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NORTH CENTRAL REGIONAL RESEARCH PUBLICATION 210



# FACTOR ANALYSIS OF THE MARKET STRUCTURE OF THE FLUID-MILK BOTTLING INDUSTRY IN THE NORTH CENTRAL REGION

by  
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Agricultural Experiment Stations of Alaska, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin, and the U.S. Department of Agriculture cooperating.



**AGRICULTURE AND HOME ECONOMICS EXPERIMENT STATION**  
Iowa State University of Science and Technology

**RESEARCH BULLETIN 573. . .October 1971. . .Ames, Iowa**

IWRBBR 573 541-576 (1971)  
(Continues IERBA2)

## FOREWORD

This report is being published as part of the North Central Regional Project NCM-38, "Dairy Market Adjustment Problems in the North Central Region." This is a cooperative study involving Agricultural Experiment Stations in the North Central Region and agencies of the U.S. Department of Agriculture.

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This publication is sponsored by the agricultural experiment stations of Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin and by the Economic Research Service and Cooperative State Research Service of the U.S. Department of Agriculture.

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## SUMMARY

This study concerns sociological, psychological, and economic variables that fluid-milk bottlers (from their knowledge and experience) believe are relevant to the marketing problems they face. Many of these marketing problems arose because the competitive conditions in the processing and distribution of milk have undergone substantial changes in recent years. These changes have affected the marketing operations of fluid-milk bottlers and produced changes in relationships between bottlers and retailers.

Data were collected from managers of fluid-milk bottling plants located in the North Central Region on their operations, their problems, changes in their market environment, and adjustments in their operations. These data were subjected to factor analysis. This report is devoted mainly to summarizing results from a factor analysis of 195 questions answered by each of 242 managers of plants who supplied supermarket chains with milk and who answered questions about fluid-milk bargaining cooperatives. Hierarchical factor analysis of these data provided 12 group factors and five general factors. A factor is identified as a basic or fundamental variable statistically independent of other factors and relevant to an understanding of bottler behavior. Answers to each question provide data on one variable. Each variable whose simple correlation with any group factor exceeded 0.14 in absolute value was assigned to the group factor with which it was most highly correlated. Also, if a variable's simple correlation with any general factor exceeded 0.14 in absolute value, the variable was assigned to the general factor with which it was most highly correlated. Each factor was assigned a name and an economic interpretation by studying the nature of the variables assigned to that factor.

Names assigned to the 17 factors obtained in this study are listed immediately after this paragraph. After each factor name is listed a title, or titles, describing contents of questions assigned to that factor. For example, the questionnaire contained 11 questions dealing with the topic "Developments that have changed the competitive situation in the bottler's market" and nine questions on the topic "Considerations that have determined areas and markets served by the bottler." Most of the questions dealing with these two topics were more highly correlated with group factor 1 than with any other group factor. And, most of the questions assigned to group factor 1 dealt with these two topics. The name "Market Area Structure" was selected as a name for this group factor since this name describes the topics covered by the questions assigned to this factor.

1. Group factor 1, Market Area Structure: a) Developments that have changed the competitive situation. b) Considerations that have determined areas and markets served.

2. Group factor 2, Consequences of the Growth of Supermarket Chains: a) Problems that have

arisen for your firm due to the growth of supermarket chains.

3. Group factor 3, Size of Discounts: a) Considerations affecting discounts to large wholesale customers.

4. Group factor 4, Competitors' Apparent Merchandising Practices: a) Inducements used by your competitors in competing for accounts of large national and regional supermarket chains. b) Inducements used by your competitors in competing for the accounts of large and medium-sized food stores of small chains and large independents.

5. Group factor 5, Wholesale Customers' Bargaining Power: a) Bargaining arguments used by large wholesale customers.

6. Group factor 6, Bottler's Bargaining Power: a) Bargaining arguments you use with large wholesale customers. b) Bargaining arguments used by large wholesale customers. c) Considerations determining which supermarket chains your firm supplies with milk.

7. Group factor 7, Sales Procedure and Services: a) Changes in selling procedures to food stores. b) Changes in services to food stores.

8. Group factor 8, Supermarket Chain Policy: a) Reactions about supermarket chains.

9. Group factor 9, Wholesale-Milk Drivers' Policy: a) Reactions about wholesale-milk drivers' unions.

10. Group factor 10, Firm Dimension: a) Size of distribution area served by plant. b) Volume of milk handled. c) Volume of sales by type of outlet and brand category. d) Type of firm and ownership.

11. Group factor 11, Managements' Wholesale Merchandising Practices: a) Considerations determining which chain your firm supplies with milk.

12. Group factor 12, Cooperative Reputation: a) Reactions about fluid-milk bargaining cooperatives.

13. General factor A, Processors' Venture in the Market: a) Developments that have changed the competitive situation. b) Considerations determining areas and markets served. c) Problems that have arisen for your firm due to the growth of supermarket chains. d) Considerations affecting discounts to large wholesale customers. e) Inducements used by your competitors in competing for accounts of large wholesale customers. f) Bargaining arguments you use with large wholesale customers.

14. General factor B, Distribution and Merchandising Policy: a) Changes in sales procedures and services. b) Reactions about supermarket chains. c) Reactions about fluid-milk bargaining cooperatives.

15. General factor C, Problems and Policies of Distribution: a) Bargaining arguments you use with large wholesale customers. b) Reactions about wholesale-milk drivers' unions. c) Considerations determining which chains your firm supplies with milk.

16. General factor D, Size: a) Reactions about supermarket chains. b) Size of distribution area

served by plant. c) Volume of milk handled. d) Volume of sales by type of outlet and brand category. e) Adjustments made during past five years. f) Adjustments planned during next five years. g) Considerations determining which chains your firm supplies with milk. h) Type of firm and ownership.

17. General factor E, Illegal Trade Practices:  
a) Inducements used by your competitors in competing for accounts of supermarkets. b) Bargaining arguments used by large wholesale customers.

After variables were assigned to factors and factors had been named, the correlations between

factors and observed variables were examined to derive hypotheses concerning bottler behavior. Each hypothesis takes the general form of the statement: "The concept identified by a factor name is closely associated with, and necessary for an understanding of, the dimensions of bottler behavior covered by the questions assigned to that factor." For example: Market Area Structure is closely associated with developments that have changed the competitive situation and also is closely associated with considerations that have determined areas and markets served by a bottler.

# Factor Analysis of the Market Structure of the Fluid-Milk Bottling Industry in the North Central Region

by

George W. Ladd and Robert L. Oehrtman

The competitive conditions in the processing and distribution of milk have undergone substantial changes in recent years. These changes have affected the operations of fluid-milk processors and produced changes in relationships between processors and retailers, and between processors and dairy farmers. Most of these changes can be divided into two categories: a) Changes resulting from technological developments and b) changes resulting from increasing size and changing organization of food stores.

Technological changes, such as automation of fluid-milk processing, have increased the capital requirements and the economies of scale. One result is that many small firms have discontinued operations, consolidated existing plants, or merged with other fluid-milk processing firms.

Distribution of fluid-milk products to food stores has been affected by the increasing size and changing business organization of food stores. Some processors market a large proportion of their total fluid-milk volume to a relatively few large food chains. Large food chains can contract for milk and ice cream from a supply source on a district or regional basis. The loss or gain of a contract to supply the food chain's stores in a region can have a considerable effect on the sales volume and financial well-being of a processor. Also, the use of a private-label brand by a food chain reduces the effectiveness of product differentiation in the fluid-milk processor's brand of milk. Private-label brands make it easier for food chains to change suppliers and to exercise controls over pricing and merchandising the product.

These changes have had an effect on the bargaining positions of fluid-milk processors and on their control over their own operations. Many small and medium-sized processors have financial problems, and others have gone out of business. Some managers of firms have made adjustments to the changes in competitive conditions and marketing situation, and other firm managers are considering changes that they can make. Managers who are thinking about making adjustments in their fluid-milk processing operations must consider many issues and conditions before making that final decision.

Efforts to understand recent developments, and to predict future developments, in processing and distribution of dairy products suffer from inadequacies of economic knowledge, especially inadequacies in our understanding of what economists frequently call "market structure analysis."

## OBJECTIVES

One purpose of our study was to provide milk bottlers with information that they might use in deciding how to adjust to changes in market conditions.

A second objective was to improve our understanding of market structure, conduct, and performance by determining some of the economic, sociological, and psychological variables that fluid-milk processors (from their own knowledge and experience) believe are relevant to their marketing problems and by determining some of the important relations among these variables.

This report is concerned with the second objective. Another report deals with the first objective.

## MARKET STRUCTURE ANALYSIS

Market structure is viewed as having an effect on the conduct of marketing firms and their performance, and sometimes, performance has a feedback effect on structure. Market structure analysis is a research method used for comprehensive analysis of marketing systems. Market structure analysis may be static or dynamic in nature, and it may be positive or predictive in purpose.

A market is defined as a closely interrelated group of buyers and sellers. A market may be defined such that it includes all the sellers in any individual industry and all the buyers to whom (in common) they sell (1).

Market structure refers to the organizational characteristics of a market that strategically influence the nature of competition and pricing within the market. The most important characteristics are listed by Bain (1) and Clodius and Mueller (2) as: a) The degree of seller concentration. b) The degree of buyer concentration. c) The degree of product and service differentiation among sellers. d) The condition of entry to the market.

Market conduct refers to the patterns of behavior that enterprises follow in adapting or adjusting to the markets in which they sell or buy. Conduct is the policies and strategies of business. Significant dimensions of conduct listed by Bain (1) and Clodius and Mueller (2) are: a) Principle and method employed in calculating price and output. b) Policy of product variation over time. c) Sales promotion policy. d) Means of coordination and cross-adaptation of price, product, and sales promotion policies among competing firms. e) Presence or absence of, and extent of, predatory or exclusionary

tactics directed against either established rivals or potential entrants. Market conduct is the patterns of behavior that an enterprise follows in its marketing activities.

Market performance refers to the end results that enterprises arrive at in any market as a consequence of pursuing whatever line of conduct they espouse. The principal aspects or dimensions of market performance include (1,2): a) The height of price relative to the average cost of production. b) The relative efficiency of production and the extent of excess capacity. c) The size of sales promotion costs relative to the costs of production. d) The character of the product, including choice of design, level of quality, and variety of product within any market. e) The rate of progressiveness of the firm and industry relative to evidently obtainable rates and relative to the cost of progress. Market performance is the result of market conduct and market structure.

Some elements of market structure that may be useful in explaining conduct and performance, but usually are not included in market structure analysis are (9): a) Laws and regulations. b) Structures of closely related industries. c) Contractual arrangements. d) Some basic economic and technological features of products and processes. Another is: e) Attitudes, knowledge, goals, values, and perceptions of businessmen.

Market structure analysis is usually static. It is therefore precluded from considering such important issues as: a) Effect of conduct and performance upon structure. b) Effect of conduct and performance upon attitudes, knowledge, goals, and perceptions of businessmen. c) Determination of the markets and industries in which a firm will sell. d) Firm growth and decline.

One purpose of our research was to bring some of these last nine items into a market structure analysis by an inductive approach. These last nine items have received little theoretical attention. Hence, economists have few prior hypotheses concerning these items. Data obtained in this research, therefore, were not used to test prior hypotheses, but were used to develop hypotheses that can be tested with other data.

Generally, in market structure research, "we" have viewed the world through "our own eyeglasses." By "we" the authors mean economists; by "our own eyeglasses" the authors refer to the received body of economic theory and market structure theory and associated judgments and values. The current study is an attempt to view the world as "they" see it through "their own eyeglasses." "They" refers to businessmen actually making decisions in some perceived market environment. "Their own eyeglasses" refers to their own observation, intuition, biases, subjective judgments, knowledge, and whatever else they use to perceive, and make decisions in, their own environment. Some of their perceptions may be "wrong." Right or wrong, they make decisions in the light of their own perceptions—not in the light of ours. The authors believe that we economists can improve the predictive ability of economics by improving our

understanding of the way "they" view the world through "their own eyeglasses."

The nature of the objectives made it desirable to collect information on a variety of topics and to ask several questions on each of these topics. This required a lengthy questionnaire. Statistical considerations (degrees of freedom) then required that data be obtained from a large number of bottlers. The need to obtain much data from a large number of bottlers placed some constraints on the format of the questionnaire. A brief discussion of the questionnaire is presented next. The entire questionnaire, in abbreviated form, is presented in Appendix A.<sup>1</sup>

## DATA

To make the questionnaire easy to administer, it was necessary that its format be relatively simple, clear, and concise. Likewise, the answer to each question needed to be determined easily by the interviewee. With these objectives in mind, we decided to have processors assign numbers to a homogeneous class of variables in such a way that the appropriately transformed values of these numbers were additive.<sup>2</sup>

This study was divided into several problem areas. Questions were developed that probed many aspects of each area. Thus, each processor answered many questions indicating how relevant each question was to the problems that he faced.

The first page of the questionnaire contained general instructions to the interviewee. Significant parts are presented here.

"This questionnaire is concerned with the changes affecting milk processors, adjustments processors are making in response to the changed conditions, and the like. Nearly all questions are to be answered by inserting numerical scores in blanks.

"The numerical scores you are to insert are to be in the range from 1 through 99. The numbers "1" and "99" represent extremes—in importance, in degrees of frequency, in the extent of your agreement with a statement, or the like. If the attribute being indicated is important, a "1" means that attribute is of no importance, while a "99" means it is highly important.

"In many instances you may want to indicate intermediate degrees by using scores between 1 and 99. On the "importance" scale, with a score of 1 indicating no importance and 99 indicating much importance, scores between 10 and 30 might be conceived of as indicating slight importance, scores between 40 and 60 as indicating moderate impor-

<sup>1</sup>Numbers assigned to some questions in this report differ from the numbers assigned to these items in the questionnaires as administered to bottlers. Renumbering was done to facilitate numerical analysis.

<sup>2</sup>Many people, in addition to the authors, made significant contributions to the construction of the questionnaire. Among them were members of NCM-38 (the North Central Regional Committee on Dairy Marketing Research), Sheldon W. Williams, and Leroy Wolins. Dr. Wolins also provided guidance in the use of psychological response scales and in factor analysis. We are grateful to all these people.

tance, and scores between 70 and 90 as indicating considerable but not maximum importance.

"The distinctions you make should be as fine as you feel you can make them. Use the number along the range that you believe best expresses your judgment."

The top of each of the subsequent pages contained a title or description of the main theme of the questions on that page, some brief instructions, and a labeled scale with numbers ranging from 1 to 99. For example, the title, instructions, scale, and first few questions from page 2 are shown in Fig. 1. The content of other pages that used the 1-99 scale is summarized in table 1.

Answers to questions 107 to 111 provided information on the size of the distribution area served by the bottler. Answers to items 112 and 113 provided data on volume of class-I milk sales and volume of milk receipts. Question 114 asked for the percentage of milk receipts obtained from a cooperative. Answers to items 115 to 120 provided data on sales by types of outlets; answers to items 121 to 125 provided data on sales by brand categories. Items 126 to 129 referred to the existence of state trade-practice laws and federal orders. Items 130 and 250 to 254 provided information about the fluid-milk bargaining cooperative (if any) from which the bottler obtained milk. Items 157 to 160 were dichotomous 0-1 variables. Items 241 to 249 provided general information about the bottler's operations.

Statements and questions were included in the questionnaire only because we believed that responses to these items would provide useful information. The inclusion of a particular statement is not to be construed as meaning that we or members of NCM-38 agree with that statement.

Figure 1. Title, instructions, scale, and first few questions from page 2 of questionnaire

Developments That Have Changed the Competitive Situation

How important has each of the developments listed below been in changing the competitive situation in your market? Place a numerical score on each line to show how important the item on that line has been in changing the competitive situation in your market during the last five years.

For example, on line 1, place a number (from 1 to 99) to show how important the growth of supermarket chains has been in changing the competitive situation in your market during the last five years.

<u>Importance in bringing about changes</u>	
<u>The following scale may help in keeping the directions in mind</u>	
1	99
10	90
20	80
30	70
40	60
50	50
60	40
70	30
80	20
90	10
Of no importance	Highly important
1. Growth of supermarket chains	_____
2. Changes in sanitary regulations affecting the movement of packaged-milk products	_____
3. Inclusion of your market in a new or expanded federal order in which it was not previously included -- or termination of a federal order	_____
4. Growth of large dairy companies	_____

## FACTOR ANALYSIS

Theoretical models that explain the changing relations between processors and retailers need to be established. To develop these models, exploratory empirical work is needed: a) to suggest interpretations of the interrelationships between processors and retailers and b) to aid in defining theoretical models of the interrelationships.

Factor analysis is concerned with two basic problems. One is the linear resolution of a set of observed variables into a small number of hypothetical variables or factors; i.e., the attainment of a parsimonious description of observed data. The resolution can be accomplished by the analysis of the correlations among the variables, and the resolution will yield factors, whose coefficients measure the association between each factor and each variable. The second concern is the description of the factors in terms of the observed variables. This expression of factors in terms of the observed variables is often referred to as factor regression (6,10). For the economist faced with the job of analyzing a large amount of data in an effort to find patterns and relationships from which hypotheses can be derived, factor analysis is a useful empirical tool.

In factor analysis, it is convenient to work with standardized variables. Let  $X_{ji}$  = the value of the  $j$ th variable for the  $i$ th individual ( $j = 1, 2, \dots, n; i = 1, 2, \dots, N$ ),  $M_j$  be the mean of the  $j$ th variable, and  $S_j$  be the standard deviation of the  $j$ th variable. Factor analysis then uses standardized data  $Z_{ji}$

$$Z_{ji} = (X_{ji} - M_j) / S_j \quad [1]$$

The classical factor-analysis model is of the form

$$Z_{ji} = a_{j1}F_{1i} + a_{j2}F_{2i} + \dots + a_{jm}F_{mi} + \alpha_j U_{ji} = \sum_{p=1}^m a_{jp}F_{pi} + \alpha_j U_{ji} \quad [2]$$

$$(j = 1, 2, \dots, n) \\ (i = 1, 2, \dots, N)$$

where each of the  $n$  observed variables is described linearly in terms of  $m$ , ( $m < n$ ), common factors  $F_p$ , and one unique factor  $U_j$ . The  $m$  common factors account for the correlations among the variables, and each unique factor accounts for the remaining variance (including error) of that variable. The coefficients of the factors are the factor loadings;  $a_{jp}$  is the loading of variable or item  $j$  on the  $p$ th common factor.  $F_{pi}$  is the value of the  $p$ th common factor for the  $i$ th individual. The term  $a_{jp}F_{pi}$  represents the contribution of the  $p$ th common factor to the variable  $Z_{ji}$ . The  $\alpha_j U_{ji}$  term is the residual error in the theoretical representation of the observed measurement of  $Z_{ji}$  (6, 7).

The first task of factor analysis is the estimation



Table 1. Item numbers, title at top of page, and labeling on scale on all pages using the 1-99 scale in the questionnaire

Item number	Title	Labeling on scale	Numerical range on scale
1-11	Developments that have changed the competitive situation in your market	Importance in bringing about changes	1: no importance 99: highly important
12-20	Considerations that have determined areas and markets you serve	Importance in determining areas and markets served	1: no importance 99: highly important
21-29	Problems that have arisen for your firm due to the growth of supermarket chains	Importance of problem	1: no importance 99: highly important
30-37	Forces affecting discounts to large wholesale customers by milk distributors	Size of discount allowed	1: no discount 99: large discount
38-47	Inducements used by your competitors in competing for accounts of large national and regional supermarket chains	Frequency of use	1: not used 99: used frequently
48-57	Inducements used by your competitors in competing for the accounts of large and medium-sized food stores of small chains and large independents	Frequency of use	1: not used 99: used frequently
58-64	Bargaining arguments used by large wholesale customers	Frequency of use	1: not used 99: used frequently
65-70	Bargaining arguments you use with large wholesale customers	Frequency of use	1: not used 99: used frequently
71-82	Changes made in sales procedures and in service to food stores	Importance now as compared with previously	1: less important 99: more important
83-96	Reactions about supermarket chains	Extent of agreement with statement	1: strongly disagree 99: strongly agree
97-106	Reactions about wholesale-milk drivers' unions	Extent of agreement with statement	1: strongly disagree 99: strongly agree
131-143	Adjustments made during past five years	Benefits received from adjustments that were made	1: very harmful 99: much benefit
144-156	Adjustments you plan to make during the next five years	Benefits expected from adjustments to be made	1: no benefit 99: much benefit

Table 1. (Continued)

Item number	Title	Labeling on scale	Numerical range on scale
161-168	Considerations determining which supermarket chains your firm supplies with milk	Importance in determining chains supplied with milk	1: no importance 99: highly important
169-184	Reactions about fluid-milk bargaining cooperatives	Extent of agreement with statement	1: strongly disagree 99: strongly agree
185-193	Operating goals	Importance of various goals	1: no importance 99: highly important

of the  $nm$  loadings on the common factors. The following assumptions are made in accomplishing this estimation<sup>3</sup>

$$\sum_{i=1}^N F_{pi} = 0 \text{ for all } p = 1, 2, \dots, m \quad [3.a]$$

$$\sum_{j=1}^n \alpha_j = 0 \quad [3.b]$$

$$\sum_{i=1}^N F_{pi}^2 = 1 \text{ for all } p = 1, 2, \dots, m \quad [3.c]$$

$$\sum_{i=1}^N U_{ji}^2 = 1 \text{ for all } j = 1, 2, \dots, n \quad [3.d]$$

$$\sum_{i=1}^N F_{pi} F_{ri} = 0 \text{ for all } p \neq r \quad [3.e]$$

$$\sum_{i=1}^N U_{ji} U_{ki} = 0 \text{ for all } j \neq k \quad [3.f]$$

$$\sum_{i=1}^N F_{pi} U_{ji} = 0 \text{ for all } p \text{ and } j \quad [3.g]$$

$$\sum_{j=1}^n \alpha_j^2 = 1 \quad [3.h]$$

Equations 3.a and 3.c state that each common factor has a mean of zero and a variance of one. Equation 3.d also states that each unique factor

<sup>3</sup>Some methods of estimation make assumptions slightly different from these.

has a variance of one. Equations 3.e, 3.f, and 3.g state that different factors are uncorrelated with each other. Equations 3.b and 3.h are normalization rules imposed for mathematical convenience.

Letting  $s_j^2$  represent the variance of the  $j$ th standardized variable, we know that  $s_j^2 = 1$ . Applying assumptions 3.c, 3.d, 3.e, 3.f, and 3.g to Equation 1, we obtain

$$s_j^2 = 1 = a_{j1}^2 + a_{j2}^2 + \dots + a_{jm}^2 + \alpha_j^2 \quad [4]$$

The first  $m$  terms on the right side of Equation 4 represent the portions of the unit variance of the variable  $Z_j$  ascribable to each of the  $m$  common factors. For example, the term  $a_{j2}^2$  is the contribution of the second common factor to the variance of  $Z_j$  (6).

Two important concepts of factor analysis are depicted in Equation 4 (1): communality and uniqueness. The communality of variable  $Z_j$  is given by the sum of the squares of common-factor loadings:

$$h_j^2 = a_{j1}^2 + a_{j2}^2 + \dots + a_{jm}^2 \quad [5]$$

$h_j^2$  equals the proportion of the total unit variance of the variable  $Z_j$  accounted for—statistically explained—by the common factors.  $h_j^2$  is the "common variance" of  $Z_j$ . The uniqueness,  $\alpha_j^2$ , equals the proportion of the total unit variance of variable  $Z_j$  not accounted for by the common factors, specifically

$$\alpha_j^2 = 1 - h_j^2 \quad [6]$$

The reduced correlation matrix is obtained from the matrix,  $R$ , of correlations among the  $Z$ 's by replacing the units in the main diagonal by communalities. The  $j$ th unit is replaced by  $h_j^2$ . Suppose

we have estimated the factor loadings. Let  $r_{jk}^*$  be the correlation between the  $j$ th and  $k$ th variables, as estimated from factor loadings.

$$r_{jk}^* = a_{j1}a_{k1} + a_{j2}a_{k2} + \dots + a_{jm}a_{km} \quad [7]$$

The differences between the observed correlation  $r_{jk}$  and the reproduced correlations  $r_{jk}^*$  are the residual correlations and are defined by

$$\text{res } r_{jk} = r_{jk} - r_{jk}^* \quad [8]$$

The factor loadings can be interpreted in three ways. a) They represent the relative importance of each factor in influencing each observed variable. Thus, the value of  $a_{j1}$ , the  $j$ th loading on the first factor, indicates that  $a_{j1}^2$  is the percentage of the variance in the  $j$ th observed variable accounted for by  $F_1$  after the allowance for the other factors. b)  $a_{jp}$  represents the net correlation coefficient between the  $p$ th common factor and the  $j$ th observed variable. c) The loadings provide a basis for combining the variables into common groups. Each of the  $m$  groups contains those variables that load higher on a particular factor than on the other  $m-1$  factors. From the content of the variables that load heavily on a factor (i.e., whose loadings on that factor are larger than their loadings on other factors), it may be possible to assign a natural interpretation and a name to the factor.

For a given correlation matrix, different methods of factor analysis will locate the factors in a different position. Various locations of the factors can be obtained by rotating the axes about the origin. It may be easier to identify or name the factors in one location than in another. After factors have been obtained, one may rotate them for ease of naming or of future computation. After rotation, the factors still retain their essential properties. To accomplish the rotation, select  $m^2$  numbers  $t_{ij}$  ( $i = 1, 2, \dots, m; j = 1, 2, \dots, m$ ) satisfying  $\sum_j t_{ij}^2 = 1$  for all  $i$  and  $\sum_j t_{ij}t_{hj} = 0$  for all  $i \neq h$ . Then define  $b_{jp} = \sum_i a_{ji}t_{ip}$  and  $G_{pi} = \sum_h t_{hp}F_{hi}$ . It then happens that  $\sum_p b_{jp}G_{pi} = \sum_p a_{jp}F_{pi}$ , and Equation 2 can be written

$$Z_{ji} = \sum_p b_{jp}F_{pi} + \alpha_j U_{ji} \quad [9]$$

This is equivalent to Equation 2

$$Z_{ji} = \sum_p (a_{jp}/t_{ip})t_{ip}F_{pi} + \alpha_j U_{ji} = \sum_j a_{jp}F_{pi} + \alpha_j U_{ji} \quad [10]$$

Further

$$s_j^2 = \sum_p b_{jp}^2 + \alpha_j^2 = \sum_p a_{jp}^2 + \alpha_j^2 \quad [11]$$

$$h_j^2 = \sum_p b_{jp}^2 \sum_p a_{jp}^2 \quad [12]$$

$$\alpha_j^2 = 1 - h_j^2 \quad [13]$$

$$r_{jk}^* = \sum_p b_{jp}b_{kp} = \sum_p a_{jp}a_{kp} \quad [14]$$

To illustrate what may be done with factor analysis, we will use the data in table 2. This is a reduced correlation matrix since the main diagonal contains communalities. Table 4 presents the estimated correlations obtained by using the  $a_{jp}$  from table 3 in Equation 7. Tables 2 and 4 are identical, showing that the correlations among these six variables can be completely explained by using

Table 2. Reduced correlation matrix among six hypothetical variables

Variable	Variable					
	Z <sub>1</sub>	Z <sub>2</sub>	Z <sub>3</sub>	Z <sub>4</sub>	Z <sub>5</sub>	Z <sub>6</sub>
Z <sub>1</sub> .....	0.80	0.76	0.76	0.64	0.48	0.32
Z <sub>2</sub> .....	--	0.74	0.77	0.56	0.42	0.28
Z <sub>3</sub> .....	--	--	0.85	0.48	0.36	0.24
Z <sub>4</sub> .....	--	--	--	0.64	0.48	0.32
Z <sub>5</sub> .....	--	--	--	--	0.36	0.24
Z <sub>6</sub> .....	--	--	--	--	--	0.16

Table 3. Factor loadings,  $a_{jp}$ , obtained from  $R^*$  in Table 2

Variable j	Factor p	
	1	2
1 .....	0.80	0.40
2 .....	0.70	0.50
3 .....	0.60	0.70
4 .....	0.80	0
5 .....	0.60	0
6 .....	0.40	0

Table 4. Values of  $r_{jk}^*$  obtained from Table 3

Variable	Variable					
	Z <sub>1</sub>	Z <sub>2</sub>	Z <sub>3</sub>	Z <sub>4</sub>	Z <sub>5</sub>	Z <sub>6</sub>
Z <sub>1</sub> .....	0.80	0.76	0.76	0.64	0.48	0.32
Z <sub>2</sub> .....	--	0.74	0.77	0.56	0.42	0.28
Z <sub>3</sub> .....	--	--	0.85	0.48	0.36	0.24
Z <sub>4</sub> .....	--	--	--	0.64	0.48	0.32
Z <sub>5</sub> .....	--	--	--	--	0.36	0.24
Z <sub>6</sub> .....	--	--	--	--	--	0.16

only two factors. These six different variables, then, are manifestations of various combinations of the two basic and fundamental variables: the factors.

In an actual problem, we usually do not know the values of the communalities; they must be estimated. Also, in an actual problem, we usually find some discrepancies between the original and the reproduced correlations. The extent of agreement between the original and reproduced correlations is a measure of the adequacy of the factor solution.

Although factor analysis is a useful tool for developing hypotheses, it is not so useful for testing hypotheses. This is because we have no way of computing standard errors, confidence intervals, or tests of null hypotheses in factor analysis. Thus, although  $a_{jp}$  may exceed  $a_{jk}$ , we can make no statement about the significance of the difference; nor can we determine if any non-zero  $a_{jk}$  is significantly different from zero.

The factor loadings, the  $a_{jp}$ , can be used to identify which factors exercise a strong influence on each variable. After computing the  $a_{jp}$ , one could compute the factor regression coefficients. These coefficients are the  $c_{pj}$  in

$$F_{pi} = \sum_{j=1}^m c_{pj} Z_{ji} \quad [15]$$

The  $c_{pj}$  can then be used to determine which variables are the more important influences on each factor. We did not compute the  $c_{pj}$ .

## PROCEDURE

Three different analyses were carried out. Analysis I contained the fewest variables and the most observations of the three analyses. Analysis I in-

cluded responses to items 1 to 160 and 241 to 254. Questions 1 through 106 asked for subjective answers based on the psychological response scale of 1 to 99. Questions numbered 107 through 130 asked for objective information such as miles of haul, percentage of recent change of market area, volume of Class-I milk sales in pounds, the numbers of years the firm was under a state fair-trade law and federal order, and the number of members associated with the bargaining cooperative.

Answers to questions 131 through 156 were in two parts. The first part was no (= 0) or yes (= 1). An answer of no meant that a bottler has not made a specified change in his operations or that he did not plan to make a specified adjustment. An answer of yes meant that he had made or planned to make a specified adjustment. The second part of each answer measured the degree of achieved or expected success from the adjustment. We included only the first (0-1) part of the answers in our analysis.

Questions 161 through 168 were answered only if the firm supplied milk to a supermarket chain. Analyses II and IV included only bottlers answering these questions. Items numbered 169 through 184 were statements about fluid-milk bargaining cooperatives. Analysis IV covered only bottlers who supplied milk to a supermarket chain store and who responded to items 169 through 184. Contents of the three analyses are summarized in table 5.

Psychologists report that individuals using the psychological response scale of 1 to 99 underreact in their responses at the extreme ends of the response scale, but overreact in their responses elsewhere on the scale. To compensate, psychologists recommend that all responses on such scales be transformed to standard normal deviates.<sup>4</sup>

Therefore, all data from the psychological response scale were transformed to standard normal deviates. Selected values of the response scale and corresponding standard normal deviates are

<sup>4</sup>Leroy Wolins. Private communication. Departments of psychology and statistics. Iowa State University. Ames. 1969.

Table 5. Composition of correlation matrices and factor solutions

Correlation matrix and factor solution number	Number of variables	Number of observations	Question numbers included (according to arrangement of questionnaire in Appendix B)
I	174	362	1-160, 241-254
II	181	273	1-156, 158-168, 241-254
IV	195	242	1-156, 159-160, 161-168, 169-184, 242-254

given in table 6. Thereafter, the standard normal deviates were multiplied by 100 and the constant value of 300 was added to each to make the manipulation of data more convenient. Selected values of the transformed standard normal deviates also are given in table 6.

Each analysis was carried out in four steps.

I. The multiple group method (3, 4) was used to obtain first-order factors from the original correlation matrix.

II. The maximum-likelihood method (4, 6) was used to obtain second-order factors from correlations among first-order factors.

III. Second-order factor loadings were rotated to obtain loadings of first-order factors on rotated second-order factors.

IV. First-order factors were transformed to yield group factors, and second-order factors were rotated to yield general factors.

The next section summarizes statistical results from Solution IV; the following section presents some interpretation of, and hypotheses derived from, these results. The section after that briefly compares results from Solutions I, II, and IV and presents some hypotheses obtained from these comparisons. Statistical results from all three factor analyses are presented by Oehrtman (8).

## SOLUTION IV: STATISTICAL RESULTS

Appendix B presents factor loadings, communalities, and mean scores. Some additional detail on mean scores and analyses of their implications have been presented previously (3, 5). For each question *j*, if the answers to that question had any factor loading exceeding 0.15 in absolute value, the question was assigned to the factor on which it loaded most heavily. From the nature of the questions loading most heavily on a factor, a name for that factor was selected. The analysis yielded 12 first-order factors and five second-order factors.

Table 6. Selected values of response scale, standard normal deviates of responses, and transformed standard normal deviates

Response	Deviate	Transformed deviate
1 .....	-2.33	67
6 .....	-1.55	145
10 .....	-1.28	172
20 .....	-0.84	216
30 .....	-0.52	248
40 .....	-0.25	275
50 .....	0.00	300
60 .....	0.25	325
70 .....	0.52	352
80 .....	0.84	384
90 .....	1.28	482
95 .....	1.64	464
99 .....	2.33	533

From these, 12 group factors and five general factors were obtained. In this section, each group factor has one table. Each table presents the items assigned to the factor and the factor loadings.<sup>5</sup>

## The Group Factors

The items shown in table 7 are those items that load more heavily on group factor 1 than on any other group factor. In tables 7 to 18, items are ordered according to the magnitudes of their factor loadings. Since item 16 has the largest loading on this factor, it is the single item most responsible for defining group factor 1. Group factor 1 explains

<sup>5</sup>In tables 7-18, items are written in full just as they appeared in the questionnaire. In Appendix A, items are presented in abbreviated form.

Table 7. Items in group factor 1 (Market Area Structure) and their factor loadings

Item number, <i>j</i>	Item	Factor loading, 100a <sub>1j</sub>
16	Sanitary regulations applicable in the market	53
20	Product specifications applicable in the market	50
15	History of competition in the market (roughness, tactics, etc.)	43
13	Whether serving an area would increase your costs of operation by subjecting you to regulation under a (additional) federal order	41
19	Whether it would increase your costs of operation by regulating you under a (different) state trade-practice law	39
3	Inclusion of your market in a new or expanded federal order in which it was not previously included -- or termination of a federal order	35
18	Prices or margins in the various markets	33
6	Passage of a state trade-practice law	29
2	Changes in sanitary regulations affecting the movement of packaged-milk products	29
14	Presence or absence of large chain dairy companies	27
9	Shortage in local supplies of milk	27
17	Presence or absence of one or more supermarket chains with which you might do business	26
160	The firm supplied a supermarket chain with milk and expressed reactions about fluid-milk bargaining cooperatives and expressed importance of the various operating goals	22
159	The firm expressed the importance of the various operating goals	22
4	Growth of large dairy companies	21
148	Plan to establish own dairy stores, convenience markets, or similar outlets during the next five years	-17
87	Supermarket chains need more competition in retailing milk	16
8	Changes in milk containers, such as the introduction of gallon jugs, gallon cartons, or plastic containers	16
5	Widening of distribution areas for packaged milk products	16

28(53<sup>2</sup>) percent of the variance in item 16. The first five items are items that processors believe determine the areas and the markets that they serve. Other items that processors believe determine the areas and markets they serve are items 18, 14, and 17. These eight items are eight of the nine items listed on page 3 of the questionnaire under the heading, "Considerations That Have Determined Areas and Markets You Serve." Seven items, developments that processors believe changed the competitive situation in their market, also load on group factor 1. These items are: 3, 6, 2, 9, 4, 8, and 5. A descriptive label for group factor 1 is *Market Area Structure*.<sup>6</sup>

The items that load higher on group factor 2 than on any other group factor are ordered according to the magnitudes of their factor loadings in table 8. The first five items are concerned with problems that the processors believe they face due to the growth of supermarket chains. Item 24 is also concerned with such problems. These are six of the nine items that appeared on the questionnaire under the heading "Problems That Have Arisen for Your Firm Due to the Growth of Supermarket Chains."

Half the items listed in table 8 are concerned with problems processors believe they face due to the supermarket chains. One item, 7, is concerned with an activity of some chains. Two items, 142 and 149, are adjustments that have been made, or will be made, in the operation of the business. These adjustments are consequential to the problems that milk processors face. A name consistent with the

<sup>6</sup>The first letter of each word in a factor name will always be capitalized.

Table 8. Items in group factor 2 (Consequences of Growth of Supermarket Chains) and their factor loadings

Item number, j	Item	Factor loading, 100a <sub>j2</sub>
23	Growing dependence on, and control by, supermarket chain(s)	43
21	Greater risk because business is in large lumps	38
26	Competitive pressure to provide services for which you are not remunerated (e.g., full-service at limited-service price)	34
25	Smaller profits in processing and distribution	30
27	Need to give discounts that are out of proportion to savings	29
249	The plant was fully regulated under a federal order at the time the questionnaire was completed	27
24	Higher costs due to greater variety of brands, container types, etc.	22
7	Processing of milk by some supermarket chains or other food distributors	22
253	The bargaining cooperative maintained a full-supply contract with part of the handlers	20
149	Plan to add sideline dairy items	20
142	During the past five years diversified into nondairy operations	19
106	Wholesale drivers should be replaced by distributors (vendors, subdealers)	-17

nature of the items in this group factor is *Consequences of Growth of Supermarket Chains*.

The items in table 9 are those items that loaded higher on group factor 3 than on any other group factor. The first eight items are all the items included in the questionnaire to indicate the size of discounts allowed to chain stores and other large wholesale customers by milk distributors in the processor's market.

The method of naming group factor 3 is different from the method of naming other group factors. The names chosen for other group factors are suggested by, and recognizable from, the items listed in the group factor tables. The situation is different for group factor 3 since the items listed in table 9 are those used by processors to indicate the size of discount allowed large wholesale customers in the processor's major market. Therefore, the items in table 9 are a measure of *Size of Discounts*.

The items that load higher on group factor 4 than on any other group factor are ordered in table 10 according to the magnitudes of their factor loadings. These items all pertain to the processor's belief about the frequency with which his competitors use various inducements in competing for the accounts of large national and regional supermarket chains, small supermarket chains, and large independent food stores.

The order of ranking of the inducements used by competitors for the accounts of large national and regional supermarket chains differs little from the order of ranking of the inducements used by competitors for the accounts of small supermarket chains and large independents. The three top-ranking inducements are the same in both lists: Free

Table 9. Items in group factor 3 (Size of Discounts) and their factor loadings

Item number, j	Item	Factor loading, 100a <sub>j3</sub>
32	The brand of milk	48
33	Central billing	46
37	Whether all milk is bought from one supplier (exclusive stop)	41
36	Top-level arrangements	37
34	Services received, including frequency of delivery	32
31	Variety of products purchased	31
30	Volume of products taken by individual stores	31
35	Over-all size of the chain	24
150	Plan to become a distributor (vendor, sub-dealer) during the next five years	23
126	Number of years the trade-practice law had been in effect at the time the questionnaire was completed	20
40	Discounts to large national and regional supermarket chains that are out of proportion to savings	16
250	The bargaining cooperative had facilities for milk packaging in use	15

Table 10. Items in group factor 4 (Competitors' Apparent Merchandising Practices) and their factor loadings.

Item number, j	Item	Factor loading, 100a <sub>j4</sub>
<u>Re: Large national and regional supermarket chains</u>		
47	Free by-products to new stores	57
39	Free milk to new stores	54
46	Free labor to new stores	50
45	Servicing display equipment free or below cost	50
42	Gifts, paid vacation trips, etc., to store personnel	48
41	Furnishing display equipment free or below cost	48
43	Store signs, clocks, etc.	46
44	Advertising allowances without supervision in spending	43
38	Financing of buyers	34
<u>Re: Small supermarket chains and large independents</u>		
49	Free milk to new stores	58
57	Free by-products to new stores	57
56	Free labor to new stores	51
52	Gifts, paid vacation trips, etc., to store personnel	50
53	Store signs, clocks, etc.	47
51	Furnishing display equipment free or below cost	46
55	Servicing display equipment free or below cost	46
54	Advertising allowances without supervision in spending	44
48	Financing of buyers	34
50	Discounts that are out of proportion to savings	16

milk to new stores, free by-products to new stores, and free labor to new stores. The sixth ranking inducement is the same on both lists: Furnishing display equipment. The eighth and ninth ranking inducements are the same in both lists: Advertising allowances and financing of buyers. Discounts out of proportion to savings has much the smallest loading of any item in the part of the table concerning small supermarket chains and large independents, and it does not appear in the other part of the table. The rank correlation between the two sets of factor loadings is 0.90. Group factor 4 was named *Competitors' Apparent Merchandising Practices*.

The items that load higher on group factor 5 than on any other group factor are ordered in table 11 according to the magnitudes of their factor loadings. Item 61 is the single item most responsible for defining group factor 5. It has a loading of 44, which means that group factor 5 explains slightly more than 19 percent of the variance observed in item 61. The items with the higher loadings in Table 11 are bargaining argu-

ments used by supermarket chains and other large wholesale customers in negotiating with processors. A suitable name for group factor 5 is *Wholesale Customers' Bargaining Power*.

The items in table 12 are items that loaded higher on group factor 6 than on any other group factor. Item 65, with its factor loading of 64, is the most important single item that can be used to define group factor 6. The three items with the highest loadings on group factor 6, and four other items—66, 69, 64, and 63—deal with the frequency that the bottler uses various bargaining arguments in dealing with large wholesale customers. The content of these seven items suggests the name *Bottler's Bargaining Power* for this group factor.

Items 164 and 163 appeared in the questionnaire under the heading, "Importance of Factors Determining Which Chains Your Firm Supplies With Milk."

Table 11. Items in group factor 5 (Wholesale Customers' Bargaining Power) and their factor loadings

Item number, j	Item	Factor loading, 100a <sub>j5</sub>
61	Threat to transfer business to competitor if demands are not met	44
58	Contention that competitor offered lower price	35
60	Promise of larger volume if you met demands	23
132	Home delivery on reduced service, large-volume-per-stop basis	21
111	Percentage decrease in size of distribution area during past five years	-20

Table 12. Items in group factor 6 (Bottler's Bargaining Power) and their factor loadings

Item number, j	Item	Factor loading, 100a <sub>j6</sub>
65	Pointing out that your product is of high quality	64
70	Pointing out that consumers have a strong preference for your brand	60
67	Reminder that you provide good service	50
164	Strong consumer preference for this firm's milk	45
66	Argument that your costs do not permit your firm to grant further concessions	45
163	Price concessions made by this firm in obtaining the account	-28
69	Reminder that the law prohibits your firm from providing the concessions the food distributor wants	28
94	Supermarket chains have little to gain by setting up their own processing plants	25
248	The plant was regulated under a trade-practice law at the time the questionnaire was completed	21
64	Argument that your brand is not advertised widely enough	-21
130	Bargaining cooperative membership at the time the questionnaire was taken	-17
84	Supermarket chains' margins on milk in your market are now too wide	-16
63	Argument that your product is not up to the quality it should be	-16

The positive factor loading for the first named and the negative loading for the second are consistent with this name. Also consistent with this name are the negative loadings of items 64 and 63, which appeared in the questionnaire under the heading, "Frequency of Use of Bargaining Arguments Used by Large Wholesale Customers." The negative loadings mean that the less frequently these are used, the greater is the Bottler's Bargaining Power.

The items in table 13 loaded higher on group factor 7 than on any other group factor. The time spent by top management in maintaining good relations with buyers and the part played by top management in negotiating sales are the two items that are the most important in defining group factor 7. Both of these items have factor loadings of 46. Items 144 and 83 are the only two items in table 13 not concerned with the changes in and importance of the sales procedures and services provided to food stores. The name that best describes this group factor is *Sales Procedure and Service*.

The five items in table 14 load higher on group factor 8 than on any other group factor. All five items are positively correlated with group factor 8 and involve processors' attitudes toward supermarket chains. *Supermarket-Chain Reputation* is an appropriate name for group factor 8. The average factor loading in table 14 is smaller than the average factor loadings in previous tables.

Those items with higher loadings on group factor 9 than on any other group factor are listed according to the magnitudes of their loadings in table 15. Items 99, 105, and 103 are the items that best describe group factor 9. All but two items (78

Table 13. Items in group factor 7 (Sales Procedure and Service) and their factor loadings

Item number, j	Item	Factor loading, 100a <sub>j7</sub>
72	Time spent by top management in maintaining good relations with buyers	46
71	Part played by top management in negotiating sales	46
75	Emphasis, in sales negotiations, upon volume that can be supplied	41
73	Knowing with whom to deal in retail organizations	38
77	Emphasis, in sales negotiations, upon product and service specifications	37
74	Adjusting services and the like to meet needs of supermarket chains	36
79	Delivery of preordered lots (instead of driver determining what and how much to leave)	33
82	Granting price concessions instead of providing certain services	30
80	Special sales-management personnel to service stores (for complaints, problems, etc.)	24
81	Providing private-label brands	23
144	Plan to sell the business	-22
76	Emphasis, in sales negotiations, upon price	22
83	Supermarket chains' demands for changes in milk delivery services have been reasonable	-18

and 140) represent the extent of the bottler's agreement with statements concerning wholesale milk drivers. Item 78 represents the change in importance of a service provided by drivers to wholesale customers. The major topics of the items in group factor 9 are the role of the wholesale milk driver in the distribution of fluid-milk products and the policy of the wholesale-milk drivers' union. A name that describes group factor 9 is *Wholesale Milk Drivers' Reputation*.

The items in table 16 load higher on group factor 10 than on any other group factor. The first four items are absolute measures of size. Some of the other items (e.g., 121 and 115) are measures of relative size of various parts of the firm.

Although the single-unit type of firm (item 244) is negatively related with group factor 10, the national dairy company type of firm (item 242) and other multi-unit type of firm (item 243) are positively related with group factor 10. Also, the partner or proprietor ownership (item 247) is negatively related with group factor 10, while corporate (excluding cooperative) ownership (item 246) is positively related with group factor 10. Type of firm and type of ownership are frequently related to size. The name given this factor is *Firm Dimension*.

Table 14. Items in group factor 8 (Supermarket-Chain Reputation) and their factor loadings

Item number, j	Item	Factor loading, 100a <sub>j8</sub>
93	Most supermarket chains have no interest in the welfare of milk processors	21
96	Supermarket chains demand excessive discounts on private-label brands of milk	20
91	Supermarket chains pressure milk processors to provide private-label milk	19
88	Supermarket chains are likely to control the business of processors who sell mainly to them	19
86	Supermarket-chain accounts are too urgently sought after by milk distributors	15

Table 15. Items in group factor 9 (Wholesale Milk Drivers' Reputation) and their factor loadings

Item number, j	Item	Factor loading, 100a <sub>j9</sub>
99	Wholesale-milk drivers should be paid on a commission basis	42
105	Full-service delivery of milk by wholesale drivers is needed by supermarket chains	41
103	Wholesale-milk drivers need to be salesmen	41
100	Wholesale-milk drivers ought to service food store milk cases	37
98	Wholesale-milk drivers' earnings in your market are too high	-27
78	Delivery at a specific time	17
140	During the past five years labor contracts were made better suited to mass distribution of milk to stores	-16
104	Wholesale drivers' unions readily adapt driver pay plans to changing market situations	15



Table 16. Items in group factor 10 (Firm Dimension) and their factor loadings

Item number, j	Item	Factor loading, 100 <sub>a</sub> j <sub>10</sub>
107	Extent of area served by this plant as indicated by the greatest length of haul, in miles	58
113	Monthly volume of milk intake	50
112	Monthly sales volume of packaged fluid-milk products	49
108	Extent of area served by this plant as indicated by average length of haul, in miles	48
121	Processor's regular brand(s) as a percentage of total packaged-milk sales	47
115	Percentage of total packaged-milk sales through home delivery	45
123	Percentage of total packaged-milk sales by private-label brands	40
244	Single-unit type of firm	-36
116	Percentage of total packaged-milk sales through supermarket chains	35
247	Partner or proprietor ownership	-31
141	During the past five years increased use of distributors (vendors, subdealers)	29
118	Percentage of total packaged-milk sales through distributors (vendors, subdealers)	28
246	Corporate (excluding cooperative) ownership	26
109	Percentage increase of distribution area during past five years	25
243	Other multi-unit type of firm	24
122	Processor's competing brand(s) as a percentage of total packaged-milk sales	24
242	National dairy company type of firm	22
129	Number of years the plant was regulated under a federal order prior to most recent termination of regulation	22
154	Plan to increase use of distributors (vendors, subdealers) in the next five years	21
28	Need to deliver milk over large areas	21
12	Transportation factors -- distance, road conditions and the like	21
120	Other types of outlets as a percentage of total packaged-milk sales	20
114	Percentage of milk purchased from a cooperative (or from members of a cooperative)	20
251	The bargaining cooperative had facilities for manufacturing surplus milk	19
147	Plan to make plant consolidation, or merger during the next five years	19
124	Custom packaged (for other dairies) as a percentage of total packaged-milk sales	19
89	Supermarket chains encourage small processors to supply them with milk	19
133	During the past five years fewer types and sizes of packages were used	-17
138	Intensified promotion of own brand during the past five years	16
59	Threat by large wholesale customers to set up their own processing plant if demands are not met	15

The items ordered according to the magnitudes of their factor loadings in table 17 load higher on group factor 11 than on any other group factor. The first six items are concerned with issues that processors believe determine which supermarket chains they supply with milk. Item 95 relates to an attitude toward supermarket chains, and item 62 is a bargaining argument used by large wholesale customers. Item 153 relates to adjusting labor contracts during the next five years so that they will be better suited to mass distribution of milk to stores. The name for group factor 11 developed from the content of the items in table 17 is *Management's Wholesale Merchandising Practices*.

The items listed in table 18 load higher on group factor 12 than on any other group factor. Item 182 is the single item that best defines this factor. The first 16 items are items that express processors' attitudes toward fluid-milk bargaining cooperatives. Thus, *Cooperative Reputation* seems an appropriate name for group factor 12.

### The General Factors

After first-order factors were obtained from the correlation matrix of the observed variables, second-order factors were obtained from the matrix of correlations among the first-order factors. These second-order factors were then rotated, and the loadings of the first-order factors on the rotated second-order factors were computed. These factor loadings are presented in table 19. The number of items assigned to each combination of group and general factors is shown in table 20. Next, the first-order factors and the rotated second-order factors were transformed to obtain loadings of indi-

Table 17. Items in group factor 11 (Management's Wholesale Merchandising Practices) and their factor loadings

Item number, j	Item	Factor loading, 100 <sub>a</sub> j <sub>11</sub>
166	Personal or business relationships between owners of this firm and of supermarket chains	41
162	Over-all size of supermarket chain	40
167	Preference by supermarket chain for a brand of milk not stocked by the supermarket's competitors	39
165	Size of chain's administrative district and its degree of conformity with this firm's area of operations	32
168	Type of service you were able to provide	30
161	Earlier business relationships	29
95	Supermarket chains have done a highly effective job of merchandising milk	-19
62	Contention that chain needs services you cannot feasibly offer	18
102	Milk drivers' unions have no concern about the welfare of milk processors	-16
153	Plan to adjust labor contracts during the next five years such that they are better suited to mass distribution of milk to stores	15

Table 18. Items in group factor 12 (Cooperative Reputation) and their factor loadings

Item number, j	Item	Factor loading, 100a <sub>j12</sub>
182	The cooperative serves a useful purpose	71
169	The cooperative benefits processors as well as producers	65
173	The cooperative is a dependable organization	61
175	The cooperative lives up to its agreements with processors	60
181	The cooperative and milk processors in your market agree on most important issues	59
171	The cooperative is a successful organization	58
180	The cooperative is poorly organized and does not know where it is going	57
177	The cooperative improves returns to producers	51
178	The cooperative has no real concern about the welfare of processors	48
174	The cooperative can exist only because it is exempt from paying income taxes	40
172	The cooperative often makes unreasonable demands of processors	40
176	Members of the cooperative are not unified in their support of the organization	35
184	The cooperative provides needed surplus-disposal services	34
179	The cooperative provides needed procurement services for processors	34
170	A sizeable minority of producers (say 20 to 30 percent) should not belong to the cooperative	33
183	The cooperative has more influence than it should have upon federal-order provisions and decisions	29
245	Cooperative type of ownership	26
252	The bargaining cooperative maintained a full-supply contract with all the handlers	22

Table 19. Names of first-order factors and loadings of first-order factors on rotated second-order factors<sup>a/</sup>

Number and name of first-order factors	Rotated second-order factors				
	A	B	C	D	E
1 Market Area Structure	-71	-02	10	24	13
2 Consequences of Growth of Supermarket Chains	-83	-03	-06	05	22
3 Size of Discounts	-73	00	-02	05	39
4 Competitors' Apparent Merchandising Practices	-49	00	01	-25	56
5 Wholesale Customers' Bargaining Power	-40	-27	07	09	74
6 Bottler's Bargaining Power	-37	-17	29	25	30
7 Sales Procedure and Service	-26	-50	-09	37	27
8 Supermarket-Chain Reputation	-23	-60	35	-50	36
9 Wholesale-Milk Drivers' Reputation	-04	06	79	-13	01
10 Firm Dimension	-13	-11	-13	61	-03
11 Management's Wholesale Merchandising Practices	-47	-15	28	43	35
12 Cooperative Reputation	00	-33	-03	06	01

<sup>a/</sup> Expressed as a percent age, not as a decimal.

Table 20. Frequency distribution of number of items assigned to each factor

General factor	Group factor													Total
	1	2	3	4	5	6	7	8	9	10	11	12	None	
A	15	7	10	4	0	3	0	0	0	3	1	0	7	50
B	2	0	1	0	1	1	8	3	0	1	0	15	2	34
C	1	1	0	0	0	5	1	0	7	1	1	1	0	18
D	0	2	0	0	0	1	2	2	1	24	6	0	10	48
E	1	0	0	15	4	2	2	0	0	1	1	1	2	29
None	0	2	1	0	1	1	0	0	0	1	0	1	9	16
Total	19	12	12	19	6	13	13	5	8	31	9	18	30	195

vidual items on group factors (we have presented some of these loadings) and loadings of individual items on general factors (all loadings are presented in Appendix B).

Each group factor is assigned the same name as the corresponding first-order factor from which it is obtained by transformation. Each general factor is assigned the same name as a rotated second-order factor since each general factor is a transformation of a rotated second-order factor.

First-order factors 1, 2, 3, 6, and 11 load more heavily on rotated second-order factor A than on any other rotated second-order factor. Of the 50 single items assigned to general factor A, 36 have been assigned to group factors 1, 2, 3, 6, and 11. Of the 24 items whose loadings on general factor A exceed 50 in absolute value, only three are not concerned with issues that processors believe determine the market area they serve, with problems that have arisen directly or indirectly for the processor from the growth of supermarket chains, or with issues that processors believe affect the size of discounts to large wholesale customers. The items in general factor A are some measures of the conduct of the participants in the market and the means by which the marketing function is performed. Items that describe strategies of participants in the market also are included in general factor A. Therefore, the label *Processors' Ventures in the Market* is consistent with the items in general factor A.

First-order factors 7, 8, and 12 load more heavily on rotated second-order factor B than on any other rotated second-order factor. Of 34 individual items classified in general factor B, 26 have been assigned to group factors 7, 8, and 12.

The central theme of the items that load heavily on general factor B concerns the processors' attitudes toward fluid-milk bargaining cooperatives and supermarket chains, and the importance of changes made in sales procedure and service to food stores. Many items loading heavily on this general factor are associated with the policies of fluid-milk bargaining cooperatives, of supermarket chains, and of fluid-milk processors. Thus, a general description of the items in general factor B is provided by the name *Distribution and Merchandising Policy*.

First-order factor 9 loads more heavily on rotated second-order factor C than on any other rotated second-order factor. Of the 18 separate questions assigned to general factor C, seven had been assigned to group factor 9, and five had been assigned to group factor 6.

Many items in general factor C are associated with the problems of distributing fluid-milk products. These problems involve the wholesale-milk drivers and the determination of which supermarket chains to supply with milk. The content of these items suggest the general factor name *Problems and Policies of Distribution*.

First-order factor 10 loads more heavily on rotated second-order factor D than on any other rotated second-order factor. Of the 48 items assigned to general factor D, 24 had been assigned to group factor 10, and 6 to group factor 11.

Most items in general factor D are measures of size. Some items measure the size of firm by the volume of milk it handles, type of firm, type of ownership, outlets it supplies with milk, and brand categories of milk it packages. Also, several items offer a measure of size of firm by the percentage of milk purchased from a fluid-milk bargaining cooperative and the nature of adjustments made and planned. Other items measure the size of market area served by the length of haul, size of the supermarket chain and its administrative district, and transportation factors such as road conditions. Thus, general factor D is a measure of *Size*.

First-order factors 4 and 5 load more heavily on rotated second-order factor E than on any other rotated second-order factor. Of the 29 items classified in general factor E, 19 come from group factors 4 and 5.

Most items in general factor E are concerned with inducements that processors believe their competitors use in competing for the accounts of food stores. The demands that a processor must meet to prevent some customers from transferring business to a competitor may be price related, service related, or related to any inducement the customer is offered by another processor. Therefore, the content of the items in general factor E suggest the name *Illegal Trade Practices*.

## Communalities

Communalities of all variables are presented in Appendix B. Each variable's communality equals the proportion of the total variance of that variable statistically accounted for by the common factors: 12 group factors and 5 general factors. A communality of 10 means that 10 percent of the variance in a variable is explained by the common factors.

There are 14 items in Solution IV that have a communality of 10 or less. They are items 84, 90, 97, 101, 124, 125, 135, 137, 139, 146, 152, 156, 250, and 254.

Fifteen items have a communality of 92 or larger. They are items 45, 169, 180, 57, 70, 95, 49, 113, 39, 47, 98, 65, 73, 175, and 182. The communalities of 100 and above for the last four items are suspect. They correspond to a value of  $R^2$  in multiple regression of 1.00 or more and probably represent the effect of cumulated rounding errors.

## Residual Correlations

Estimated correlations  $r_{jk}^*$  as defined in Equation 7 were computed, and the residual correlations  $res\ r_{jk}$  defined in Equation 8 also were computed. This factor analysis involved 18,915 values of  $r_{jk}$ . As table 21 shows, 18,357, or 97 percent, of the 18,915 values of  $res\ r_{jk}$  were less than or equal to 20.

The questionnaire contained 16 statements concerning attitudes toward fluid-milk bargaining cooperatives. There were 28 correlation coefficients (exclusive of  $r_{jj}$ 's) among these variables. The factors included in this study are not adequate to

Table 21. Frequency distribution of residual correlations calculated by Equation 8<sup>a/</sup>

Absolute value of residual interval <sup>a/</sup>	Frequency
76-80 .....	1
71-75 .....	0
66-70 .....	1
61-65 .....	0
56-60 .....	1
51-55 .....	6
46-50 .....	3
41-45 .....	14
36-40 .....	31
31-35 .....	64
26-30 .....	103
21-25 .....	334
≤ 20 .....	18,357
Total .....	18,915

<sup>a/</sup> Expressed as a percentage, not as a decimal.

reproduce the correlations among these items. Of the 57 pairs of items having values of  $res\ r_{jk}$  greater than 35 in absolute value, 28 consisted of pairs of items concerning attitudes toward cooperatives. In addition, six of the other pairs of items having values of  $res\ r_{jk}$  exceeding 35 contained one item concerning attitudes toward cooperatives.

#### SOLUTION IV: INTERPRETATION AND HYPOTHESES

The main interest in this section is the development of hypotheses from the factor loadings. Some interpretation of results also will be presented. The factor-loading matrix contains 3,315 (=195 x 17) entries. Each of these entries can be treated as offering a simple hypothesis. Our interest here is in selecting some hypotheses that may prove useful in future research.

Two different procedures may be followed in deriving hypotheses: a) For each item, we derive a hypothesis concerning the factors closely related to that item. Thus, each row of Appendix B offers a hypothesis. b) For each factor, we derive hypotheses concerning items closely related to that factor. Thus, each column of Appendix B offers a hypothesis. We will generally follow the second procedure and will use factor loadings to identify common factors that explain sizable portions of the common variance of each variable. We expect that the concepts identified by the names assigned to the factors on which a variable loads heavily are important to obtaining an economic understanding of the variable.

A highly significant regression coefficient in a multiple regression equation does not demonstrate the existence of a cause-effect relation between the

dependent and independent variables. Likewise, in factor analysis, a large factor-loading coefficient does not demonstrate the existence of a cause-effect relation between variable and factor. And, if there is a cause-effect relation between them, factor analysis does not show the direction of causation.

To identify the variables closely related to each group factor, one can use tables 7 to 18 or Appendix B; using the Appendix provides a more complete accounting. It is necessary to use the Appendix to identify those variables closely related to each general factor. Alternatively, one can use the Appendix to determine those factors on which each variable loads most heavily.

For an example, let us take group factor 1 (Market Area Structure). Table 7 shows the variables that load more heavily on this group factor than on any other group factor. The Appendix shows that items 24, 130, and 249 also load heavily on this factor. Hence, inclusion of this group factor is necessary for a complete understanding of the variables in table 7 and of these last three variables. This group factor by itself, however, is not sufficient for a complete understanding of these variables. For example, item 4 loads nearly as heavily on group factor 10 (Firm Dimension) as on group factor 1. Hence, we infer that Firm Dimension also is important in an understanding of item 4. Further, the group factors may not be sufficient for a thorough understanding of a variable. For example, item 2 loads heavily on general factors A and D. Hence, we hypothesize that Processor's Venture in the Market and Size are closely related to item 2.

In deriving tables 7 through 18 and the hypotheses, we used 15 as the dividing line between important and unimportant. In deriving his own hypotheses, the reader may choose to use a higher value as his dividing line.

Factors are generally interpreted as basic or fundamental forces that: a) are independent or nearly independent of each other and b) affect behavior. Therefore, we hypothesize that each factor represents a concept statistically independent of the other factors, whose content influences or is influenced by behavior and attitudes of bottlers.

Each group factor generally has a rather simple economic interpretation; the general factors, however, have relatively complex interpretations. Hence, the meanings of verbally stated hypotheses concerning group factors can be simply understood, but the meanings of verbally stated hypotheses concerning general factors are not easily understood. For this reason, we will concentrate on hypotheses concerning group factors.

For ease of cross-reference, hypotheses will be numbered. Each reader will probably find that some of these statements provide tests of some of his own prior hypotheses. For simplicity and uniformity of treatment, however, each numbered statement will be referred to as a hypothesis. The statement immediately after each number is the hypothesis. The parenthetical statement after the hypothesis derives, explains, or justifies the hypothesis.

## Group Factors

### *Group Factor 1: Market Area Structure*

1. Changes in the competitive situation, and decisions on which markets to serve, are closely related to Market Area Structure. (Of the 19 items assigned to this factor, 15 come from the two questionnaire pages entitled, "Developments That Have Changed the Competitive Situation" and "Considerations That Have Determined Areas and Markets You Serve.")

2. No other recent development has been nearly so important in changing the competitive situation facing bottlers as the growth of supermarket chains. (Item 1—growth of supermarket chains—had by far the highest mean score of any item on pages 2 and 3; see hypothesis 24.)

3. The structures of the markets served by a firm are not completely exogenous to the firm. Market structure is determined by the conduct of firms, as well as being a determinant of their conduct. (A firm has some control over its choice of which markets to enter. The structures of alternative potential markets affect its decisions on which markets to enter. A firm's entry into an imperfectly competitive market changes the structure of that market.)

4. The structure of one market is affected by the structures of other markets. (A firm's choice of markets to enter is affected by structures of alternative potential markets. A firm's entry into an imperfectly competitive market changes the structure of that market.)

5. Laws and regulations affect market structure through their effect on firm entry. (The presence of items 16, 13, 19, 3, 6, and 2 in this factor suggests that laws and regulations affect a firm's decisions on which markets to enter. A firm's entry into an imperfectly competitive market changes the structure of that market.)

### *Group Factor 2: Consequences of Growth of Supermarket Chains*

6. Growth of supermarket chains exerts an influence, on bottler behavior and attitude, that is independent of market-area structure. (The scores of items 21 through 29 measure the importance of various problems that have arisen from the growth of supermarket chains. Six of these items are assigned to this factor. Item 7—processing of milk by food distributors—also loads heavily on this factor.)

### *Group Factor 3: Size of Discounts*

7. Any discount-depressing effects that a trade-practice law does have, tends to decline as the law ages—perhaps as bottlers and chains become more ingenious at avoiding the law as they accumulate experience under it. (Item 126—number of years trade-practice law had been in effect—loads positively on this factor, as do items 30 through 37. These latter eight items in the questionnaire were titled, "Factors Affecting Discounts to Large Wholesale Customers.") (See also hypothesis 17.)

8. Large discounts are more commonly believed to exist in markets where bargaining cooperatives package fluid milk than in other markets. (Item

250—bargaining cooperative from which plant buys milk had milk packaging facilities in use—was assigned to group factor 3.)

### *Group Factor 4: Competitors' Apparent Merchandising Practices*

9. This factor is closely related to inducements used by competitors in competing for accounts of supermarkets. (All items that load heavily on this factor appear in the questionnaire under the heading, "Inducements Used by Your Competitors in Competing for Accounts." And, all items but one listed under this heading are assigned to this factor.)

10. The perceived frequency of use of the various inducements is nearly identical for large national and regional supermarket chains, on the one hand, and large independents, on the other. (The distinction between the two groups makes little difference in the factor loadings and in the mean scores.)

### *Group Factor 5: Wholesale Customers' Bargaining Power*

11. This factor is closely related to frequency of use of various bargaining arguments by large wholesale customers. (With the exception of items 59 and 62, all items included in the questionnaire under the heading, "Bargaining Arguments Used by Large Wholesale Customers" loaded heavily on this factor; see also hypothesis 49.)

12. The threat of setting up their own processing plant is rarely used by large wholesale customers and its frequency of use is not closely related to Wholesale Customers' Bargaining Power. (Item 59 has one of the lower mean scores of any item under "Bargaining Arguments Used by Large Wholesale Customers": Its loading on group factor 5 is nearly zero; see also hypothesis 29.)

13. A decrease in the size of the bottler's distribution area accompanies an increase in Wholesale Customers' Bargaining Power, but an increase in the size of the bottler's distribution area does not accompany a decrease in Wholesale Customers' Bargaining Power. (Item 111—percentage decrease in size of distribution area—loads negatively on group factor 5. But item 109—percentage increase in the size of the bottler's distribution area—does not load on this factor.)

### *Group Factor 6: Bottler's Bargaining Power*

14. This factor is closely related to arguments used by bottlers in their dealing with wholesale customers, to consumer preference for a bottler's products, to existence of a trade-practice law, and to a belief that chains have little to gain by setting up their own bottling plants. (The majority of the items assigned to, or loading heavily on, this factor pertain to these topics; see also hypothesis 31.)

15. Producing a high-quality product (including concomitant services) for which consumers have a strong preference is the single most important contributor to a strong bargaining position for the bottler. (Items 65, 70, 67, and 164 have large positive loadings on this factor; see also hypothesis 31.)

16. The arguments most frequently used by bottlers are the arguments believed to contribute most

to Bottler's Bargaining Power. (The mean scores of items 65, 70, and 67 are higher than the mean scores assigned to other bargaining arguments used by bottlers; see also hypothesis 31.)

17. The existence of a trade-practice law does strengthen the bargaining position of a bottler, but the effect erodes over time. (Item 69—reminder that law prohibits your firm from granting concessions the distributor wants—and item 248—whether plant was regulated under a trade-practice law—load positively on this factor. But item 126 loads positively on group factor 3; see hypothesis 7.)

18. The existence of a federal order has a slight effect on Bottler's Bargaining Power. (The loadings of items 129 and 128 on this factor are -22 and -13, and item 127 does not load on this factor.)

19. Bottler's Bargaining Power and cooperative membership are negatively related. (Item 130—membership of cooperative from which bottler obtains milk—loads negatively on this factor.)

20. Bottlers view price concessions as expressing lack of Bottler's Bargaining Power and presence of Wholesale Customers' Bargaining Power. (Item 163—price concessions made by this firm—loads negatively on this factor and positively on group factor 5.)

21. Some forces affect both Bottler's Bargaining Power and Wholesale Customers' Bargaining Power, but in opposite directions, although most forces affect only one of these two factors. (Item 63—argument that bottler's product is not up to quality it should be—and item 64—argument that bottler's brand is not advertised widely enough—load positively on group factor 5 and negatively on group factor 6 with nearly equal magnitudes. Item 163 loads negatively on group factor 6 and positively on group factor 5. Most items that load heavily on either of these two factors load heavily on only one of them.)

22. Bargaining power is not only related to the argument reached with a given customer; it also has something to do with determining who the customer will be. (Items 163 and 164—strong consumer preference for this firm's milk—were included in the questionnaire under the heading, "Factors Determining Which Supermarket Chains Your Firm Supplies With Milk." These items were assigned to group factor 6.)

#### *Group Factor 7: Sales Procedure and Service*

23. This factor is closely related to changes made in sales procedure and in services to food stores. (There is a close conformity between the list of items loading heavily on this factor and the list of items included in the questionnaire under the heading, "Changes Made in Sales Procedures and in Services to Food Stores." These were items 71 to 82.)

24. One effect of growth of supermarket chains has been to call forth greater sales and service efforts from bottlers. (Means of raw scores assigned items 71 to 82 ranged from 53 to 67, indicating that most of these procedures have become more important and that none have become less important; see hypothesis 2.)

#### *Group Factor 8: Supermarket Chain Reputation*

25. This factor is not closely related to any of the aspects of bottler's behavior and attitudes covered in the questionnaire. (Few variables were assigned to this factor. The largest loading of any variable on this factor was only 0.21.)

#### *Group Factor 9: Wholesale-Milk Drivers' Reputation*

26. This factor is closely related to attitudes toward wholesale-milk drivers' unions. (The questionnaire contained 10 statements, 97 to 106, intended to elicit bottlers' attitudes toward these unions. Six of these 10 items are assigned to this factor.)

#### *Group Factor 10: Firm Dimension*

27. "Size" is not a simple one-dimensional variable; "size" varies in many dimensions. (The items assigned to this factor cover diverse topics.)

28. Larger bottlers tend to procure a larger proportion of their milk from cooperatives than do smaller bottlers, and larger bottlers tend to deal with larger cooperatives. (Item 114—percentage of milk purchased from a cooperative—and item 251—cooperative had facilities for manufacturing surplus milk—load positively on this factor. It is usually the larger cooperatives that have surplus-milk-processing facilities; see hypotheses 33 and 47.)

29. Bottlers serving supermarket chains do not view a customer's threat to set up his own bottling plant if his demands are not met as something used by customers to obtain better terms, but do view the threat as affecting the size of the bottler's firm. (This threat—item 59—is assigned to this factor rather than to Wholesale Customers' Bargaining Power; see also hypothesis 12.)

#### *Group Factor 11: Management's Wholesale Merchandising Practices*

30. This factor is closely related to elements determining which chains a bottler supplies with milk. (Items 161 and 168 dealt with these elements; six of these eight items were assigned to this factor.)

31. Strong consumer preference for a bottler's product and the provision of desired services to dealers contribute importantly to a bottler's bargaining power and also to determining which chains he will serve. (Item 164 loads heavily on group factor 6 and item 168 loads heavily on group factor 11; see also hypotheses 14, 15, and 16.)

#### *Group Factor 12: Cooperative Reputation*

32. This factor is closely related to attitudes toward fluid-milk bargaining cooperatives. (Of the 18 items assigned to this factor, 16 are statements about cooperatives.)

33. Cooperative Reputation is positively related to the existence of full-supply contracts with all bottlers. (Item 252 loads positively on this factor; see also hypotheses 28 and 47.)

### **General Factors**

34. The data show a strong tendency for each group factor to be closely related to items dealing with only one topic and to be only tenuously related to questionnaire items dealing with any other topic. (Some examples are: a) Items 169 to 184 appeared in the questionnaire under the heading, "Reactions

About Fluid-Milk Bargaining Cooperatives." All 16 of these items are assigned to group factor 12. Only eight items outside of items 169 to 184 had values of  $100a_{12}$  exceeding 14; the largest of these eight values of  $100a_{12}$  was only 26. b) Cooperative Reputation is important in explaining attitudes toward cooperatives, but has little relation to other attitudes studied here and little relation to aspects of bottler behavior studied here. c) Of the 174 items contained in the questionnaire on pages other than those listed in hypothesis 1, only seven had absolute values of  $100a_{11}$  exceeding 14, and the largest of these seven values of  $100a_{11}$  was only 22. Market Area Structure is important in explaining the topics on these two pages, but has little relation to the other aspects of bottler behavior and attitudes studied here. Firm Dimension is the only group factor for which this tendency does not apply.)

On the other hand, each general factor is closely related to several of the questionnaire topics. (Rather than list a number of hypotheses under each general factor, we will list topics of the items assigned to each general factor.)

*General Factor A: Processor's Venture in the Market*

35. Items dealing with the following topics loaded heavily on this factor: a) Developments that have changed the competitive situation, b) Considerations determining areas and markets served, c) Problems that have arisen due to the growth of supermarket chains, d) Considerations affecting discounts to large wholesale customers, e) Inducements used by your competitors in competing for accounts of food stores, f) Bargaining arguments used by large wholesale customers, g) Bargaining arguments bottler uses with large wholesale customers, h) Changes in sales procedures and services, i) Elements determining which chain the bottler supplies with milk.

*General Factor B: Distribution and Merchandising Policy*

36. Items dealing with the following topics loaded heavily on this factor: a) Problems that have arisen due to the growth of supermarket chains, b) Bargaining arguments used by large wholesale customers, c) Bargaining arguments bottler uses with large wholesale customers, d) Changes in sales procedures and services, e) Attitudes toward supermarket chains, f) Considerations determining which chain your firm supplies with milk, g) Attitudes toward fluid-milk bargaining cooperatives.

*General Factor C: Problems and Policies of Distribution*

37. Items dealing with the following topics loaded heavily on this factor: a) Bargaining arguments bottler uses with large wholesale customers, b) Changes made in sales procedures and services, c) Attitudes toward supermarket chains, d) Attitudes toward wholesale milk drivers' unions, e) Considerations determining which supermarket chains your firm supplies with milk.

*General Factor D: Size*

38. Items dealing with the following topics loaded

heavily on this factor: a) Considerations determining areas and markets bottler serves, b) Inducements used by competitors in competing for accounts of food stores, c) Bargaining arguments you use with large wholesale customers, d) Changes made in sales procedures and services, e) Attitudes toward supermarket chains, f) Size of distribution area and volume of milk handled, g) Percentage of sales by type of outlet and brand category, h) Adjustments made during past five years, i) Adjustments planned during next five years, j) Considerations determining which supermarket chains your firm supplies with milk, k) Type of firm and ownership.

*General Factor E: Illegal Trade Practices*

39. Items dealing with the following topics loaded heavily on this factor: a) Problems that have arisen due to the growth of supermarket chains, b) Elements affecting discounts to large wholesale customers, c) Inducements used by competitors in competing for accounts of food stores, d) Bargaining arguments used by large wholesale customers, e) Bargaining arguments bottler uses with large wholesale customers, f) Changes made in sales procedures and in services, g) Considerations determining which supermarket chains bottler supplies with milk.

## Adjustments

40. The factors included in this study explain relatively little of the variation in bottlers' decisions to make or not to make certain adjustments in their operations.

(Responses to items 131 to 143 identified the adjustments the bottler had made during the five years preceding the survey. Responses to items 144 to 156 identified the adjustments the bottler planned to make during the next five years. The communalities for items 131 to 143 ranged from 0.06 to 0.39; their median was 0.14. The communalities for items 144 to 156 ranged from 0.08 to 0.38; their median was 0.17. Table 22 shows which adjustments loaded on which factors.)

## COMPARISON OF SOLUTIONS I, II, AND IV: STATISTICS, INTERPRETATION, AND HYPOTHESES

Solution I included all bottlers who provided usable data. Solution II included only bottlers who did supply milk to a supermarket chain store. Solution IV included only those bottlers who supplied milk to a supermarket chain store and who responded to statements concerning attitudes toward fluid-milk bargaining cooperatives. Most bottlers included in Solution IV obtained all or part of their milk from a cooperative or its members.

Comparison of Solution I with Solutions II and IV may provide some insight into differences between bottlers who do not supply milk to chain stores and those who do. And, comparison of Solution II with IV may provide some insight into differences between bottlers who do not obtain milk from a cooperative and those who do.

Table 22. Items representing adjustments made or planned having absolute values of  $100a_{jp}$  exceeding 14, classified according to factors loaded upon and sign of  $a_{jp}$  ( $j$  identifies the  $j$ -th adjustment made or  $j$ -th adjustment planned)

Factors, p	Adjustments made, having absolute values of $100a_{jp}$ exceeding 14		Adjustments planned, having absolute values of $100a_{jp}$ exceeding 14	
	Positive $a_{jp}$	Negative $a_{jp}$	Positive $a_{jp}$	Negative $a_{jp}$
A		134, 138	150	147, 149, 151, 153
B		132, 133, 137		
C		134, 140, 141		147, 153
D	134, 136, 140, 141, 143		146, 147, 149, 151, 153, 154, 155	144
E	132, 134, 138		145, 148, 149, 151, 152, 154	
1				148
2	142		149	150, 154
3		142	150	
4		132		
5	132		149	
6				
7				144
8				
9		140		
10	138, 141	133	147, 153, 154	
11			153	
12				

41. Similarities between the three solutions were much more common than were differences between them. [ a) Group factors 1 through 9 were assigned the same name in all three solutions. b) Generally, the same items loaded on group factor 1 in all three analyses. c) The six items with the largest loadings on group factor 2 were the same in all three solutions. d) Items 30 through 37 were assigned to group factor 3 in all solutions. e) Items 38 to 57 were assigned to group factor 4 in every analysis. f) The 13 items assigned to group factor 7 in Solution IV were assigned to this factor in all three solutions. g) The five items assigned to group factor 8 in Solution IV also were assigned to this factor in Solutions I and II. h) The items classified in group factor 9 in Solution IV also were assigned to this factor in the other solutions. ]

#### Group Factor 1: Market Area Structure

42. The relation of Market Area Structure to bottlers' behavior and attitudes does not vary between bottlers who do serve chains and bottlers who do not serve chains. (Market Area Structure was an appropriate name for this factor in all three analyses. Generally, the same items loaded on this factor in all three analyses, and their loadings were about equal in all three analyses.)

43. Given conditions are not viewed the same

way by bottlers serving chain stores as by bottlers not serving chain stores. (Items 7, 11, 12, and 109 are assigned to group factor 1 in Solution I, but are assigned to other factors in Solutions II and IV; see hypothesis 48.)

#### Group Factor 2. Consequences of Growth of Supermarket Chains

44. In some instances, it is the decisions of chains that determine if a bottler will be regulated under a given federal order and will enter a given market. (Item 249—plant was regulated by a federal order—loads positively and heavily on group factor 2 in Solutions II and IV, but not in Solution I. Also, items 3 and 13 pertain to regulation under a federal order, and their loadings on group factor 1 are substantially smaller in Solution I than in other solutions, showing that the importance of changes in federal-order status is more closely related to Market Area Structure among bottlers serving chains than among bottlers in general.)

45. The perceived seriousness of the reduced effectiveness of the bottler's own brands and of sales below cost by some supermarkets is more closely related to this factor among bottlers not serving chain stores than among bottlers serving chain stores. (These two items—22 and 29—are assigned to this group factor in Solution I, but not in Solutions II and IV.)



46. Bottlers not serving chain stores who feel a need to deliver milk over large areas do so because of the growth of chains. Bottlers who serve chains and who do feel a need to deliver milk over large areas do so for reasons other than the growth of chains: possibly because of economies of scale and of advantages of operating plants at capacity. (Item 28—need to deliver milk over large areas—is assigned to Firm Dimension in Solutions II and IV.)

47. Full-supply contracts are more common among bottlers serving chains than among other bottlers. (Item 253—cooperative maintained a full-supply contract with some handlers—loaded heavily positively on this factor in Solutions II and IV, but not in Solution I; see also hypotheses 28 and 33.)

48. Bottlers with chain-store customers view processing of milk by chains as a Consequence of Growth of Supermarket Chains, but other bottlers view it as a determinant of Market Area Structure. (Item 7—processing of milk by chains—is assigned to this group factor in Solutions II and IV, but is assigned to group factor 1 in Solution I; see hypothesis 43.)

*Group Factor 5: Wholesale-Customer's Bargaining Power*

49. Services needed by chains are viewed by bottlers serving chains as a demand to be met and not as an aspect of bargaining power, whereas bottlers not serving chains view these needs as obstacles to obtaining chain-store customers. (Item 62—chain's contention that it needs services bottler cannot offer—was assigned to this factor in Solution I, but was assigned to Management's Wholesale Merchandising Practices in Solutions II and IV; see also hypothesis 11.)

*Group Factor 6: Bottler's Bargaining Power*

50. If a bottler does not serve a chain store, his bargaining power is subject to fewer influences or manifests itself in fewer ways than if he does serve a chain store. (Fewer items were assigned to this factor in Solution I than in either of the other two solutions.)

51. The possibility of the bottler's firm operating dairy outlets is not used frequently by bottlers in their negotiations with large wholesale customers. The use of this bargaining tactic is not closely related to Bottler's Bargaining Power. (Item 68—possibility of operating dairy outlets—has a low mean score and is not assigned to this factor in any of the analyses.)

*Group Factor 7: Sales Procedures and Services*

52. Bottlers serving chains have all made similar adjustments in Sales Procedures and Services regardless of their size. Among bottlers not serving supermarket chains, the larger have been more aggressive than have the smaller in changing their Sales Procedures and Services. (Items 108, 112, and 113—extent of area served by this plant measured by average length of haul, volume of Class-I milk sales, volume of milk intake—were all assigned to this factor in Solution I, but were as-

signed to Firm Dimension in Solutions II and IV.)

53. Multi-unit bottling firms without chain-store customers have been more aggressive in modernizing their Sales Procedures and Services than have single-unit firms without chain-store customers. Of the bottlers serving chain stores, however, all have been equally aggressive regardless of the number of plants in the firm. (Items 242 and 243—national dairy company and other multi-unit firm, respectively—load relatively heavily, positively, on this factor in Solution I, but not in Solutions II and IV. Item 244—single-unit firm—loads heavily, negatively, on this factor in Solution I, but not in Solutions II and IV.)

54. Among all bottlers, a bottler's aggressiveness in adjusting Sales Procedures and Services is: a) positively correlated with relative importance of sales to supermarket chains, b) positively correlated with relative importance of private-label brands, and c) negatively correlated with proportion of total packaged-milk sales sold under processor's regular brand names. Among bottlers who do sell to supermarket chains, aggressiveness in adjusting Sales Procedures and Services is not correlated with these three variables. (Items 116 and 123—percentage of packaged milk sold through chains and percentage of packaged milk sold under private-label brands—are assigned to this factor in Solution I, but not in Solutions II and IV. Item 121—percentage of total packaged-milk sales sold under processor's regular brands—loads negatively on group factor 7 in Solution I, but not in Solutions II and IV.)

*Group Factor 10: Firm Dimension*

55. Many aspects of firm behavior and attitudes cannot be adequately understood without a consideration of Firm Dimension. This is the most important single, group factor in contributing to an understanding of bottlers' behavior. (Solution I did not contain a Firm Dimension factor; Solutions II and IV did. For nearly every item assigned to this factor in Solutions II and IV: a) the absolute value of  $a_{j10}$  in these two solutions substantially exceeds the largest factor loading for the same item in Solution I and b) the communality is substantially larger in Solutions II and IV than in Solution I. A larger number of items were assigned to this group factor than to any other in Solution II and IV.)

56. Combining bottlers not serving chain stores and bottlers serving chain stores into one analysis masks some important manifestations of Firm Dimension. Separate analyses are required for each group to properly account for these manifestations. (See evidence cited in hypothesis 55.)

## SUGGESTIONS FOR FUTURE RESEARCH

Three possible ways of testing the hypotheses derived in this study are: a) Administer the questionnaire used in this study to other bottlers and either a.1) compute factor loadings from these new data and compare these new factor loadings with the ones obtained in this study or a.2) use

factor loadings from this study to obtain factor regression coefficients  $c_{pj}$  from Equation 9, apply the factor regression coefficients to the new data to determine the factor values for the new data, then use the new data to regress observed variables on estimated factors, and use these regression results to test hypotheses. b) Use hypotheses derived in this study to construct a theoretical model and subject the predictions from this model

to statistical analysis. The lack of hypotheses tests in factor analysis makes it likely that a.1 will be less productive than a.2 or b. Of the questionnaires collected in this study, 10 percent were set aside and were not used in the factor analysis. Procedure a.2 is being used on this 10-percent sample.

A number of suggestions for improving the questionnaire are presented by Oehrtman (8).

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## APPENDIX A: ABRIDGED QUESTIONNAIRE

Page 2

### Developments That Have Changed the Competitive Situation

How important has each of the developments listed below been in changing the competitive situation in your market? Place a numerical score on each line to show how important the item on that line has been in changing the competitive situation in your market *during the last five years*.

1. Growth of chains\*
2. Changes in sanitary regulations
3. Inclusion in a new or expanded federal order, termination of a federal order
4. Growth of large dairy companies
5. Widening of distribution areas
6. Passage of state trade-practice law
7. Processing of milk by food distributors
8. Changes in milk containers
9. Shortage in local supplies of milk
10. Milk price-war
11. Increased sales of milk through distributors, sub-dealers

\*Questionnaire used "supermarket chains" where "chains" (unmodified) is used in this report.

Page 3

### Factors That Have Determined Areas and Markets You Serve

How important has each of the factors listed below been in determining the areas and markets in which your firm *now sells* milk? Place a numerical score on each line to show how important the item on that line has been in determining the area and markets in which your firm sells milk.

12. Transportation factors
13. Whether serving an area would subject you to regulation under a (additional) federal order
14. Presence of large chain dairies
15. History of competition in the market
16. Sanitary regulations
17. Presence or absence of chains with which you might do business
18. Prices or margins in markets
19. Whether you would be regulated under a (different) state trade-practice law
20. Product specifications

Page 4

### Problems That Have Arisen for Your Firm Due to the Growth of Supermarket Chains

The growth of supermarket chains has directly and indirectly created many problems for milk processors in both wholesale and retail distribution. Indicate on each line below by a numerical score (from 1 through 99) how serious the problem listed on that line has been *for your firm*.

21. Greater risk because business is in large lumps
22. Reduced effectiveness of own brand(s)
23. Growing dependence on and control by chain(s)
24. Higher costs due to greater variety of brands, container types, etc.
25. Smaller profits
26. Pressure to provide services for which you are not remunerated
27. Need to give discounts out of proportion to savings
28. Need to deliver milk over large areas
29. Sales below cost by supermarkets

Page 5

### Factors Affecting Discounts to Large Wholesale Customers

How much effect does each of the factors listed below have on the size of the discounts allowed chain stores and other large wholesale customers for milk *by milk distributors in your major market*? Place a numerical score (from 1 through 99) on each line to show the relative size of the discount allowed because of that factor.

30. Volume taken by individual stores
31. Variety of products purchased
32. Brand of milk
33. Central billing
34. Services received
35. Over-all size of chain
36. Top-level arrangements
37. Whether all milk is bought from one supplier

Page 6

### Inducements Used by Your Competitors in Competing for the Accounts of Large National and Regional Supermarket Chains

How frequently do *your competitors* in your major market use each of the following inducements in competing for the milk accounts of *large national and regional supermarket chains*? Place a numerical score (from 1 through 99) on each line to show the frequency of use of the inducement described on that line.

38. Financing of buyers
39. Free milk to new stores
40. Discounts out of proportion to savings
41. Furnishing display equipment below cost
42. Gifts to store personnel
43. Store signs, clocks, etc.
44. Unsupervised advertising allowances
45. Servicing display equipment below cost
46. Free labor to new stores
47. Free by-products to new stores

Page 7

### Inducements Used by Your Competitors in Competing for the Accounts of Large and Medium-Sized Food Stores of Small Chains and Large Independents

How frequently do your competitors in your major market use each of the following inducements in competing for the milk accounts of *large and medium-sized food stores operated by small chains and independents*? Place a numerical score (from 1 through 99) on each line to show the frequency of use of the inducement described on that line.

48. Financing of buyers
49. Free milk to new stores
50. Discounts out of proportion to savings
51. Furnishing display equipment below cost
52. Gifts to store personnel
53. Store signs, clocks, etc.
54. Unsupervised advertising allowances
55. Servicing display equipment below cost
56. Free labor to new stores
57. Free by-products to new stores

Page 8

### Bargaining Arguments Used by Large Wholesale Customers

In your experience with supermarket chains and other large wholesale customers, what bargaining arguments have they used in negotiations with your firm? Place a numerical

score (from 1 through 99) on each line to indicate the degree of frequency with which they have used the argument listed on that line in their negotiations with you.

58. Competitor offered lower price
59. Threat to set up own processing plant
60. Promise of larger volume
61. Threat to transfer business
62. Chain needs services you cannot offer
63. Your product is not up to the quality it should be
64. Your brand is not advertised widely

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#### Bargaining Arguments You Use With Large Wholesale Customers

In its dealings with supermarket chains and other large wholesale customers, what bargaining arguments has *your firm* used to support its position? Place a numerical score (from 1 through 99) on each line to indicate the degree of frequency with which your firm has used the argument listed on that line in negotiations with such customers.

65. Your product is of high quality
66. Costs do not permit granting further concessions
67. You provide good service
68. Possibility of your firm operating dairy outlets
69. Law prohibits your firm from providing concessions distributor wants
70. Consumers have strong preference for your brand

Page 10

#### Changes Made in Sales Procedures and in Service to Food Stores

How have your firm's selling procedures and service to food stores changed during the past five years? Place a numerical score (in the range from 1 through 99) on each line to show the *direction and extent* of the change in the importance of the selling procedure or service listed on that line. In this case, a score of 50 indicates no change; scores from 51 through 99 indicate that the item has increased in importance, with "99" indicating a very substantial increase; scores from 1 through 49 indicate that the item has become less important, with "1" indicating a very substantial decline in importance.

*Changes in selling procedures:*

71. Part played by top management in negotiating sales
72. Time spent by top management in maintaining good relations with buyers
73. Knowing with whom to deal in retail organizations
74. Adjusting services to meet needs of chains
75. Emphasis, in negotiations, upon volume that can be supplied
76. Emphasis, in negotiations, upon price
77. Emphasis, in negotiations, upon product and service specifications

*Changes in services and the like:*

78. Delivery at a specific time
79. Delivery of preordered lots
80. Special sales-management personnel to service stores
81. Providing private-label brands
82. Granting price concessions instead of providing services

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#### Reactions About Supermarket Chains

Please read each of the following statements carefully. Place a numerical score (from 1 through 99) on each line to indicate the extent of your agreement or disagreement with the statement on that line.

83. Chains' demands for changes in delivery services have been reasonable

84. Chains' margins on milk are too wide
85. Chains have increased value of processors' brands
86. Chain accounts are too urgently sought after
87. Chains need more competition in retailing milk
88. Chains are likely to control the business of processors who sell mainly to them
89. Chains encourage small processors to supply them with milk
90. Chains should process their own milk
91. Chains pressure milk processors to provide private-label milk
92. Chains are satisfied with limited service arrangements
93. Most chains have no interest in welfare of processors
94. Chains have little to gain by setting up processing plants
95. Chains have done an effective job of merchandising milk
96. Chains demand excessive discounts on private-label brands

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#### Reactions About Wholesale-Milk Drivers' Unions

Please read each of the following statements carefully. Put a numerical score (from 1 through 99) on each line to indicate the extent of your agreement or disagreement with the statement on that line.

97. Unions serve a useful purpose\*\*
98. Drivers' earnings are too high
99. Drivers should be paid on a commission basis
100. Drivers ought to service food-store milk cases
101. Union contracts are a handicap to processors
102. Unions have no concern about welfare of milk processors
103. Drivers need to be salesmen
104. Unions readily adapt driver pay plans to changing situations
105. Full-service delivery of milk by drivers is needed by chains
106. Drivers should be replaced by distributors, vendors, etc.

\*\*Questionnaire used phrase, "wholesale-milk drivers' unions" where word "unions" is used in this report. Questionnaire used "wholesale-milk drivers" where "drivers" is used in this report.

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#### Description of the Bottler's Operations

*Extent of area served by this plant, 1967, and change in area over past five years*

107. Greatest length of haul in miles
108. Average length of haul in miles

*Approximate percentage change in size of distribution area during past five years*

109. Percentage increase in size
110. Little change in size (check if applicable)
111. Percentage decrease in size

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112. Monthly volume of your Class-I sales
113. Monthly volume of your milk intake
114. Percentage of milk purchased from a cooperative (or from members of a cooperative)

*Percentage of packaged milk sold by type of outlet*

115. Home delivery
116. Supermarket chains (including voluntary buying groups)
117. Special dairy stores or other controlled outlets

- 118. Distributors (vendors, subdealers)
- 119. Small stores, schools, restaurants, hospitals, etc.
- 120. Other

*Percentage of packaged milk sold by brand category*

- 121. Processor's regular brand(s)
- 122. Processor's competing brand(s)
- 123. Private-label brand(s)
- 124. Custom packaged (for other dairies)
- 125. Other

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- 126. If a trade-practice law was in effect, for how many years had it been in effect?
- 127. If plant was regulated under a federal order when the questionnaire was taken, for how long had it been under federal order regulation?
- 128. If plant was *not* under federal order when the questionnaire was taken, *but previously had been*, how many years had it been since it was regulated?
- 129. *Prior to most recent termination of regulation* for this plant, for how many years was it under regulation?

The following question pertains to the bargaining cooperative from which you buy the largest quantity of milk.

- 130. At the time the questionnaire was taken, what was its membership?

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**Adjustments Made During Past Five Years**

Indicate by check marks in the left-hand column which of the adjustments listed below your firm has made during the past five years. For each of the adjustments your firm has made, indicate by a numerical score (in the range from 1 through 99) the degree to which it has been beneficial or harmful. A score of 99 would indicate the adjustment was highly beneficial; a score of 50 that it was neither beneficial nor harmful; a score of 1 that it was very harmful.

- 131. Sale of the business
- 132. Home delivery on reduced service, large-volume basis
- 133. Fewer types and sizes of packages
- 134. Plant consolidation or merger
- 135. Establishing own dairy outlets
- 136. Adding sideline dairy items
- 137. Becoming a distributor or vendor
- 138. Intensified promotion
- 139. Gas station outlets, outdoor dispensers, etc.
- 140. Labor contracts made better suited to distribution to stores
- 141. Increased use of distributors or vendors
- 142. Diversifying into nondairy operations
- 143. Wider line of package sizes or types

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**Adjustments You Plan to Make During the Next Five Years**

Indicate by check marks in the left-hand column which of the adjustments listed below your firm *plans to make during the next five years*. For each adjustment your firm plans to make, indicate by a numerical score (in the range from 1 through 99) the extent of the benefit you expect to receive from it. A score of 1 would indicate no benefit; a score of 99 much benefit.

- 144. Sale of the business
- 145. Home delivery on reduced service, large-volume basis
- 146. Fewer types and sizes of packages
- 147. Plant consolidation or merger
- 148. Establishing own dairy outlets
- 149. Adding sideline dairy items

- 150. Becoming a distributor or vendor
- 151. Intensified promotion
- 152. Gas station outlets, outdoor dispensers, etc.
- 153. Labor contracts better suited to distribution stores
- 154. Increased use of distributors or vendors
- 155. Diversifying into nondairy operations
- 156. Wider line of package sizes or types

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- 157. The firm supplied a supermarket chain with milk in the past five years
- 158. The firm expressed reactions about fluid-milk bargaining cooperatives
- 159. The firm expressed the importance of the various operating goals
- 160. The firm supplied a supermarket chain with milk and expressed reactions about fluid-milk bargaining cooperatives and expressed importance of the various operating goals

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**Factors Determining Which Supermarket Chains Your Firm Supplies With Milk**

How important has each of the factors listed below been in determining which supermarkets your firm supplies with milk? Place a numerical score (from 1 through 99) on each line to indicate the importance of that item in determining which supermarket chains your firm supplies with milk.

If your firm has not supplied a supermarket chain with milk during the past five years, write "none supplied" at the bottom of the sheet and do not answer the questions.

- 161. Earlier business relationships
- 162. Over-all size of chain
- 163. Price concessions made by this firm
- 164. Consumer preference for this firm's milk
- 165. Size of chain's administrative district and its conformity with this firm's market area
- 166. Personal or business relationships between owners of this firm and of chains
- 167. Preference by chain for a brand of milk not stocked by competitors
- 168. Type of service you were able to provide

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**Reactions About Fluid-Milk Bargaining Cooperatives**

In the statements that follow, the term cooperative refers to the fluid-milk bargaining cooperative from which you buy the largest quantity of milk.

Please read each statement carefully and indicate the extent of your agreement or disagreement with it by a numerical score (from 1 through 99).

- 169. Cooperative benefits processors
- 170. Sizable minority of producers should not belong to cooperative
- 171. Cooperative is successful
- 172. Cooperative makes unreasonable demands of processors
- 173. Cooperative is dependable
- 174. Cooperative can exist only because it is exempt from paying income taxes
- 175. Cooperative lives up to its agreements
- 176. Members of cooperative are not unified
- 177. Cooperative improves returns to producers
- 178. Cooperative has no concern about welfare of processors
- 179. Cooperative provides needed procurement services for processors

- 180. Cooperative is poorly organized
- 181. Cooperative and milk processors agree on important issues
- 182. Cooperative serves useful purpose
- 183. Cooperative has too much influence upon federal order decisions
- 184. Cooperative provides needed surplus-disposal services

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#### Operating Goals

How important is each of the goals listed below in your firm's operations? Place a numerical score (from 1 through 99) on each line to indicate the relative importance of that item as a goal of your firm.

- 185. To make largest possible net profit
- 186. To maintain this firm's share of the market
- 187. To have an up-to-date bottling operation
- 188. To protect the value of capital invested in the business
- 189. To develop as much customer goodwill as possible
- 190. To be a leading firm in the market
- 191. To develop assured outlets for milk
- 192. To obtain the largest possible gross dollar receipts
- 193. To keep the dollar volume of business growing from year to year

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#### General Information About Your Operations

- 241. The firm supplied a supermarket chain with milk in the past five years and expressed reactions about fluid-milk bargaining cooperatives

*Type of firm* (check one)

- 242. National dairy company
- 243. Other multi-unit firm
- 244. Single-unit firm

*Type of ownership* (check one)

- 245. Cooperative
- 246. Corporation (excluding cooperative)
- 247. Partnership or proprietorship
- 248. Was this plant regulated under a trade-practice law at the time the questionnaire was completed?
- 249. Was this plant (fully) regulated by a federal order when the questionnaire was taken?

#### General Information About the Fluid-Milk Bargaining Cooperative From Which This Plant Buys Milk

- 250. Did it have milk packaging facilities in use?
- 251. Did it have facilities for manufacturing surplus milk?
- 252. Did it use a full-supply contract with all the handlers?
- 253. Did it use a full-supply contract with part of the handlers?
- 254. Did it use a full-supply contract with none of the handlers?

**APPENDIX B:  
SOLUTION IV FACTOR LOADINGS  
MATRIX, COMMUNALITIES, AND MEAN SCORES**

Matrix of factor loadings,<sup>a</sup> communalities,<sup>a</sup> and mean scores for Solution IV

Item	General factors					Group factors												Communi- nality h <sup>2</sup>	Mean score <sup>b</sup>	
	A	B	C	D	E	1	2	3	4	5	6	7	8	9	10	11	12			
1	-30	-24	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	22	393
2	-44	..	..	17	..	29	..	..	..	..	..	..	..	..	..	..	..	..	35	221
3	-38	..	18	..	..	35	..	..	..	..	..	..	..	..	..	..	..	..	37	185
4	-28	..	..	-21	..	21	..	..	..	..	..	..	..	..	-20	..	..	..	25	305
5	-34	..	..	20	19	16	..	..	..	..	..	..	..	..	..	..	..	..	28	320
6	..	..	27	..	..	29	-17	..	..	..	..	..	..	..	..	..	..	..	26	221
7	-48	-24	..	..	..	..	22	..	..	..	..	..	..	..	..	..	..	..	42	278
8	-33	..	..	..	..	16	..	..	..	..	..	..	..	..	..	..	..	..	21	281
9	-40	..	..	..	..	27	..	..	..	..	..	..	..	..	..	..	..	..	28	136
10	-31	-27	..	..	18	..	..	..	..	..	..	..	..	..	..	..	..	..	24	284
11	-27	..	..	..	16	..	..	..	..	..	..	..	..	..	..	..	..	..	18	242
12	-40	..	..	51	..	..	..	..	..	..	..	..	..	..	21	..	..	..	55	288
13	-46	..	..	..	19	41	..	..	..	..	..	..	..	..	..	..	..	..	50	178
14	-54	-15	24	..	..	27	..	..	..	..	..	-16	..	..	..	16	..	..	55	279
15	-54	..	..	..	..	43	..	..	..	..	..	-15	..	..	16	..	..	..	56	298
16	-58	..	..	..	..	53	..	..	..	..	..	..	..	..	..	..	..	..	66	163
17	-52	..	..	34	..	26	..	..	..	..	..	..	..	..	..	..	..	..	50	281
18	-60	-16	..	16	19	33	..	..	..	..	..	..	..	..	..	..	..	..	62	319
19	-41	..	..	..	..	39	..	..	..	..	..	..	..	..	..	-15	..	..	39	160
20	-59	16	..	16	..	50	..	..	..	..	..	..	..	..	..	..	..	..	70	164
21	-62	..	..	17	..	..	38	..	..	..	..	..	..	..	..	..	..	..	64	319
22	-57	-35	..	19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	58	301
23	-64	-15	..	18	..	..	43	-17	..	..	..	..	..	..	..	15	..	..	77	328
24	-66	-16	..	..	..	15	22	..	..	..	..	..	..	..	..	..	..	..	58	261
25	-52	-24	..	..	..	..	30	..	..	..	..	..	..	..	..	..	..	..	48	364
26	-58	-23	..	..	15	..	34	..	..	..	..	..	..	..	..	..	..	..	61	296
27	-54	-23	..	..	25	..	29	..	..	..	..	..	..	..	..	..	..	..	53	315
28	-57	..	..	..	25	..	..	..	..	..	..	..	..	..	21	..	..	..	56	244
29	-41	-23	..	..	30	..	..	..	..	..	..	..	..	..	..	..	..	..	37	261
30	-33	..	-17	..	31	..	..	31	..	17	..	..	..	..	..	-18	..	..	43	364
31	-63	..	..	..	23	..	..	31	..	..	..	..	..	..	..	..	..	..	62	220
32	-67	..	..	..	23	..	..	48	..	-15	..	..	..	..	..	..	..	..	85	209
33	-53	..	..	..	25	..	..	46	..	..	..	..	..	..	..	..	..	..	60	236
34	-54	..	-21	..	37	..	..	32	..	..	..	..	..	..	..	..	..	..	63	294
35	-52	..	..	22	25	..	..	24	..	..	-15	..	..	..	..	..	..	..	51	262
36	-61	..	..	..	43	..	..	37	..	..	..	17	..	..	..	..	..	..	77	284
37	-70	..	..	..	36	..	..	41	..	..	..	..	..	..	..	..	..	..	82	254
38	-44	..	..	..	51	..	..	..	34	..	..	..	..	..	..	..	..	..	64	225
39	-52	..	17	-37	44	..	..	..	54	-15	..	..	..	..	..	..	..	..	97	192
40	-54	-24	16	-15	45	..	..	16	..	..	..	..	..	..	..	..	..	..	69	309
41	-47	..	16	-32	52	..	..	..	48	..	..	..	..	..	..	..	..	..	89	245
42	-41	..	..	-27	42	..	..	..	48	..	..	..	..	..	..	..	..	..	71	192
43	-34	..	..	-39	45	..	..	..	46	..	..	..	..	..	..	..	..	..	72	230
44	-46	..	..	-22	56	..	..	..	43	..	..	..	..	..	..	..	..	..	83	228
45	-45	..	..	-33	57	..	..	..	50	..	..	..	..	..	..	..	..	..	92	228
46	-49	..	..	-26	54	..	..	..	50	..	..	..	..	..	..	..	..	..	88	256
47	-47	..	..	-30	54	..	..	..	57	..	..	..	..	..	..	..	..	..	98	218

(Continued)

Item	General factors					Group factors												Communi- nality h <sup>2</sup>	Mean score
	A	B	C	D	E	1	2	3	4	5	6	7	8	9	10	11	12		
48	-41	..	-28	..	54	..	..	..	34	..	..	..	..	-17	16	..	..	75	262
49	-50	..	..	-26	51	..	..	..	58	..	..	..	..	..	..	..	..	96	203
50	-48	-20	..	..	46	..	..	..	16	..	..	..	..	..	..	..	..	57	302
51	-47	..	..	-22	58	..	..	..	46	..	..	..	..	..	..	..	..	87	257
52	-48	..	..	-20	44	..	..	..	50	..	..	..	..	..	..	..	..	77	196
53	-29	..	..	-32	47	..	..	..	47	..	..	..	..	..	..	..	..	65	246
54	-48	..	..	-20	61	..	..	..	44	..	..	..	..	..	..	..	..	89	226
55	-41	..	..	-24	61	..	..	..	46	..	..	..	..	..	..	..	..	84	234
56	-53	..	..	-18	52	..	..	..	51	..	..	..	..	..	..	..	..	87	250
57	-46	..	..	-21	55	..	..	..	57	..	..	..	..	..	..	..	..	94	215
58	-33	-32	..	..	66	..	..	..	..	35	..	..	..	..	..	..	..	79	358
59	-44	-18	..	21	19	..	..	..	..	..	..	..	..	..	15	..	..	35	177
60	-36	-16	..	..	55	..	..	..	..	23	..	..	..	..	..	..	..	55	256
61	-33	-20	..	..	69	..	..	..	..	44	..	..	..	..	..	..	..	84	319
62	-30	-15	..	..	48	..	..	..	..	..	..	..	..	..	..	18	..	43	208
63	-27	..	..	..	23	..	..	..	..	15	-16	..	..	..	..	..	..	23	128
64	-24	15	..	..	27	..	..	..	..	16	-21	..	..	..	..	..	..	31	167
65	-33	-23	20	47	37	..	..	..	..	..	64	..	..	..	..	..	..	100	418
66	-50	-23	26	19	33	..	..	..	..	..	45	..	..	..	..	..	..	76	347
67	-41	-17	26	25	37	..	..	..	..	..	50	..	..	..	..	..	..	75	412
68	-30	..	..	-17	..	..	..	..	..	..	..	..	..	..	..	..	..	18	137
69	-24	..	32	..	16	..	..	..	..	..	28	..	..	15	..	..	..	31	273
70	-41	-22	42	27	32	..	..	..	..	..	60	..	..	..	..	..	..	95	377
71	..	-49	..	43	23	..	..	..	..	..	..	46	..	..	..	..	..	74	357
72	-21	-41	..	39	29	..	..	..	..	..	..	46	..	..	..	..	..	69	346
73	-22	-51	..	38	17	..	..	..	..	..	..	38	..	..	..	..	..	67	361
74	-25	-31	..	30	18	..	16	..	..	..	..	36	..	..	..	..	..	48	363
75	..	-22	..	18	19	..	..	..	..	..	..	41	..	..	..	..	..	32	316
76	-18	-33	..	..	26	..	..	..	..	..	..	22	..	..	..	..	..	32	360
77	-27	-27	..	22	15	..	..	..	..	..	..	37	..	..	..	..	..	43	346
78	..	..	30	..	21	..	..	..	..	..	..	..	..	17	..	..	..	22	305
79	..	..	-33	..	..	..	..	..	..	..	..	33	..	..	..	..	..	30	310
80	-22	..	..	..	29	..	..	..	19	..	16	24	..	..	..	..	..	33	310
81	-23	-50	-24	28	..	..	..	..	..	..	..	23	..	-15	..	..	15	58	341
82	-15	-24	-16	..	26	..	..	..	..	..	..	30	..	..	..	..	..	33	332
83	..	..	..	-26	..	..	..	..	..	..	..	-18	..	..	..	..	15	21	339
84	..	..	..	..	..	..	..	..	..	..	-16	..	..	..	..	..	..	09	327
85	..	-26	-18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	19	228
86	..	-24	24	-28	..	..	..	..	..	..	..	..	15	..	..	..	..	28	381
87	-27	-18	18	-22	..	16	..	..	..	..	..	..	..	..	..	..	..	27	291
88	..	-38	20	-18	15	..	..	..	..	..	..	..	19	..	..	..	..	33	395
89	..	..	..	31	..	..	..	..	..	..	..	..	..	..	19	-15	..	28	198
90	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	06	138
91	..	-48	..	..	16	..	..	..	..	..	..	..	19	..	16	..	..	38	381
92	..	..	-20	30	..	..	..	..	..	..	..	..	..	..	..	..	..	20	331
93	-19	-31	31	-45	19	..	..	..	..	..	..	..	21	..	-17	..	..	59	379
94	..	-21	..	..	18	..	..	..	..	..	25	..	..	..	..	..	..	17	358
95	..	..	..	-28	17	..	..	..	..	17	..	..	..	..	..	-19	..	27	324
96	-17	-46	26	-38	27	..	..	..	..	..	..	..	20	..	..	..	..	58	377
97	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	08	272
98	..	-27	-34	..	..	..	..	..	..	..	..	..	..	-27	..	..	..	32	344
99	..	..	67	..	..	..	..	..	..	..	..	..	..	42	..	..	..	67	310
100	..	..	63	..	..	..	..	..	..	..	..	..	..	37	..	..	..	59	309



(Continued)

Item	General factors					Group factors												Communi- nality h <sup>2</sup>	Mean score
	A	B	C	D	E	1	2	3	4	5	6	7	8	9	10	11	12		
101	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	08	373
102	..	..	..	-26	16	..	..	..	..	..	..	..	..	..	..	..	-16	17	342
103	..	..	67	..	..	..	..	..	..	..	..	..	..	41	..	..	..	65	370
104	..	18	30	..	..	..	..	..	..	..	..	..	..	15	..	..	..	21	229
105	..	..	69	-18	..	..	..	..	..	..	..	..	..	41	..	..	..	70	272
106	..	..	..	..	..	..	-17	16	..	..	..	15	..	..	..	..	..	14	245
107	..	..	..	53	..	..	..	..	..	..	..	..	..	..	58	..	..	67	97
108	-16	..	..	49	..	..	..	..	..	..	..	..	..	..	48	..	..	52	40
109	..	..	..	..	..	..	..	..	..	..	..	..	..	..	25	..	..	15	27
110	17	..	..	-22	-22	..	..	..	..	..	..	..	..	..	..	..	..	19	49
111	..	..	..	..	-16	..	..	..	..	-20	..	..	..	..	16	..	..	15	1
112	..	-18	-35	65	..	..	..	..	..	..	..	..	..	..	49	..	..	86	28 <sup>c</sup>
113	-16	-25	-36	68	..	..	..	..	..	..	..	..	..	..	50	..	..	96	31 <sup>c</sup>
114	..	-20	..	25	..	..	..	..	..	..	..	-15	..	..	20	..	20	27	74
115	..	..	..	42	..	..	..	..	..	..	..	..	..	..	45	..	..	45	29
116	..	..	..	53	..	..	..	..	..	..	..	..	..	..	35	..	..	47	29
117	-17	..	19	31	..	..	..	..	..	..	..	..	..	..	..	..	..	26	6
118	..	..	..	35	..	..	..	..	..	..	..	..	..	..	28	..	..	24	12
119	..	..	..	24	..	..	..	..	..	..	..	..	..	..	..	..	..	14	21
120	..	..	..	16	..	..	..	..	..	..	..	..	..	..	20	..	..	11	3
121	..	-18	-15	55	..	..	..	..	..	..	..	..	..	..	47	..	..	64	83
122	..	..	..	23	..	..	..	-16	..	..	..	..	..	..	24	..	..	19	3
123	..	-24	-33	50	..	..	..	..	..	..	..	..	..	..	40	..	..	64	10
124	..	..	..	20	..	..	..	..	..	..	..	..	..	..	19	..	..	10	3
125	..	..	..	..	..	..	..	..	..	-18	..	..	..	..	..	..	..	10	0
126	18	21	..	-19	..	..	..	20	..	..	..	..	..	..	..	..	..	25	5
127	..	..	-20	31	..	..	..	..	..	..	..	..	..	..	..	..	..	23	10
128	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12	0
129	..	..	-15	..	..	..	..	..	..	-22	..	..	..	22	..	..	..	19	1
130	-18	..	-25	..	..	-15	..	..	..	-17	..	..	..	15	..	..	..	22	2,899
131	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	06	7
132	..	-26	..	..	18	..	..	..	-15	21	..	..	..	..	..	..	..	24	52
133	..	-16	..	..	..	..	..	..	..	..	..	..	..	..	-17	..	..	14	23
134	-22	..	-21	42	17	..	..	..	..	..	..	..	..	..	..	..	..	38	32
135	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	08	14
136	..	..	..	23	..	..	..	..	..	..	..	..	..	..	..	..	..	15	52
137	..	-16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	09	8
138	-25	..	..	23	16	..	..	..	..	..	..	..	..	..	16	..	..	22	41
139	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	06	12
140	-17	..	-36	39	..	..	..	..	..	..	..	..	..	-16	..	..	..	39	23
141	..	..	-18	19	..	..	..	..	..	..	..	..	..	..	29	..	..	25	32
142	..	..	..	..	..	..	19	-19	..	..	..	..	..	..	..	..	..	14	24
143	..	..	..	24	..	..	..	..	..	..	..	..	..	..	..	..	..	14	48
144	..	..	..	-18	..	..	..	..	..	..	..	-22	..	..	..	..	..	13	7
145	..	..	..	..	21	..	..	..	..	..	..	..	..	..	..	..	..	11	47
146	..	..	..	16	..	..	..	..	..	..	..	..	..	..	..	..	..	08	22
147	-19	..	-16	38	..	..	..	..	..	..	..	..	..	..	19	..	..	30	19
148	..	..	..	..	23	-17	..	..	..	..	..	..	..	..	..	..	..	15	25
149	-28	..	..	29	20	..	20	..	..	17	..	..	-16	..	..	..	..	34	43
150	15	..	..	..	..	..	-21	23	..	..	..	..	..	..	..	..	..	20	5
151	-24	..	..	22	18	..	..	..	..	..	..	..	..	..	..	..	..	18	43
152	..	..	..	..	15	..	..	..	..	..	..	..	..	..	..	..	..	10	12
153	-20	..	-23	42	..	..	..	..	..	..	..	..	..	..	20	15	..	38	24

(Continued)

Item	General factors					Group factors												Communi- nality h <sup>2</sup>	Mean score
	A	B	C	D	E	1	2	3	4	5	6	7	8	9	10	11	12		
154	..	..	..	15	18	..	-18	..	..	..	..	..	..	..	21	..	..	21	29
155	..	..	..	26	..	..	..	..	..	..	..	..	..	..	..	..	..	17	34
156	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	08	22
159	..	-26	..	..	..	22	..	..	..	..	..	..	..	..	..	..	15	20	78
160	..	-26	..	..	..	22	..	..	..	..	..	..	..	..	..	..	15	20	78
161	-28	-17	17	36	20	..	..	..	..	..	..	..	..	..	29	..	..	46	340
162	-28	..	18	31	25	15	-16	..	..	..	-21	..	..	..	..	40	..	54	242
163	-26	-18	..	15	41	..	..	..	..	18	-28	..	..	..	..	23	..	49	228
164	-34	-20	47	..	22	..	..	..	..	..	45	..	..	..	..	..	..	68	341
165	-32	..	..	43	24	..	..	..	..	..	..	..	..	..	..	32	..	51	269
166	-27	-18	..	35	15	..	15	..	..	..	..	..	..	..	..	41	..	49	285
167	-26	..	29	18	25	..	..	..	..	..	..	..	..	..	..	39	..	45	224
168	-38	..	27	28	..	..	..	..	..	..	..	..	..	..	..	30	..	43	328
169	..	-67	..	..	..	..	..	..	..	..	..	..	..	..	..	..	65	92	323
170	..	-30	..	..	..	..	15	..	..	..	..	..	..	..	..	..	33	29	307
171	..	-64	..	25	..	..	..	..	..	..	..	..	..	..	..	..	58	86	369
172	..	-24	..	..	..	..	..	..	..	..	..	..	..	..	..	..	40	28	312
173	..	-76	..	..	..	..	..	..	..	..	..	..	..	..	..	..	61	100	376
174	..	-38	-20	..	..	..	..	..	..	..	..	..	..	..	..	..	40	43	284
175	..	-74	..	22	..	..	..	..	..	..	..	..	..	..	..	..	60	101	389
176	..	-18	-19	..	-15	..	..	..	..	..	-17	..	..	..	..	..	35	29	304
177	-16	-73	..	..	..	..	..	..	..	..	..	..	..	..	..	..	51	88	345
178	..	-45	-27	..	..	..	..	..	..	..	..	..	..	..	..	..	48	55	275
179	..	-35	20	..	..	..	..	..	..	..	..	..	..	..	16	..	34	39	338
180	..	-69	-24	..	..	..	..	..	..	..	..	..	..	..	..	..	57	92	238
181	..	-58	..	..	..	..	..	..	..	..	..	..	..	..	..	..	59	72	343
182	..	-86	..	22	..	..	..	..	..	..	..	..	..	..	..	..	71	132	370
183	..	..	..	..	-16	..	..	..	..	..	..	..	..	..	..	..	29	18	369
184	..	-60	15	..	..	..	..	..	..	..	..	..	..	..	..	..	34	55	353
242	..	..	-23	47	..	..	..	..	..	..	21	..	..	..	22	..	..	45	10
243	..	-16	..	34	..	..	..	..	..	..	..	..	..	..	24	..	..	27	19
244	..	..	..	-61	..	..	..	..	..	..	..	..	..	..	-36	..	..	56	71
245	..	-23	..	15	..	..	..	..	..	..	..	..	..	..	..	..	26	19	6
246	..	..	..	38	..	..	..	..	..	15	..	..	..	..	26	..	..	30	74
247	..	..	15	-50	..	..	..	..	..	-16	..	..	..	..	-31	..	..	44	20
248	23	..	26	-21	..	..	..	..	..	..	21	..	..	..	..	-16	..	29	64
249	-16	..	-15	33	..	-15	27	..	..	..	..	..	-18	..	..	..	..	34	80
250	..	..	..	..	..	..	..	15	..	..	..	..	..	..	..	..	..	10	25
251	..	..	..	21	..	..	..	..	..	..	..	..	..	..	19	..	18	19	63
252	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	22	14	25
253	-21	..	-22	..	..	..	20	..	..	..	..	..	-17	..	..	..	..	23	52
254	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	05	7

<sup>a</sup> Expressed as percentages, not as decimals. .. indicates factor loading of less than 15 in absolute value.

<sup>b</sup> Items 1 through 106 and 161 through 184 were answered on the 1-99 scale. Mean scores for these items are means of the transformed responses. (See text for transformation.) Mean scores for items 107 through 109 and 111 through 130 are the means of the actual responses. Mean scores for items 110, 131 through 156, 159, 160, and 242 through 254 are the percentages of respondents checking the item or answering yes to the item.

<sup>c</sup> Thousands of hundredweight.

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3 1723 02044 5870