

Analysis of the Marketing Structure of the Dairy Industry in the Trakya Region and the Determination of Emerging Issues with Multidimensional Scaling

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Abstract: The purpose of this paper is to examine the marketing structure of milk processors, factors influencing production and problems faced by firms following recent economic conditions in the Trakya region. Dairy cattle production is more developed in the research area than in other regions. In addition, the region has played an important role with its high milk processing capacity. The research results indicate that the dairy industry has important problems, such as an insufficient and low quality milk supply, and poor hygiene and marketing. In particular, a large number of small-and medium-sized milk processors face extensive hygiene and marketing problems. The other problems in the milk sector are an insufficient cold chain, high production costs and bureaucracy. Although firms do not regard the absence of a cold chain as an important factor, it is a major problem and obstacle to the improvement of the milk sector. Factors affecting production and dairy firms were analyzed by the multidimensional scaling (MDS) method. The MDS analysis results indicate that total market demand and dairy product prices are major factors affecting production decisions. Another MDS result reveals that the dairy industry faces two serious problems: milk quality and marketing.

Key Words: milk, milk processors, dairy industry, marketing, multidimensional scaling

Trakya Bölgesinde Süt Sektörünün Pazarlama Yapısının Analizi ve Karşılaşılan Sorunların Çokboyutlu Ölçkleme Yöntemiyle Belirlenmesi

Özet: Çalışmanın amacı Trakya bölgesinde süt işleyen firmaların son ekonomik koşullar altında pazarlama yapısının, üretime etki eden faktörlerin ve karşılaşılan sorunların analiz edilmesidir. Araştırma bölgesi Türkiye süt hayvancılığında ve süt işleme kapasitesi olarak önemli bir yere sahiptir. Trakya Bölgesi süt hayvancılığı açısından Türkiye'nin en gelişmiş yörelerindedir. Araştırma sonuçlarına göre süt sektörünün en önemli sorunları; yetersiz ve kalitesiz süt arzı, hijyen ve pazarlamadır. Özellikle çok sayıdaki orta ve küçük ölçekli işletmeler hijyen ve pazarlama konularında büyük sorunlar yaşamaktadır. Bunun dışında soğuk zincirin olmaması, üretim maliyetlerinin yüksekliği ve bürokrasi diğer karşılaşılan sorunlardır. Firmalar tarafından önemli olarak belirtilmese de aslında sektörün temel sorunu soğuk zincirin yetersizliğidir. Üretime etki eden faktörler ve firmaların karşılaştıkları sorunlar çokboyutlu ölçkleme yöntemiyle analiz edilmiştir. Elde edilen sonuçlara göre, pazar talebi ve süt ürünlerinin fiyat seviyesi üretim kararına etki eden en önemli iki faktör olarak saptanmıştır. Firmaların karşılaştığı sorunların analizinde ise sonuç olarak süt kalitesi ve pazarlamanın en önemli iki sorun olduğu ortaya çıkmıştır.

Anahtar Sözcükler: süt, süt işleyicileri, süt sektörü, pazarlama, çokboyutlu ölçkleme

Introduction

Dairy cattle raising is an important activity in Turkey from both the social and economic points of view. Despite the fact that cattle production reaches the expert level within agricultural production in developed countries, it is regressing in Turkey (Talim et al., 2000). In this connection, per capita milk consumption has been falling (Tan and Ertürk, 2001). Milk production is the most

important agricultural activity in all (EC) EU countries, representing 18.4% of the total value of agricultural production (European Commission Food and Veterinary Department, 2000). The Trakya region is of great importance from the point of view of dairy cattle production and milk processing capacity in Turkey. The region is the most developed farming area in Turkey with respect to dairy cattle raising. Although average milk

production per cow is 1.5 t/year in Turkey, this rises to 4.5 t/year in the Trakya region (Azabağaoğlu et al., 2002).

The dairy industry in Turkey encounters problems in the collection, storage, processing and marketing stages (Tan, 2001). Recent studies indicate that low quality milk is a major problem in the sector (Yavuz et al., 2001). Similar results were found in the research region, such as low quality of milk, and insufficient milk supply, marketing and hygiene. The hygiene problem in particular was pointed out in an EC report concerning milk and milk products in Turkey (EC food and Veterinary Department, 2000). The other problems in the dairy sector are an insufficient cold chain, high production costs and excessive bureaucracy. The findings from the research region may benefit Turkey's dairy policy and practices.

The aim of this paper is to examine dairy firms' marketing structures, as well as factors affecting production and dairy issues. Firstly, milk supply, pricing strategy, promotion activity and the distribution system in the region were examined. The findings reveal the structure of dairy firms in the region. Next, factors such as total market demand, milk product price levels, and firms' storage capacity, capital levels and stock conditions were tested to determine their importance level, and the distance between each other. For this reason we used multidimensional scaling (MDS) to reveal a geometrical picture of the factors. An identical method was used to determine the importance level of factors such as milk quality, marketing problems, milk supply, bureaucracy, and the cold chain. These issues have been discussed by other researchers (Erdal, 1989; Yavuz et al., 2001; Tan and Ertürk, 2002). In this connection, possible solutions to the problems of the dairy sector are offered according to the results of the study. This snapshot will be useful for further researchers and policy-makers.

Materials and Methods

Materials

The research data were provided from TUBAP project No: 298. Some parts of the findings derived from the project were used in this paper. The project was carried out in the Trakya region and included the whole dairy industry. However, this study comprises the milk processing firms which were a major part of the project. Data were collected from the managers of dairy firms via

interviews. Firms' addresses were obtained from the Tekirdağ, Edirne and Kırklareli provincial agricultural offices (Ministry of Agriculture and Village Affairs, 2001). The goal of the field work was to collect data from all the firms in the region. Provincial agricultural offices indicate 144 active dairy firms in the region and it is these firms that constitute the research frame work.

Methodology

At first, the data collected through fieldwork were analyzed by descriptive statistical methods. However, the factors affecting production and dairy firms' issues have now been analyzed by the MDS method. MDS is used to reveal the underlying structure of a set of data items or represents the perceptions of respondents in a spatial map (Malhotra, 1993; Faloutsos and Lin, 1994). Young (1985) defines MDS as a set of data analysis techniques that display the structure of distance-like data as a geometrical picture. We used the classical MDS (CMDS) procedure. The factors affecting production and problems are "objects" and the preference rankings are "dissimilarities". CMDS gives a picture of the relative locations of factors (Norusis, 1992). Closer factors show similarities on the spatial map. Dimension 1 indicates importance and dimension 2 indicates the distance between factors. In general, CMDS employs Euclidean distance to model dissimilarity. That is, the distance d_{ij} between points i and j is defined by Young (1985) as

$$d_{ij} = \sqrt{\sum (x_{ia} - x_{ja})^2}$$

where x_i specifies the position (coordinate) of point i on dimension a .

Statistics and terms associated with MDS are as follows: Preference (perception) rankings: Stimuli from the most preferred to the least preferred (i.e.; factors affecting production, and issues).

Stress function: This is a lack-of-fit measure; higher values of stress indicate poorer fit (0-0.025: excellent, 0.025-0.05: good, 0.05-0.1: fair, 0.1-0.2: poor). Stress value is indicative of the quality of the MDS scaling solution.

$$\text{stress} = \sqrt{\frac{\sum_{i,j} (\hat{d}_{ij} - d_{ij})^2}{\sum_{i,j} d_{ij}^2}}$$

d_{ij} : dissimilarity measure between i .th and j .th factors
 \hat{d}_{ij} : Euclidean distance between i .th and j .th factors.

R-square: R-square is a squared correlation index that indicates the proportion of variance of the optimally scaled data that can be accounted by the MDS procedure. Higher values (closer to 1) indicate a higher correlation between factors.

Coordinates: Coordinates indicate the positioning of a stimulus in a spatial map.

Results

When dairy firms' distribution in the provinces is considered, Kirklareli occupies first place with 68 firms and 1448.4 t/day milk processing capacity. Whole milk processors' maximum capacity was estimated as 2208.8 t/day (Table 1).

The average capacity usage in the three provinces is calculated as 33.7% (Table 1), which is closer to the whole milk sector capacity usage of 29.8% in Turkey (DPT, 2000). It is clear that low capacity usage by the dairy industry is a major problem in Turkey. The dairy firms operating at under 15 t/day milk processing comprise a high percentage (77.8) of the total number of firms. However, these processors have faced problems in providing raw milk due to financial difficulties. Due to the very low capacity usage at the small-sized firms, overall capacity usage is 33.7%. Major dairy firms in the Trakya region work at approximately 80% capacity.

Milk Supply

The firms in the region obtain their milk from dairy cattle raisers in the same region. In addition, due to the high milk supply in the region, firms located in other regions also obtain their milk from the Trakya region. Branded firms have established their cooling tanks in the villages that have made agreements with the firms for the transportation of milk to the plant without

Table 1. Milk processors distribution in the provinces and processing capacities.

Provinces	Milk processors	Maximum capacity (t/day)	Capacity usage (t/day)	Capacity usage average (%)
Kirklareli	68	1448.4	547.9	37.8
Tekirdağ	45	354.3	110.5	31.2
Edirne	31	338.4	86.6	25.6
Total	144	2208.8	745.0	33.7

contamination. Major findings derived from the research show that only two firms have set up cold chains and the others (142 firms) transport milk in milk containers.

Pricing Strategies

Due to the large number of small-scale milk processors in the region, the major pricing strategy emerges as competitive pricing (61.9% of total firms). The most important reason for this is price fluctuation in the market and decreasing demand as a result of the latest economic crisis. In particular, firms had to reduce cheese prices in order to unload their cheese stock at the beginning of the economic crisis. Moreover, competition was increasing due to the falling prices.

Promotion Activities

It is evident that only large-scale firms have carried out promotion activities in practice. The most important promotion activities are press advertising, TV advertising and product promotions. The firms employ qualified marketing staff and use them on in-store activities for product presentation. In addition, these firms have reshaped their product scale in line with an analysis of their customers' attitudes. Contemporary firms have focused on research and development in order to develop new products. In contrast, small-scale firms have focused on selling by means of price reductions, discounts and late payments due to the lack of a sufficient promotion budget.

Distribution System

Most of the dairy firms have established their own distribution channels from factory to-wholesaler to-retailer. In particular, firms have sold their products through the mediation of the Rami Food Wholesalers Center, located in Istanbul. On the other hand, factory-retailer channels have been formed by small-scale firms. Due to their inadequate economic means to support their products in the market, small-scale firms have to choose traditional and small groceries. Only 12 firms work with modern retailers and retail chains.

Factors Affecting Production

Firms' responses to factors affecting production were analyzed by MDS. Factor codes and descriptions are given Table 2. These factors have been extracted from previous research. Stress value was calculated at the first step of the analysis and established at 0.04409, which indicates a good fit. However, another statistic (RSQ) was

Table 2. Description of factor affecting production.

Factor code	Description
piyasata	Total market demand
fiyatuyg	Milk products price level
depolama	Firms' storage capacity
sermaye	Firms' capital level
stok	Stock condition

calculated as 0.98093 and indicated a higher correlation between factors.

Total market demand was initially expressed by 71.4% of the respondents. Examining the spatial map (Figure 1), it is clear that total market demand is located in the distant-right dimension. This result reveals that demand decrease is the major problem resulting from the economic crisis. Milk products price levels follow as a second factor. This factor was mentioned by 61.9% of the processors. Due to the common problem of the existence of too many small-sized dairy firms, these are more affected by price fluctuation. In addition, the economic crisis influenced small-size firms' customers more deeply than others. The right side of the spatial map indicates the most important factors that influence firms. Firms also pay attention to storage capacity apart from economic factors. The capital levels and stock conditions of the firms were less important than other factors.

Milk Firms Problems

The issues faced by the firms were also analyzed by the MDS scaling method. Factor codes and descriptions related to issues are given Table 3. These factors have

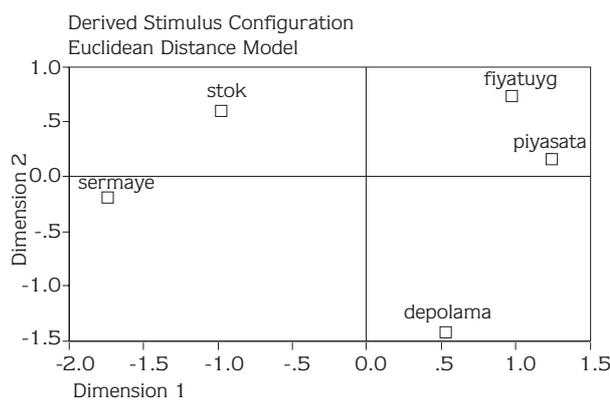


Figure 1. Factors affecting production in a spatial map.

Table 3. Description of dairy firms' issues.

Factor code	Description
sutkalt	Milk quality
pazarlam	Marketing problems
suttemin	Milk supply
buokras	Bureaucracy
sogutma	Cold chain
yarmadde	Other materials (package, tin, additives etc.)

been extracted from previous research. In particular, milk quality, marketing problems and milk supply are described as major issues in many papers cited at the end of the paper. Stress value was established at 0.01888, and indicates an excellent fit. However, the RSQ statistic was calculated as 0.996930, which indicates a high correlation between factors.

According to the research, the most serious problem confronted by dairy firms is that of milk quality. This is cited by 85.7% of the processors. The findings of another study emphasize the same results, which means that milk quality is the major problem, as mentioned by 81% of the respondents (Yavuz et al., 2001). The low quality of milk occurs as the result of producers' tricks such as skimming the cream or adding water to the milk. This influences the quality of dairy products. As seen in Figure 2, the factor of milk quality was placed on the right. A firm's next problem is marketing. Approximately 2/3 of the processors cite this as a problem. In many studies marketing is indicated as the key problem among the medium- and small-sized firms (Chaston, 1996). Nevertheless, decreases in market demand make conditions more difficult. The other problems, which are placed on the left of the spatial map, are less significant

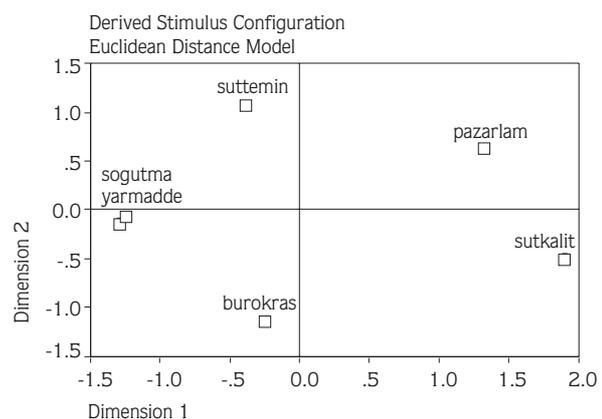


Figure 2. Dairy firms' issues in a spatial map.

than the milk quality and marketing problems. However, one remarkable point to emerge is that although almost none of the dairy firms had a cold chain, this was not perceived as a problem.

Discussion

The dairy industry has evolved with the entry of foreign entrepreneurs into Turkey. The manufactured products from these firms meet EU norms, and the firms have ISO 9000 quality assurance certificates. In contrast, milk processed by dairies represents only 6-7% of the total milk supply. Only 2 million t of milk are processed by the industry, although Turkey's total milk supply is 10 million t. Açıkgöz (2001) emphasizes that the quality and quantity of raw milk has been an unresolvable problem in Turkey for years. Many of the firms could not meet EU norms, since milk products of good quality represent only 0.6-0.7 million t. Small-sized firms that produce low quality milk products should leave the dairy industry, or at least their number should be reduced. Considering the experiences of developing countries regarding the dairy sector, small-sized milk processors either had to merge or close down (Dirven, 2001). Despite the fact that the dairy industry has developed due to technological innovations by means of foreign entrepreneurs, medium- and small-sized processors still use old technology. Medium- sized firms, especially, should be supported by the government in order to improve their technologies.

On the other hand, unregistered milk supplies number 8 million t, representing a major problem for the dairy industry. In this connection, the government suffers serious tax losses, and most of the milk and dairy products are sold under unsuitable hygienic conditions. The government must take steps immediately with regard to sales of milk and milk products. This measure would influence the flow of milk from milk producers to the dairy industry, and thus the 30% capacity usage would be increased.

The absence of a cold chain is another serious problem for the milk sector. Milk transportation in milk cans affects milk quality by increasing the pH of the milk and by contamination. To ensure harmony with EU norms, Turkey will have to make urgent arrangements for milk flow from producer to consumer. Firstly, the government should encourage producers' organizations, for instance dairy cooperatives, to collect milk from producers. Inan (1989) suggests that dairy cooperatives may contribute

to the development of the dairy industry. Next, dairy cooperatives should form their own cold chains to protect milk from contamination. Thus, the high quality milk that industry needs can be provided. However, firms have to monitor milk at the producer level more often in order to increase milk quality. Major companies frequently check the milk from their suppliers and low quality milk suppliers have been warned and even suffered sanctions.

There is another problem regarding human health. Only a few firms have laboratories that can undertake microbiological analysis. The vast majority of firms release their products onto the market without analysis. These firms are checked by the Food Control Department of the Ministry of Agriculture and Village Affairs, although these checks are not sufficient, as cited by the European Commission, Food and Veterinary Office (EC Commission Food and Veterinary Department, 2000a). Agricultural Ministry laboratories should therefore be improved, and controllers must be trained in HACCP (hazard analysis critical control point) and milk processors should be checked by them on a frequent basis.

Small-sized dairy firms processing more than 500 l of milk daily and operating without business registration lead to unfair competition in the milk sector. Unregistered production and sales benefit these firms because they have low operating costs. Owing to the high number of low income consumers in Turkey, cheap milk products are bought and the firms that produce these products dominate the market. There seems to be only one solution: to get rid of these primitive firms. In this way, human health would be protected and competitive firms possessing high technology would be developed.

These research results reveal that one of the major problems is the marketing of milk products. To solve this problem, medium- and small-sized firms should engage in boutique-style production and produce regional products. Nevertheless, some major features of these regional products should be given priority and these characteristics promoted at the customer base. Another solution to marketing problems would be working with retail chains as a retailers' brand.

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