The remaining 20% of ghee was sold to the final consumers. In addition, retailers sold the whole portion (i.e., 100%) of yogurt and ghee to the final consumers.

3.3. Determining the factors that affect the value addition of selected dairy food products

Using a multiple regression model, the factors that affect the value addition of dairy food products were investigated. Tables 3 and 4 summarize the regression results derived from Eqs. (5) and (6), respectively, for yogurt and ghee. From Table 3, the results revealed that five out of eight variables were significant at 5% level. The value of $F$ was 110.07 with an $R^2$ of 0.891. It indicates that the combined effect of explanatory variables could explain about 89% of the value addition for yogurt. It is shown in Table 3 that the coefficient of gender ($t = 2.513$, $p = 0.014$), experience ($t = 2.847$, $p = 0.010$), purchase price ($t = -11.355$, $p = 0.000$), sale price ($t = 16.254$, $p = 0.000$) and distance to market ($t = -3.663$, $p = 0.000$) had significant influence in the value addition of yogurt in selected study areas. From the findings, it has been shown that gender of the actors of yogurt value chain had positive coefficients i.e. if the actor was a male in selected areas, the amount of value addition for yogurt was higher than the female respondents and vice versa. From this, it can explain that a male actor can engage more in value addition activities of yogurt compared to female actors. In addition, the coefficients of sale price and experience were also positive and significantly influenced the value addition of yogurt i.e. if the sale price and experience of the actors increase by 1 unit (Tk/kg), the value addition of that product will increase by 0.540 and 0.457 units (Tk/kg) respectively. On the contrary, there were negative significant effects of both purchase price and distance to market on the value addition of yogurt in the study area. It implies that if the purchase price (Tk/kg)
and distance to market (km) of yogurt increase by 1 unit, the value addition will decrease by 0.443 and 0.038 units respectively. This indicates that if the actors add more amount to buy the raw milk and other inputs, they will contribute less to the value addition of the yogurt in the selected area. Likewise, if the actors choose near market for their product then they will add more value rather than long distance market.

The findings of Table 4 indicates that among the eight variables analysed, only three variables namely purchase price, sale price and market distance to market had negative significant effects on the value addition of ghee. The results show that if the sale price of ghee increases by 1 unit, the amount of value addition to ghee will increase by 0.833 unit. However, the purchase price and the distance to market had negative significant effects on the value addition of ghee. It means that if the coefficients of both purchase price and distance to market increase by 1 unit, the amount of value addition to ghee will decrease by 0.835 and 0.098 units respectively. From these findings it can be stated that the more the purchase price and distance to ghee market, the less the value addition to that product in the study area and vice versa.

### 3.4. Stepwise regression analysis

A stepwise regression analysis was conducted to assess the contribution of explanatory variables in finding the variation in the value addition of selected dairy food products. From Table 5 it is clear that the models for yogurt included five explanatory variables such as gender, experience, sale price, purchase price and distance to market. The results show that these five variables can explain ($R^2 = 0.893$) about 89 percent of the variation in the value addition along the yogurt value chain. From the findings, sale price was the first variable to enter the model and can explain the lowest amount of variation 54.7% in the value addition of yogurt. Similarly, purchase price as the second variable explained 86.4% of the variation of the value addition among the four other variables entered into the model. The next variable entered into the model was the distance to market followed by experience and they explained 88.2% and 88.7% of the variations of the value addition respectively. Finally, the last variable entered into the model was gender, which contributed to the highest percentage (i.e. 89.3%) of the variation in the value addition of ghee.

Likewise, Table 6 reveals the stepwise regression results for ghee, which comprised three explanatory variables i.e. sale price, purchase price and distance to market. The findings indicate that these variables explain ($R^2 = 0.798$) about 80 percent of the variation in the value addition of ghee. These results express that in an ascending order, sale price was the first entered variable which explained the lowest amount of variation (75.9%) followed by purchase price (77.4%) and distance to market (79.8%) respectively.

### 3.5. Analysis of the constraints faced by the actors in the processed food value chain

The value chain is a structured network of producers, traders, processors, and service providers who collaborate to increase production and add value to their respective activities. The main advantages of an effective value chain include reduced costs of doing business, enhanced access to technology, information, and capital, and innovations in manufacturing and marketing operations to achieve higher values and supply consumers with higher-quality products. From a commercial point of view, the failure of the linkages among the stakeholders and the service providers, causes ineffective value chains (Asian Development Bank, 2014).

The value chain actors in the study area encountered a number of constraints during the value chain development of selected processed food products which is presented in Table 7. Lack of capital was found to be the most common issue faced by yogurt and ghee producers in the value chain. This was ranked as first because the actors needed to install machinery, scientific storage, and skilled labour for processing these products to improve value addition activities. Lack of training facilities ranked second, followed by inadequate credit facilities, inadequate storage spaces, lack of processing centers, lack of proper transportation facilities, expensive license fees, packaging fees, lack of market information, etc.

The estimated Kendall Coefficient of Concordance (W) was 0.789, which was derived from Eq. (7), indicating that there was around 78% agreement in the ranking of constraints experienced by the actors.
participants in the processed food products value chain. According to the asymptotic significance value ($p < 0.01$), the ranking was significant.

4. Conclusion

On the basis of the findings of the study, it can be stated that there is a substantial opportunity to raise the productivity of processed dairy food products and expand the value chain. Many people are involved in the production and marketing of dairy food products in the study area. The common factors that influenced the value addition of yogurt and ghee were the purchase price, the sale price and market distance. Another surprising factor of yogurt value addition was the gender indicating female farmers more precisely female producer and processors had added less value than to the male. The reasons behind that were lack of training facilities and market information. So, the dairy farmers and actors could thus be better informed about value addition and the market. In this way, the dairy industry can be improved by providing the necessary support.

4.1 Notes

- **Notes:** Sample size, $N = 100$, Kendall's $W = 0.789$, chi square = $630.929$, df = 8, Asymptotic significance = $0.000$, Critical value = $20.09$ at 1%.

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