Methods of Research in Marketing

Paper Number 4

How Marketing Problems of the Apple Industry Were Attacked and the Research Results Applied

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Preface

This paper summarizes in brief form a series of integrated studies made by Dr. Donald A. Van Waes, Dr. Bennett A. Dominick, Dr. Peter L. Henderson and Mr. Martin A. Blum all of whom did their work under the direction of Max E. Brunk, Professor of Marketing. Walter T. Federer, Professor of Biological Statistics has been statistical consultant in all these studies.

HOW MARKETING PROBLEMS OF THE APPLE INDUSTRY WERE ATTACKED AND THE RESEARCH RESULTS APPLIED*

General Considerations in Marketing Research

In general, the problems of marketing research center around the companion objectives of market development and physical operating efficiency. Much of the market development for a particular product depends on ability to determine the economic wants of both actual and potential consumers. The marketing system operates in an imperfect way in bringing about practices and services most acceptable. In the large, the system is so constructed that products are offered to the public on a "take-it-or-leave-it" basis with adjustments made by experience in a slow and cumbersome way. A study of these imperfections in the system constitute the most important problems of marketing research.

Consumer's decision to buy or not to buy are based on a multitude of motivations varying all the way from fickle whims to thorough study of value received per dollar spent. Small wonder then that the crude, unscientific observations of producers and merchants lead to uneconomic marketing practices which fail to satisfy the consumer and cost the producer and merchant vast sums in lost sales. The problem resolves itself to one of measuring variables believed to be associated with volume of consumer purchases.

There are two distinct and conventional avenues of attack on such problems:

(i) The problems may be studied under controlled or laboratory conditions using experimental designs

(ii) The problems may be studied under uncontrolled or actual conditions using sample surveys.

Using the experimental method the researcher must describe and control the conditions under which the effects are produced. Variables not kept constant must be measured and eliminated statistically. The data gathered with the survey method are the everyday experiences of the populations under study. Elimination of the effect of non-test variables are attempted by stratification in sampling and by statistical analysis after the data are gathered. Assuming that this can be done the latter approach is restricted in that innovation cannot be tested. This is a serious restriction for market development *per se* implies innovation.

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* Presented at the American Statistical Association Meetings in Chicago, Illinois, December 27, 1952 under the title "Combining Probability Sampling and Experimental Designs in Marketing Research."

Any satisfactory method must meet two major requirements if results are to have utility; these are:

(i) The method must permit relatively satisfactory means of isolating the effects of specific variables.

(ii) The effects of specified variables must be measured under conditions essentially the same as those found under actual conditions.

Once these requirements are met the selection of procedure is largely one of cost considerations per unit of information.

Of paramount importance to the successful solution of a marketing research problem is a thorough understanding of the principles involved and of the nature of the tools employed whether they be statistical or otherwise. Thus, it may be necessary to employ a team of scientists to effect practical solutions. The statistician advisedly may be a member of such a team.

Certainly the researcher must keep in mind that solutions are nothing more than a stage in development. In this sense solutions to marketing problems are sought only in terms of improvement over existing practices. The theoretical potential of market development is always beyond grasp with the area between present practice and theoretical perfection always offering a fertile field for research.

Some Experiments in Marketing Research

The remainder of the discussion will be devoted to some illustrations of research designed to measure consumer wants for one product -- apples. The coordinated sequence of projects to be described were undertaken at the request of apple growers who at the outset were of the opinion that quality of product was one of the most serious factors impeding apple sales. After considerable deliberation it became apparent that the industry was more concerned with bruising than any other quality problem.

Studies on bruising

In 1948 and 1949 Van Waes undertook to determine the effect of bruising on consumer acceptance.1 Since it was assumed that different degrees of bruised apples were in the

1. Van Waes, D. A. Economic Significance of Bruising on Retail Sales of McIntosh Apples. Ph. D. Thesis, Cornell University Library, Ithaca, New York, 1951.

market place the survey method theoretically would have offered a satisfactory tool. However, previous experience in attempting to isolate the effect of one particular variable from a multitude of others through either stratification or analysis led to the use of controlled experiments in which non-test variables could be held constant.

For such a test the self-service supermarket appeared to be made to order for in such a store the reactions of customers could be freely observed and measured. It would have been a relatively simple matter to run a series of tests in which matched lots of apples varying only as to degree of bruising were offered to buyers but such a scheme violated the requirement that tests be conducted under actual conditions. It was not the general practice for stores to offer several lots of apples varying only as to bruising. Relative sales from the various lots would not indicate what actual sales would be if only one of the lots were offered. Many such experiments using matched lots have been conducted in the past but the results are meaningless from a practical standpoint. They serve only to illustrate the fallacy of the method.[1]

In order to simulate actual conditions it was necessary to have only one degree of bruising in a store at any one time, and in order to obtain valid comparisons among the various degrees of bruising it was necessary that they be tested under comparable conditions. Since time and store difference represent two major sources of variation, a design with two-way elimination is desirable. The latin square design is admirably suited for this situation.[2] In this design every treatment (the various degrees of bruising) appears once in a row (the particular time interval selected) and once in a column (the store). We have found the latin square design to be a very effective design in marketing research for controlling or measuring variations due to store and time differences.[3] Therefore, in order to study the effect of bruising on the volume of apple sales we set up four degrees of bruising with the lots of apples alike in all other respects. These four treatments were tested in three 4 x 4 latin squares. The columns of the three sets of 4 x 4 latin squares were the 12 stores (one in each of 12 cities) in which the experiment was conducted. The rows were four two-week periods.

1. Van Waes, D. A. Evaluation of Research Techniques Used For Measuring the Influences of Factors Believed to be Associated with Volume of Consumer Purchases in Retail Stores, Methods of Research in Marketing, Paper No. 1, Department of Agricultural Economics, Cornell University, July 1951.

2. Fisher, R. A. The Design of Experiments, 5th Edition, Hafner, New York, 1949.

3. Dominick, Jr., B. A. An Illustration of the Use of the Latin Square in Measuring the Effectiveness of Retail Merchandising Practices, Methods of Research in Marketing, Paper No. 2, Department of Agricultural Economics, Cornell University, June 1952.

As a companion study to the one described above a survey was made of randomly selected stores to determine the extent of bruising on apples normally on the market. The sample was drawn in the same cities included in the controlled experiment. This was done in order that recommendations could be made from the results of the controlled experiment.

The companion studies furnished two important items of information:

(i) The extent of bruising necessary to reduce the volume of apple sales.

(ii) The extent of bruising on apples found in the market place.

With the above information it was possible to inform growers and store owners that present methods of handling apples were not causing undue damage as measured by the volume of apples purchased by customers.[1] Only two per cent of the apples in the 504 sample records were as badly damaged as the experimental treatment which had the most bruising and this treatment was the only one to which buyers responded through decreased purchases. Measuring the effect on sales of this two per cent would have been very difficult, if not impossible, if only the sample survey data had been available. This illustrates one of the differences between controlled and uncontrolled experiments and how the two can be combined to advantage.

Studies of merchandising practices

In the process of making the studies on bruising many varied practices of pricing, displaying, and packaging apples were observed together with highly varying sales rates. This raised the question of how these practices affected sales. To obtain information on this Dominick conducted a series of experiments on these as well as innovated variables.[2] A series of 4 x 4 latin squares were used with 4 stores as columns and 4 time periods of 1 or 1/2 days as rows (figure 1). Over a period of 12 weeks, in the fall of 1950, 16 different merchandising practices (the treatments) were compared, and 24 individual experiments were conducted.

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1. Brunk, Max E. Influence of Bruising on the Sale of Apples. New York State Horticultural Society 95:73 - 80, 1950.

2. Dominick, Jr., B. A. Merchandising McIntosh Apples Under Controlled Conditions - Customer Reaction and Effect on Sales. Ph. D. Thesis, Cornell University Library, Ithaca, New York, 1952.

Figure 1. Diagrammatic Lay-out of Two 4 x 4 Latin Squares for Four Treatments (A, B, C, D).

	First part of week					Second part of week			
	Store					Store			
Day	1	2	3	4		1	2	3	4
Monday	B	C	D	A	Friday A.M.	B	A	C	D
Tuesday	A	B	C	D	Friday P.M.	C	D	B	A
Wednesday	D	A	B	C	Saturday A.M.	A	B	D	C
Thursday	C	D	A	B	Saturday P.M.	D	C	A	B

Because approximately half of the volume of grocery sales occur on Friday and Saturday and because larger grocery orders per customer are purchased on weekends the week was divided into two parts. The first part of the week consisted of the first four days. On weekends both Friday and Saturday were divided into two parts so that the two days combined formed four time periods. Thus there were two latin squares in each week. Each set of four treatments were tested over a two-week period.

The treatments selected for testing in any two-week period depended largely upon the results of the preceding experiments. This practice quickly led to innovations in the selection of treatments, care being taken to determine the practicability of any treatment before it was included in an experiment. This sequential selection of treatments, although not formalized by mathematical rule[1], resulted in the selection of 16 different merchandising practices whose sales varied from 11 to 33 pounds of apples per 100 customers.[2]

The most effective treatment, an innovation, was recommended to the trade less than a month after the store tests were completed. Within two years the treatment though modified in some cases was in general practice by the trade with over two-thirds of the apples so sold in Western New York. The New York State legislature promptly amended the grading laws to facilitate the use of this merchandising practice. The recommended method of merchandising apples was further tested over a twelve-week period in the fall of 1951 in ten stores of another chain organization.[3] Their sales increased 42 per cent.

1. Wald A., Sequential Analysis, Wiley, New York, 1947.

2. Brunk, Max E. and Dominick, B. A. Experiments Show What Makes Your Apples Sell. New York State Horticultural Society 96:21 - 28, 1951.

3. Davis, Lloyd H. Marketing Research Results Work. Cornell Farm Economics 186:4888 - 4889, October 1952.

The results of the controlled experiments had indicated that the apple sales of this organization could be expected to increase 40 per cent. (These results were obtained with McIntosh apples, the variety selling in greatest volume. Tests made during 1950 revealed that for every dollar we increased McIntosh apple sales the sales of other apple varieties decreased 25 cents and the sales of other fruit decreased 22 cents. The remaining 53 cents came from outside the fresh fruit business). Another large chain organization using the innovation of 1952 reported almost identical volume (pounds) of sales in 1951 and 1952, but at 60 per cent higher retail prices.

By December 1952 apple prices had more than doubled since the 1950 tests and some question arose concerning the effect this price increase might have had on the recommended merchandising practice which consisted of a combined bulk and polythene package display priced in 6 pound units. Consequently an experiment was conducted in a 3 x 3 latin square comparing 2, 4 and 6 pound pricing units as had been done in 1950. The same stores were used for the tests. Again the recommended practice proved most effective in maximizing sales with results similar to those obtained in 1950. Even though only a 3 x 3 design was employed the experimental error was so small that the results proved significant at the .05 level.

Study of carry-over effects

Many of the treatments tested during 1950 also were retested by Henderson in 1951 under a different price situation and in 12 different stores located in 12 large cities.[1] The conclusions, without exception, were the same as those obtained in 1950 (table 1). A new factor was incorporated in the design of these experiments.[2] Because the day to day rotation of treatments among stores created an artificial condition not normally found in the market place it was desirable to determine the effect of given treatments on following treatments. To do this the treatments were rotated among stores every week instead of

1. Henderson, P. L. Influence of Selected Marketing Services on Apple Sales. Ph. D. Thesis, Cornell University Library, Ithaca, New York, 1952 and

   Brunk, Max E. How We Increased the Retail Sales of Apples. New York Horticultural Society 97:24 - 33, 1952.

2. Henderson, P. L. Application of the Double Change-over Design to Measure Carry-over Effects of Treatments in Controlled Experiments, Methods of Research in Marketing, Paper No. 3, Cornell University, July 1952.

Table 1. Effect of Merchandising Practices on Apple Sales

September-December 1950		September-December 1951	
Practice	Pounds Per 100 Customers	Practice	Pounds Per 100 Customers
Promotional devices (All 4 lb. bag and bulk)		Packaging material (All in 5 lb. units)	
Display without promotional devices	20	No packages -- bulk only	12
Display marked as to variety and use	20	Red mesh bags and bulk	17
With window streamers added	20	Paper window bags and bulk	18
Display doubled in size	21	Pliofilm bags and bulk	19
With added window display of apples	25	Purple mesh bags and bulk	20
		Polythene bags and bulk	22
Bulk only		Size of pricing unit	
Priced in two-pound units	11	Four-pound Polythene bags and bulk	19
Priced in four-pound units	13	Five-pound Polythene bags and bulk	22
		Six-pound Polythene bags and bulk	27
Package only		Eight-pound Polythene bags and bulk	20
Four-pound Cellophane bags	18		
Combination package and bulk displays		Five-pound mesh bags and bulk	20
Two-pound Cellophane bags and bulk	13	Eight-pound mesh bags and bulk	20
Four-pound Cellophane bags and bulk	20	Ten-pound mesh bags and bulk	20
Four-pound Polythene bags and bulk	23		
Six-pound Polythene bags and bulk	28	Location of display	
Six-pound open hi-hat baskets and bulk	21	By scales	17
		End of counter next to no fruit	22
Quality and price (All 4 lb. bag and bulk)		End of counter next to oranges	21
2-1/4" min. priced 25% under 2-1/2"	17	End of counter next to bananas	19
Bruise-free apples	24		
Price reduced 35%	29		
Highly colored apples	33		

every day and a double change-over design was used.[1] In using the change-over design particular treatments must be in given stores a sufficient time to insure that carry-over effects stem only from immediately preceding treatments and not from earlier treatments.[2] It is believed that weekly rotations are satisfactory with most perishable foods particularly in view of the weekly shopping habits of people.

The double change-over design was found useful in measuring the effect of the Thanksgiving and Christmas holiday trade. In one such instance using two orthogonal 3 x 3 latin squares, carry-over effects of the treatment in one 3 x 3 latin square were the reverse of those in the second 3 x 3 latin square. The second square was completed prior to Christmas, a time when customers were buying relatively more of the larger packages as compared to their performance in the first square. Thus, the design proved useful in pointing up and detecting variation in buying habits at different times during the season.

Comments on techniques and efficiencies

The above discussion illustrates the application of two very useful designs to marketing research experiments. Of course, other designs, the randomized complete block, the split plot, and the lattices may be successfully used for studying certain marketing problems. The particular nature of the problem and the sources of variation will determine the appropriate experimental design.

1. Cochran, W. G., Autrey, K. M. and Cannon, C. Y. A Double Change-over Design for Dairy Cattle Feeding Experiments, Journal of Dairy Science 24:937 - 951, 1941.

2. The double change-over design consists of the k-1 orthogonal k x k latin squares. The treatments are compared in various sequences. The double change-over design retains the advantages of the latin square in eliminating store and time effects and at the same time permits the measurement of carry over effects. When carry-over effects are not present k-1 ordinary latin squares may be used instead of the double change-over design. If carry-over effects are present and a double change-over is used, adjustments are made in the treatment means for the effect of the preceding treatment Such adjustments tend to reduce the experimental error and to give unbiased comparisons of the treatment effects.

It is interesting to note that missing values for the period of observation, or "missing plots", may and do occur in marketing research studies just as they do in other fields of research. Failure to keep records or lost records is only one source of omission. Sometimes unforeseen developments will occur such as street repairs in front of a store over a period of time. If a street is torn up in front of a store the customer count may decline far more than total sales because the obstruction will affect small sales more than the large ones. Also, fire or flood may prevent a store from operating in the accustomed manner. The analysis of experiments with missing observations may be handled in the usual manner as described by Cochran, Cox, Snedecor and others.

To obtain an idea of the effect of stratification by time intervals and by stores the results of 34 experiments (table 2) were studied. As a measure of relative variation in the various experiments the coefficient of variation was computed for each experiment. The coefficients of variation were higher for the 24 experiments conducted in 1950 than for the others. In these experiments the time interval was one day while in the remaining experiments the time interval was either a one or two week period. Thus, one method for reducing the coefficient of variation is to use time periods of one week rather than of one day. It should be noted here that the coefficient of variation was computed from the residual mean square in the latin square without covariance.

The efficiencies[1] of the latin square relative to randomized complete block designs using stores as replicates are given in column five of table 2. If the time interval stratification is ignored the average error variance in the 24 experiments in 1950 is 51 per cent larger; the median increase in efficiency of the latin square over the randomized complete block is 22.5 per cent. If the store stratification is ignored but the time period grouping is not, the average increase in efficiency of the latin square is 49 per cent, while the median increase is 42 per cent (column 6, table 2). If both the store and time interval variation is not controlled the average increase in the error mean square for the complete randomized design in these same 24 experiments is 77 per cent, and the median increase is 62 per cent. The other experiments were not included in these averages because the period of observation was of different length.

1. Cochran, W. G. and Cox, G. M. Experimental Designs, Wiley, New York, 1950.

Table 2. Relative variation and efficiency due to stratification or covariance in 34 latin square analyses.

Size of latin square	Experiment conducted Yr.	Experiment conducted No.	Coefficient of variation	Efficiency relative to: Randomized complete blocks using as rep. Stores	Efficiency relative to: Randomized complete blocks using as rep. Times	Efficiency relative to: Completely randomized	Efficiency using co-variance analysis
				(Percent)			
8x8	1948	1	19.7	214	214	303	102[a]
4x4	1949	1	17.7	112	702	572	148[a]
4x4	1949	2	15.5	113	243	220	174[a]
4x4	1949	3	7.9	146	1241	1013	94[a]
4x4	1950	1	45.1	120	143	148	132[b]
4x4	1950	2	30.0	341	126	306	116[b]
4x4	1950	3	31.1	108	141	138	83[b]
4x4	1950	4	25.7	210	149	222	81[b]
4x4	1950	5	32.73	90	192	163	80[b]
4x4	1950	6	25.75	220	181	255	86[b]
4x4	1950	7	37.16	124	159	164	160[b]
4x4	1950	8	37.93	225	152	237	132[b]
4x4	1950	9	40.58	98	71	76	84[b]
4x4	1950	10	47.40	102	128	123	78[b]
4x4	1950	11	31.06	184	185	230	162[b]
4x4	1950	12	36.72	115	150	150	98[b]
4x4	1950	13	34.64	95	158	140	81[b]
4x4	1950	14	24.23	286	125	263	114[b]
4x4	1950	15	38.32	152	101	141	80[b]
4x4	1950	16	47.79	108	94	102	61[b]
4x4	1950	17	39.60	225	120	211	90[b]
4x4	1950	18	42.41	152	128	161	80[b]
4x4	1950	19	53.48	80	82	72	100[b]
4x4	1950	20	21.96	135	301	282	80[b]
4x4	1950	21	36.24	121	284	257	80[b]
4x4	1950	22	27.88	116	152	153	148[b]
4x4	1950	23	48.45	84	91	81	278[b]
4x4	1950	24	19.77	141	166	182	84[b]
6x6	1951	1	19.19	132	226	234	112[c]
6x6[2]	1951	1	16.67	101	368	328	107[c]
4x4	1951	2	6.09	72	3237	2492	85[c]
4x4[1]	1951	2	22.34	182	3921	3102	113[c]
4x4[2]	1951	2	6.72	283	9977	7838	96[c]
4x4[3]	1951	2	14.13	170	731	693	81[c]

[1] Other apples

[2] All apples

[3] Oranges

[a] Covariance on volume of grocery and produce sales

[b] Covariance on number of customers

[c] Covariance on volume of produce sales

The analysis of covariance of apple sales and total number of customers, total grocery sales, or total produce sales was of limited usefulness in these studies. The removal of store and time interval differences in the latin square accounted for most of the relationship between the covariate and volume of apple sales. The residual variations were not related to any extent. If the variation due to stores and time intervals were not removed then covariance analyses may be expected to decrease the error variance considerably, but not to the extent that the latin square did. In other studies the use of covariance analyses may prove quite beneficial.

A Sampling Problem

Having affected material improvement in the merchandising of apples and having ascertained some of the important factors affecting their sales the industry was anxious to use this information to achieve an orderly movement of the crop into consumption. Experience from the previous work indicated that observations of sales coupled with customer counts might serve as an indicator of movement rate from week to week. Rate of movement together with descriptions of store practices would enable the industry to undertake remedial action as soon as undesirable developments occurred. Over a large number of stores the movement rate could be affected by a number of factors chief among which are: (1) merchandising practice used (2) proportion of stores handling apples (3) relative display space devoted to apples (4) prices of apples and other fruits and (5) quality condition of apples and competing fruits.

Even though previous experience had revealed a high degree of consistency in the customer reactions to different selling practices among different stores, there still remained a tremendous problem of how to efficiently sample stores over a wide geographic area. Published lists of stores were available for most towns and cities in the western half of New York State which was chosen for study but it was desirable to know something of the effects of geographic area, size of city, size of store, day of week and time of day on the rates of sale. To insure the measurement of all these variables with a relatively restricted budget some form of experimental design seemed to offer definite advantages. The first purpose of the study was to learn more about the influence of the above factors on rate of sale. The second purpose was to provide a crude measure of movement rate from week to week for release to the trade until a more adequate coverage could be obtained. At the outset it was decided that the second purpose should be subservient to the first.

Since the unit of observation in this study was the customer in the store, the question might arise as to why people were not interviewed in their homes or why rate of movement information was not obtained from weekly store inventories. Direct observation of actual performances has many advantages in avoiding memory biases and in enabling enumerators to cover much larger numbers of shoppers. But of greater importance is associating specific merchandising practices with shopper performance. Assuming that accurate store inventories could be obtained (and there is good reason to doubt it) there could still remain the problem of determining how the product was merchandised as well as shopper response to such practice.

Because the sales rate on weekends varied considerably from the first parts of the week, it was decided to make one visit to each selected store in each part of the week and during each visit take customer counts and sales for a one hour period. The budget limited such coverage to 64 stores. Western New York was divided into four geographic areas. In each of these areas 4 sizes of cities were selected. Lists were prepared of all places over 100,000 population, 20,000 - 100,000, 5,000 - 20,000 and under 5,000.

It so happened that there was only one city in each area having over 100,000 population so these were automatically selected. Random selections were then made of one city in each area from the second size grouping, 2 cities from the third and 4 cities in each area from those under 5000 population. Many small cities are clustered around the larger ones with the shopping areas for the smaller places being in the larger cities. For this reason it was necessary to impose a restriction that any smaller city selected to be at least 10 miles from a larger city. Routes were then constructed for each area with 4 stores in each of the two larger sizes cities, 2 each in cities of 5 to 20,000 and 1 each in towns under 5,000 population. Lists in each area were used to select stores, half being small and half large stores. The plan was so constructed that visits to any one store were made in succeeding weeks at precisely the same hour and day of week. Within any one two-hour period throughout the week one store was enumerated in each of the 4 geographic areas, in each of the 4 sizes of cities and half the stores were small and half were large.

All combinations of the variables -- geographic area, city size, day of week, time of day and size of store -- constitute a 2 x 44 factorial. The possible combinations total 512. From these combinations the 64 given in figure 2 were selected. The fractional replicate selected was constructed so as not to confound the main effects. The time periods within each week were so divided to permit two complete sets of the 64 combinations -- one set during slack trading hours and one during heavy trading

hours. Thus each store in the design is enumerated twice a week and at precisely the same hours in succeeding weeks.

Weekly enumerations are completed each Saturday night at 6 o'clock. Office tabulations are made daily as the field reports are received so that summaries are completed by Monday noon for each preceding week. These completed reports on movement rate are mailed to the trade by Monday evening (figure 3). The greatest delay in tabulation results from making adjustments in the non-proportional sampling which was necessitated by the experimental design. The summaries report the rate of sale per 100 customers, quality indices and retail prices of each variety, size of pricing unit, a description of display practices as well as qualities, prices and display space of other fruit. Experience has shown that these factors are associated with rate of movement and the information has proved useful to the trade in taking correct remedial action in maintaining the movement of apples into consumption consistent with storage inventories.

Combining probability sampling with an experimental design in this instance serves to evaluate certain variables for use in the designing of an improved sample for future use and at the same time permits some degree of estimate of the current movement situation together with its associated causes.

Figure 2. Sixty-four Treatments Used in Studying Rate of Movement

Level of factor

a b c d e	a b c d e	a b c d e	a b c d e
0 0 0 0 0	0 2 0 2 0	1 0 0 0 1	1 2 0 2 1
0 0 0 0 2	0 2 0 2 2	1 0 0 0 3	1 2 0 2 3
0 0 1 2 1	0 2 1 0 1	1 0 1 2 0	1 2 1 0 0
0 0 1 2 3	0 2 1 0 3	1 0 1 2 2	1 2 1 0 2
0 0 2 1 1	0 2 2 3 1	1 0 2 1 0	1 2 2 3 0
0 0 2 1 3	0 2 2 3 3	1 0 2 1 2	1 2 2 3 2
0 0 3 3 0	0 2 3 1 0	1 0 3 3 1	1 2 3 1 1
0 0 3 3 2	0 2 3 1 2	1 0 3 3 3	1 2 3 1 3
0 1 0 1 1	0 3 0 3 1	1 1 0 1 0	1 3 0 3 0
0 1 0 1 3	0 3 0 3 3	1 1 0 1 2	1 3 0 3 2
0 1 1 3 0	0 3 1 1 0	1 1 1 3 1	1 3 1 1 1
0 1 1 3 2	0 3 1 1 2	1 1 1 3 3	1 3 1 1 3
0 1 2 2 0	0 3 2 0 0	1 1 2 2 1	1 3 2 0 1
0 1 2 2 2	0 3 2 0 2	1 1 2 2 3	1 3 2 0 3
0 1 3 0 1	0 3 3 2 1	1 1 3 0 0	1 3 3 2 0
0 1 3 0 3	0 3 3 2 3	1 1 3 0 2	1 3 3 2 2

a_0 = large store
a_1 = small store

b_0 = cities over 100,000
b_1 = cities between 20,000 and 100,000
b_2 = cities between 5,000 and 20,000
b_3 = cities under 5,000

c_0 = Buffalo area
c_1 = Binghamton area
c_2 = Syracuse area
c_3 = Rochester area

d_0 = Monday)
d_1 = Tuesday) For First Part of Week
d_2 = Wednesday)
d_3 = Thursday)

e_0 = 8 a.m. to 10 a.m.)
e_1 = 10 a.m. to noon) For First Part of Week
e_2 = noon to 2 p.m.)
e_3 = 2 p.m. to 4 p.m.)

Figure 3. Illustration of Weekly Report on Rate of Movement

Apple Observations for Week Ending November 15, 1952

Pounds of apple sales per 100 customers		27.2
Per cent sold bulk	24.1	
Per cent sold prepackaged	75.9	

Variety Detail

Variety	Per cent of Total Display Space	Average Price Per Pound*	Per cent Offered Prepackaged*	Average Condition*
McIntosh	41.5	12.6	50.8	1.4
Cortland	25.1	12.0	52.2	1.4
Northern Spy	12.3	9.1	5.0	1.7
Western Delicious	7.4	18.8	12.9	1.1
Greening	3.3	11.5	8.0	1.5
York Imperial	2.3	9.8	100.0	1.6
Twenty Ounce	1.7	9.0	17.3	2.0
Eastern Delicious	1.5	13.8	8.9	1.6
All Other**	4.9	11.5	35.2	1.5

* Weighted by display space.
**All other varieties none of which were given over 1 per cent of display space.

Proportion of Offerings Priced and Packaged in Various Ways*

Pricing Unit	Bulk	Prepackaged	Other**	Total
1 Pound	1.0	--	--	1.0
2 Pound	19.6	.6	.3	20.5
3 Pound	23.2	8.1	1.1	32.4
4 Pound	2.2	8.9	.2	11.3
5 Pound	4.4	21.7	.4	26.5
Other	8.1	.2	--	8.3
Total	58.5	39.5	2.0	100.0

* Weighted by display space.
**Includes only jumble displays which could not be identified as either bulk or package.

Average Prices, Display Space and Condition of Selected Fruits

Fruit	Average Price	Per cent Display Space	Average Condition
Bananas	14.6¢ lb.	17.4	1.3
Oranges	50.1¢ doz.	28.4	1.5
Grapes	13.7¢ lb.	11.3	1.2
Apples*	12.3¢ lb.	42.9	1.4

* Price and condition weighted by display space.