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ABSTRACT

INDUSTRY DEMAND FOR EGG CLEARINGHOUSE SERVICES

Dennis P. Helmreich and Bill R. Miller

Tabular and regression analyses are utilized in conjuction with discriminant analysis to determine user acceptance of the services of Egg Clearinghouse, Incorporated. The results provide fundamental information required to project the level of demand for such marketing services in the near future. An additional two percent of existing firms in the industry are catagorized as potential users of egg clearinghouse services. Although this is a small portion of the total market it could almost double the current volume of eggs available for trade in the clearinghouse.

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Introduction

Since 1950 there have been significant changes in the production and marketing of shell eggs. The general trend has been toward vertical integration and larger production units. In the southeast, many broiler production units were converted into egg production units, and this phenomenon, along with the vertical integration and larger units, caused a shifting of production areas. The southeastern part of the United States became an egg surplus area and began competing with the midwest producers for the market along the eastern seaboard.

Along with larger, more vertically integrated production units came more direct methods of marketing. Eggs were forwarded by jobbers or producers to supermarket warehouses or retail stores. Large central markets (Los Angeles, Chicago, New York, etc.) fell into disuse as they were bypassed by new shell egg market channels [4].

As the flow of eggs through centralized markets diminished, the market price quotes were based on a rapidly diminishing volume, but these quotes were used as a basis for placing value on eggs which were traded

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Dennis P. Helmreich is a Research Assistant and Bill R. Miller is Associate Professor of Agricultural Economics at the University of Georgia at Athens.

directly [5]. Thus, volume of trading increased based on a market quote which had decreasing reliability.

There were few places in the distribution cycle of eggs where competitive bidding could take place as egg prices tended to be negotiated in privacy among individual traders. By 1970, there was no single source of egg prices to which the producer could turn to determine the value of his shell eggs. The producer was not sure of the value of his eggs and may or may not have been receiving for his eggs what they were actually worth.

Another facet of the growth in direct marketing is the evolution in the market structure to fewer and larger egg producers. This increase in size of firms entailed more uniform production methods (placements, feeding, medication, etc.) and a more uniform product. Egg producers are now producing large quantities of uniform, high quality eggs. This trend has lent credibility to the idea of trading gradeable nest run (GNR) shell eggs. This adds still another dimension to the pricing problem since, historically, prices have been quoted on a graded basis.

The Problem

In order to maximize returns to his operation, the producer needs to know the market value of eggs. During the latter half of the 1960's, a federally funded comprehensive program of research on egg pricing was conducted. The results of this study pointed out many problems associated with market decentralization. In an attempt to fill the price information void left by decentralization, United Egg Producers developed a short run price projection model to provide a base point price series [3]. Through

use of this model, prices were published to the news media for two years but its function has now been replaced by Egg Clearinghouse Inc. (ECI). ECI began trading gradeable nest run eggs (GNR) in November, 1971. It is held by some members of the industry that ECI trading accurately reflects the current supply and demand situation. While many eggs are traded on the basis of the Urner-Barry quote or USDA prices, it is possible that the ECI auction method of trading more accurately establishes the true value of gradeable nest run eggs at the wholesale level. USDA has established nest run specifications for determining weight classes and quality standards of gradeable nest run eggs. Trading (GNR) eggs through a clearinghouse can also eliminate the need for dual grading, once at the point of origin and again at the point of destination, but will the clearinghouse he acceptable to the industry? Continued acceptance of this form of trading could provide a solution to the need for an efficient market price quotation for eggs. Current market price information for GNR eggs has become a vital necessity since futures contracts for GNR began trading July 1, 1974 on the Chicago Merchantile Exchange and have for some time been traded on the Pacific Coast Exchange.

Objective

A study with several broad objectives was implemented in 1973 and this paper reports on one objective: project the demand for the new services of ECI.

Theoretical Background

Research on acceptance of new products and services has been a focus of study for some time. One of the most common phenomema observed is an increase in sales during the introductory period when newness of the product apparently has an experimental appeal to some buyers [1] [2]. These buyers try the product, then, finding it not to their liking or not fulfilling their expectations, become inactive in the market. We hypothesized in this research that a comparison of the inactive users of the new marketing services offered by ECI compared to the active users would yield parameters to aid in forecasting demand among the population not yet fully exposed to, or informed about, ECI.

Data

All members of ECI (82), effective June 1, 1973, were polled via mail questionnaire concerning their production and marketing practices and their acceptance of ECI. At the same time a random sample of 85 non-ECI members was surveyed with a similar questionnaire. A second questionnaire was mailed to non-respondents after three weeks. Several non-respondents were interviewed personally, and a random sampling of the remaining non-respondents were interviewed by telephone. A total of 53 responses were obtained from ECI members and 45 from non-members.

Analysis of Data

The data were first subjected to tabular analysis [3] to determine

which variables from the questionnaires were significant in terms of the amount of trade done through ECI.

Analysis was conducted using volume of ECI sales and purchases as a base comparison variable. The base variable was cross-classified with all other variables from the questionnaire to yield results which suggested that the following variables (based on analysis of variance and economic logic) were significantly related to the volume of business transacted through ECI:

1. Size of firm
2. Ownership of a flock
3. Volume of production in 1972
4. Volume of fill-in eggs purchased in 1972
5. Satisfaction with the pricing method used when purchasing fill-in eggs
6. Use of the futures market
7. Volume of surplus sold in 1972
8. Satisfaction with the pricing method used when selling surplus eggs
9. Volume of eggs sent to breaking plants.

Regression Analysis

These variables were then used as independent variables in several stepwise multiple regression analyses. The dependent variables used in different models were: 1. Volume of eggs purchased through ECI, 2. Volume of eggs sold through ECI, and 3. Total volume of business (purchases and sales) transacted through ECI. The independent variables which were consistently significant in terms of explaining the total level of trading

done through ECI were: 1. size of firm, 2. ownership of a production flock, 3. satisfaction with the pricing method used when purchasing fill-in eggs, 4. satisfaction with the pricing method used when selling surplus eggs, 5. volume of eggs sent to breaking plants.

A general characteristic of the data was that statistical relationships were relatively weak. The equation for active traders contained variables that showed the best statistical fit (ownership of flock and volume of eggs sent to a breaking plant) and three additional variables included because of their logical relationship to the theory of demand for new marketing services (Table 1).

Size of firm as measured by the volume of eggs handled had the smallest t value, but the sign of the coefficient was positive, which is consistent with an expected increase in demand for marketing services as size of firm increases. Demand theory also leads us to think that level of service use would increase as the level of satisfaction increases. The two variables related to satisfaction had a negative effect, but this is logically consistent with an index of satisfaction in which the highest level was 1 and the lowest level was 4.

Except for size of firm, the t values for all coefficients decreased more than 50 percent when the same set of five variables was applied to both active and inactive traders (Table 1). This supports the hypothesis that the inactive traders represented a significantly different sub-group of service users. These 18 inactive members had been willing to try the service at one time, but for some reason were not demanders at the time of the study.

Discriminant Analysis

We hypothesized, therefore, that the variables most important in describing the demand for the service (level of service use) were also most important in discriminating active from non-active traders. The different values of independent variables among non-active traders suggest that they have a different level of demand for ECI services. This hypothesis was tested by applying a multivariate discriminant analysis model to the 53 observations on all traders [6]. Size of firm, in terms of total volume of eggs handled, volume of breaking eggs, satisfaction indices, and ownership were, thus, variables used in the discriminant analysis.

The discriminant analysis supported the hypothesis of two distinct groups. The analysis yielded significant results in terms of both accuracy of classification and F value (Table 2). Those members of ECI who traded eggs through ECI from January, 1972 through June, 1973 were defined as traders; those who did not were considered to be non-traders. Of the 35 traders, the discriminant function correctly classified 28 of them as traders (80% accuracy), and the function correctly classified 8 of the 18 non-traders (44% accuracy) (Table 2).

The following is the discriminant function calculated by the BMD Ø4M program:

$$Z = .01665\ X_1 - .039\ X_2 - .01882\ X_3 + .10049\ X_4 + .00655\ X_5$$

where:

X_1 = size of firm (in 1,000,000 total cases of eggs handled, January, 1972 - June, 1973)

X_2 = ownership of a flock = 0; non-ownership = 1

X_3 = volume of eggs sent to breaking plants (in 100,000 cases, January, 1972 - June, 1973)

X_4 = Index of satisfaction with pricing method used for purchasing fill-in eggs

X_5 = Index of satisfaction with pricing method used for selling surplus eggs.

The mean Z for traders was .022; and was .004 for non-traders. Thus, a positive coefficient in the discriminant function would tend to place an observation in the "trader" group. The positive coefficient for size of firm in the discriminant and regression analyses suggests that the larger firms would tend to use the services of ECI and that, as size of firm increased, so would level of trade through ECI. The negative sign for ownership of a flock indicates that flock owners are attracted to ECI. There are, however, some large marketing firms who do not own flocks. Thus, the regression analysis suggests that among active traders the non-owners trade more through ECI than flock owners. The negative coefficient for volume of eggs sent to breaking plants suggests that those firms who sell to breaking plants tend to be non-ECI traders. However, when we find active traders who sell to breakers, the regression analysis shows that level of trade through ECI is positively correlated with the volume of eggs sent to breaking plants. Positive signs in the discriminant function suggest that those members who are least satisfied with pricing methods used for purchasing fill-in and selling surplus tend to trade through ECI (index of satisfaction is 1 for best satisfied and 4 for least satisfied). Both variables had negative signs in regression analysis suggesting that those who traded at highest levels through ECI were better satisfied with their pricing methods.

The discriminant function derived from the 53 members of ECI was

applied to the observed data on 45 non-ECI members. Of the 45 respondents, only one produced a Z value greater than the average of the two mean Z's ($\frac{\bar{Z}_1 + \bar{Z}_2}{2}$ where $\bar{Z}_i = \sum_1^n Z/n$ for group i), indicating that an additional 2.22 percent of the sample members are potential users of the services of ECI. In 1972, 2.22 percent of total U.S. egg volume would have been approximately 45,000,000 cases of eggs annually. By comparison active ECI members in 1972 were handling about 25,000,000 cases annually with only a small proportion of these traded through the ECI clearinghouse.

Summary

The data suggest that an additional 2.22 percent of the firms in existence are potential users of a clearinghouse for trading GNR eggs. While this would represent a significant increase in ECI members and in trading it does not represent a fast growing and universal acceptance. Some estimates of volume of actual trade on the ECI exchange could be developed by applying the regression results to the firms projected by discriminant analysis as definite new prospects.

These estimates should be considered as very short-run as they depend on existing levels of satisfaction with alternate market price plans and characteristics of ECI members. At present, larger than average firms who are most dissatisfied with alternate methods of marketing appear to be the best clients for membership. Furthermore, as members, their total volume of eggs handled and their volume sent to breaking plants appear to be principal determinants in use of ECI. Under these conditions there appears to be adequate room for growth, but general acceptance will

depend on developing services that are appealing to a much broader segment of the market.

The study also demonstrated that the signs of variables in discriminant models applied to the total sample are not always consistent with signs of the same variables in regression models applied to a sub-sample. While this is not surprising, it suggests that regression analysis of questionnaires could usually be improved by any discriminant model that aids in sorting the data into more homogenous groupings.

Table 1. Variables Related to the Total Volume of Business Transacted Through ECI by All Traders and by Active Traders, 1973

Variable	Active Traders (35) Function Coefficient	S.E.	t	All Traders (53) Coefficient	S.E.	t
Ownership of flock[1/]	.61489	.30802	1.96	.01927	.16508	.12
Satisfaction with pricing of purchase	-2.04735	1.21165	1.69	-.57998	1.03969	.56
Satisfaction with pricing of sales	-1.24844	1.09083	1.15	-.57535	.871	.66
Size of firm	.14133	.12558	1.13	.31783	.9415	3.38
Volume of eggs sent to breaking plant	.43013	.21411	2.01	.107	.14331	.75
Constant	.79781	--	--	.28987	--	--

[1/] Dummy variable with owners = 0, non-owners = 1.

Table 2. Classification of the 53 ECI Members by Their Active Trade Through ECI and a Discriminant Function of Size of Flock, Volume of Business, Volume of Breaking Eggs, Ownership of a Flock, and Satisfaction with Pricing Methods.

		As Classified By Actual Trading		
		Traders	Non-traders	Total
As Classified by Discriminant Function 1/	Traders	27	10	37
	Non-traders	8	8	16
	Total	35	18	53

1/The f-test for the D-square value was 2.004 indicating a significant difference between the groups at the .10 level. Sixty-six percent of the firms were classified correctly by the discriminant function.

References

[1] Eskin, Gerald J., "Dynamic Forecasts of New Product Demand Using a Depth of Repeat Model," Journal of Marketing Research, 10:115-129, May, 1973.

[2] Massey, William F., "Forecasting the Demand for New Convenience Products," Journal of Marketing Research, 6:405-412, November, 1969.

[3] Miller, Bill R., and Gene C. Masters, "A Short-Run Price Prediction Model for Eggs," American Journal Agricultural Economics, 55:484-490, August, 1973.

[4] Rogers, George B., "Marketing Channels for Eggs," ERS, USDA, ERS-322, May, 1973.

[5] Smith, Duane A., and Robert L. Christensen, "The New England Shell Egg Market--An Analysis of the Present Pricing System," New Hampshire Agricultural Experiment Station and ERS, USDA, Research Report Number 7, October, 1968.

[6] Tintner, Gerhard, "Discriminant Analysis," Econometrics, John Wiley & Sons, Inc., New York, 1952, pp. 96-102.