




A STUDY OF THE PAPER DEPARTMENTS  
IN SELECTED SUPER MARKETS

Thesis for the Degree of M. A.  
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Jesse Pike Schaudios  
1955

**This is to certify that the**  
**thesis entitled**  
A Study of the Paper Departments in  
Selected Super Markets

**presented by**  
Jesse P. Schaudies

**has been accepted towards fulfillment**  
**of the requirements for**  
Master of Arts degree in Food Distribution

  
Major professor

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SELECTED SUPERMARKETS

By

Jesse Pike Schaudies

AN ABSTRACT

Submitted to the School of Graduate Studies of Michigan State  
University of Agriculture and Applied Science in  
Partial Fulfillment of the Requirements  
for the degree of

MASTER OF ARTS

Department of General Business

Curriculum in Food Distribution

Approved

E. A. Brand

This study is a pilot study to determine the factors that influence sales of paper products in super markets.

It is believed that the growth of paper departments in today's modern super market has not kept pace with the growth in proportion with other departments. A great deal of study is necessary to determine the proper size and location of the paper department within the super market.

Three hypothesis were selected for study: (1) location of paper department within the store; (2) out-of-stock conditions in paper department; (3) the number of facings representing the product categories.

Audits were run in nine selected super markets to obtain the required data. Actual physical counts were made of the units in the paper department on a "whole population" basis. These audits were conducted over a two week period during the summer months.

This study is not an attempt to answer all the questions concerning the hypothesis. The author attempts to shed some light on trends and areas where additional study is needed.

The actual physical location of the paper department within the store seems to have some bearing on sales. A system of grids were used to standardize the stores and to give some credence to the findings. It is believed that there is a psychological arrangement of products in the super market. The flow of traffic was not considered in this study in determining the proper location.

In this study, out-of-stock did not prove to be a factor. The relatively low occurrence of out-of-stock prevented any conclusions being drawn.

The number of facings representing the product categories showed some interesting trends. Points of maximum return on facings were found on sanitary items, food wraps, and paper towels. These findings give rise to a belief that there is a seasonal arrangement in the paper department.

An interesting observation was made between the amount of toilet tissue, by units, a store sold and the total amount of paper sales, by units, for that same store. The percentage of total toilet tissue sales by each store in relation to the total toilet tissue sales by all stores correlated to the percentage of total paper sold by each store in relation to the total paper sales by all stores. This correlation of coefficient was found to be .995.

The author hopes that the methodology used in this study and the trends related to the hypothesis will be of value to both manufacturer and retailer in further evaluating and studying the paper department in today's modern super market.

**" The Food Distribution program at Michigan  
State University is under the sponsorship of  
the National Association of Food Chains"**

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Jesse Pike Schaudies

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## CHAPTER I

### INTRODUCTION

The year 1955 marks the twenty-fifth anniversary of the super market. The growth of this industry in the past twenty-five years has been tremendous. The sales volume for the food industry has advanced from a mere five billion dollars in 1930 to a figure of over 36 billion dollars in 1954.<sup>1</sup>

Paralleling this rise in dollar volume, has been the cost of opening a new, fully equipped, super market. In 1930 it was possible to open a fully equipped market for \$2,000, while today the investment in equipment alone is over \$150,000.<sup>2</sup> This rise in equipment needs was made necessary by new innovations in food merchandising and handling. Frozen food cases of over 100 feet may be found in many of today's super markets. Produce departments featuring fresh fruits and vegetables from every section of the United States and some foreign countries are becoming a common sight in the modern super market.

With the added importance of such departments as the health and beauty aids, hardware and soft wear sections, some authorities see the modern

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1. Robert W. Mueller, "22nd Annual Progressive Grocery Survey," Progressive Grocer, March 1955, Vol. 34, No. 3, p. 42.

2. "The 1955 Chain Store Age Equipment Preview," Chain Store Age, December 1954, Vol. 30, No. 12, p. 42.

super market as a big "general store." Mr. M. M. Zimmerman, Editor of Super Market Merchandising says:

"In many ways the real predecessor of the super market in American merchandising is the old trading post. The super market, to a startling degree, is nothing but the trading post grown to Gargantuan proportions."<sup>3</sup>

In the fast moving food industry, it is difficult for even the largest of chains to remain abreast of all new inventions and ideas. Because of the speed with which this industry has grown, the author believes that some departments in the grocery section of the super market have not advanced to the high degree that they should have.

It is the author's belief that the paper department in super markets has not kept pace with the growth in proportion to the other departments.

The purpose of this thesis is to attempt to establish a few of the reasons why the volume in one paper department of a super market is larger than the volume of the paper department in another super market.

Basically this study may be called a pilot study, since to the author's knowledge no extensive survey of this type has been conducted previous to this time. From a marketing research standpoint, the general problem was to devise a method to determine what factors influence the sales volume of paper products in super markets.

Based on the general problem, three hypothesis were considered:

1. Location of the paper department has some bearing on the sales volume of paper in super markets.

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3. M. M. Zimmerman, The Super Market, McGraw-Hill Book Company, Inc., New York, 1955, p. 19.

2. Out-of-stock conditions have some bearing on the volume of paper department sales.

3. The number of facings representing the product categories has some influence on the sales of these categories.

## CHAPTER II

### DESCRIPTION OF METHODOLOGY

#### Selection of Stores

Nine super markets were selected from a north-central trading area with a population of approximately 163,000. The retail sales estimate for food merchandising stores was \$31,538,000 annually. No store was selected that had an annual sales volume of less than \$250,000. The actual selection of the stores was done strictly on a judgment basis.

#### Audit Forms

The paper department in each selected store was audited on a "whole population" basis. Each audit form was divided into eight product categories: toilet tissue, facial tissue, food wraps, paper towels, paper napkins, sanitary items, picnic supplies, and miscellaneous items. The brands carried by each selected store were recorded under their respective categories so that each audit form was as uniform as possible. A sample of the audit form will be found in the Appendix.

#### Procedure for Audit Form

The first day, the brands in the various categories were recorded along with the price, the physical count on the shelves and the backroom

stock was taken. The number of facings for each brand was also counted.

The second day any change in the price was noted and recorded along with a change in facings. A physical count was again made on the shelves and in the backroom to determine the unit sales from one day to the next. Each surveyor inventoried the paper department of his store precisely the same time each day; however, the time of day that the different stores were inventoried varied with each individual.

#### Determining the Location of the Paper Department

In order to have a logical system of determining the location of the paper departments in relationship to each other in the different stores, a grid system was established. Each store was divided into nine equal sections or grids and the nine grids were labeled A through I. The paper department of the nine surveyed stores lay in one of the nine different grids. The paper department of only one store was located so as to cut across grid lines.

#### Limitations of Study

The author is aware that since the survey was conducted during the summer months the information obtained may not be indicative of information which may be obtained at other times of the year. Furthermore, observations for only two weeks may not be adequate to reflect conditions over a longer period of time. The sample used was small when compared to the whole population, but for the location of the survey the nine stores represented the largest share of business.

As was stated earlier, the survey was conducted over a two week period.

One week's sales reflected a pay week for the area, whereas the second week did not. Observations were recorded from Tuesday to Tuesday in order to reflect the Saturday sales for the two weeks.

It is believed, however, that benefits may be derived from the methodology used in conducting this survey. It was not the intent of the author to prove the hypothesis, nor to make final and conclusive statements about the findings, but rather to show what trends may be apparent.

#### Brief Description of Stores

The selected stores were similar in many respects. All of the stores were located in middle income neighborhoods within the selected trading areas. Only one store had what was considered an inadequate parking lot.

The selling area for the nine stores varied from 8,000 square feet to 19,000 square feet. Actual paper department measurements ranged from 30 linear feet to 48 linear feet.

## CHAPTER III

### FINDINGS OF THE SURVEY

The findings will be discussed in the order of the hypotheses established.

#### Hypothesis I

Location of the paper department has some bearing on the sales volume of paper in super markets.

Although Chart I would seem to indicate that location "D" is perhaps the best for the paper department, location "E" cannot be discounted. Both locations, "D" and "E", are in the left center of the store. Since this constitutes approximately 22 percent of the store, it is thought that perhaps a grid system with 18 different locations should have been used to pinpoint the location more adequately.

There are other variables that enter into the location of the paper department. One important variable is the neighboring departments of the paper department. In seven of the nine stores the paper departments were located across the aisle or next to the soap department. The other two were closer to the beverage department.

An interesting observation was made in store E concerning location. For the first week of observations store E's paper department was located

CHART Ia

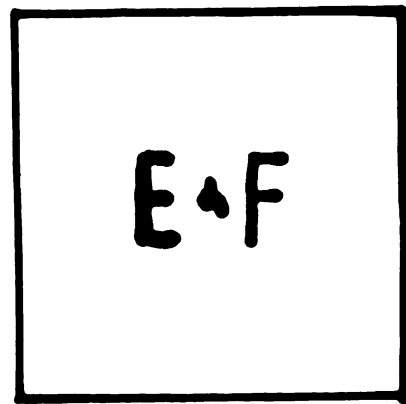
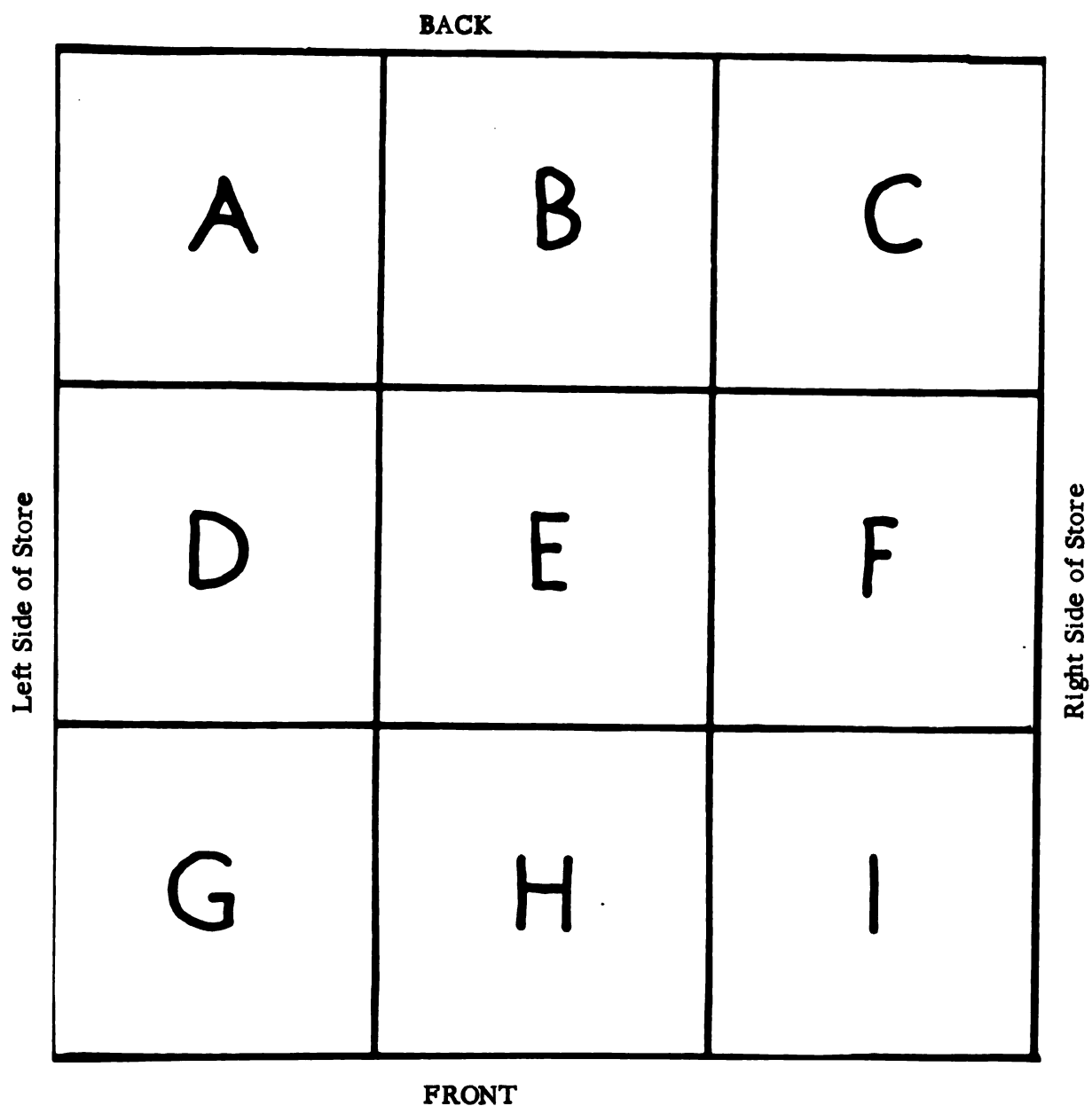


CHART 1b



Location of lettered grid squares assigned to surveyed stores.

### Hypothesis III

The number of facings representing the product categories has some influence on the sales of these categories.

The average number of facings for the eight product categories was computed for the two weeks survey period. A wide variance of facings was noted for each category.

Charts #2 through #8 show the grouping of facings for the various paper product categories along with their average percentages of dollar sales for the number of facings. For the toilet tissue category, the findings show very little besides the fact that additional surveys should be conducted.

In computing the percentage of average dollar sales of sanitary items, food wraps, and paper towels to average total dollar sales by facings, a point of maximum returns was found. For sanitary items, the highest percentage of dollar sales was reached with from 14 to 20 facings. Food wraps and paper towels reached their peak with 15 to 21 facings. A number of hypothetical suggestions may be offered for the variations in these three categories:

1. Few additional sales are realized after a certain number of facings has been utilized.
2. The location of the product on the shelf stimulates the sales independent of the number of facings.
3. Certain brands will sell in large quantities regardless of number of facings.
4. Toilet tissue is a staple product and the percentage of total paper is not affected by the number of facings.

DOLLAR SALES OF PRODUCT CATEGORIES AS A PERCENTAGE OF THE  
STORE's TOTAL DOLLAR PAPER SALES BY FACINGS

Toilet Tissue

Facings	\$ Sales T. T.	\$ Sales paper	%
1 - 10	* .00	* .00	* .00
11 - 20	275.14	781.16	35.22
21 - 30	253.05	846.89	29.88
31 - 40	236.58	761.99	31.05
41 - 50	848.85	2794.80	30.37

Facial Tissue

1 - 5	* .00	* .00	* .00
6 - 10	146.69	781.16	18.78
11 - 15	124.86	751.47	16.62
16-20	284.53	1974.47	14.41

Food Wraps

1 - 7	129.34	883.88	14.63
8 - 14	202.54	1391.13	14.56
15 - 21	158.18	881.30	17.95
22 - 28	* .00	* .00	* .00
29 - 35	111.09	781.16	14.22

Paper Towels

1 - 7	44.02	831.70	5.29
8 - 14	57.25	748.75	7.65
15 - 21	128.11	1154.15	11.10

22 - 28	56.44	545.95	10.34
29 - 35	222.29	2794.80	7.95
<u>Paper Napkins</u>			
1 - 5	* .00	* .00	* .00
6 - 10	63.27	857.79	7.38
11 - 15	* .00	* .00	* .00
16 - 20	* .00	* .00	* .00
21 - 25	210.10	1670.37	12.58
<u>Sanitary</u>			
1 - 6	45.34	575.50	7.88
7 - 13	75.48	832.64	9.07
14 - 20	135.20	1127.66	11.99
21 - 27	* .00	* .00	* .00
28 - 34	207.14	2794.80	7.41
<u>Picnic Items</u>			
1 - 10	40.94	545.94	7.50
11 - 20	82.42	803.82	10.25
21 - 30	* .00	* .00	* .00
31 - 40	* .00	* .00	* .00
41 - 50	* .00	* .00	* .00
51 - 60	517.49	2794.80	18.52
<u>Miscellaneous</u>			
1 - 2	1.38	881.30	.16
3 - 5	32.55	1582.31	2.06

6 - 8	11.97	828.47	1.44
9 - 11	36.40	1127.66	3.23

\* No observations were made with these facings.

CHART II

Percentages

40

35

30

25

20

15

10

5

1 - 10

11 - 20

21 - 30

31 - 40

41 - 50





CHART III

Percentages

40

35

30

25

20

15

10

5

Facings

1

4

7

12

14

20

21

27

33

34

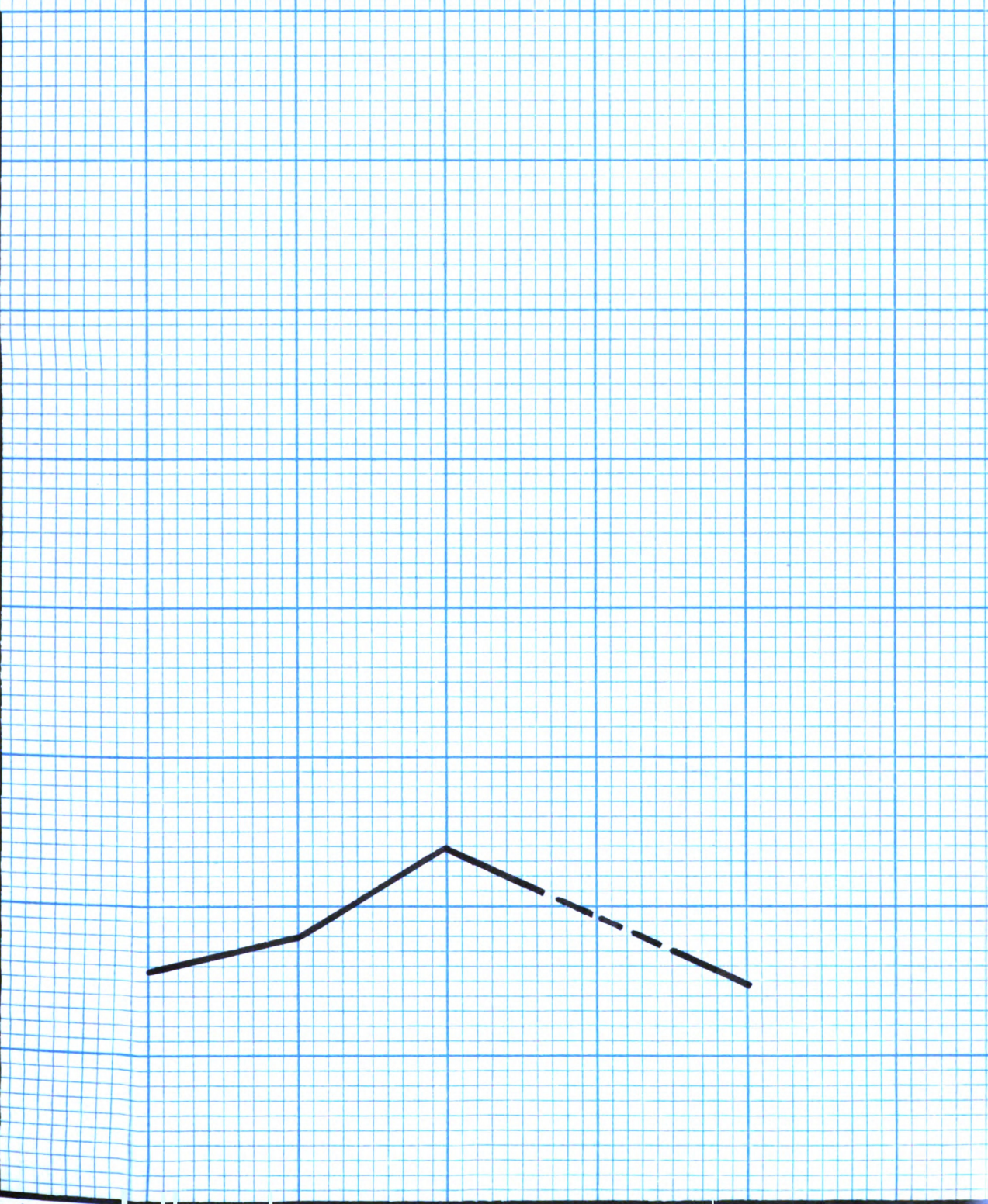




CHART IV

Percentages

40

35

30

25

20

15

10

5





CHART V

Percentages

40  
35  
30  
25  
20  
15  
10  
5

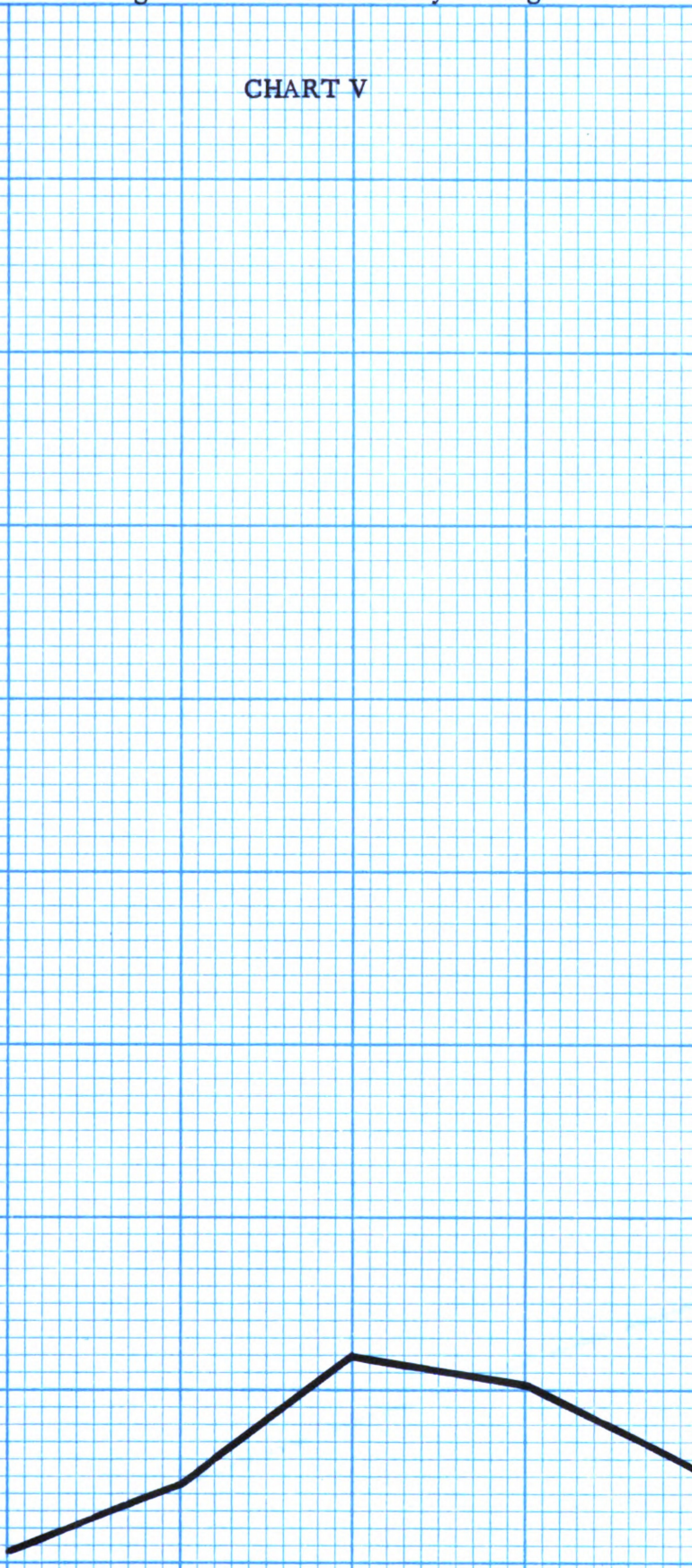


CHART VI

Percentages

40

35

30

25

20

15

10

5

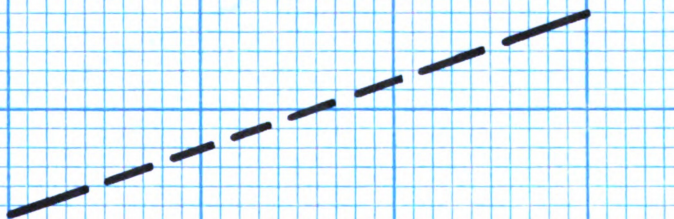


CHART VII

Percentages

40

35

30

25

20

15

10

5

Facings

1 - 10

11 - 20

21 - 30

31 - 40

41 - 50

51 - 60

61 - 70

71 - 80

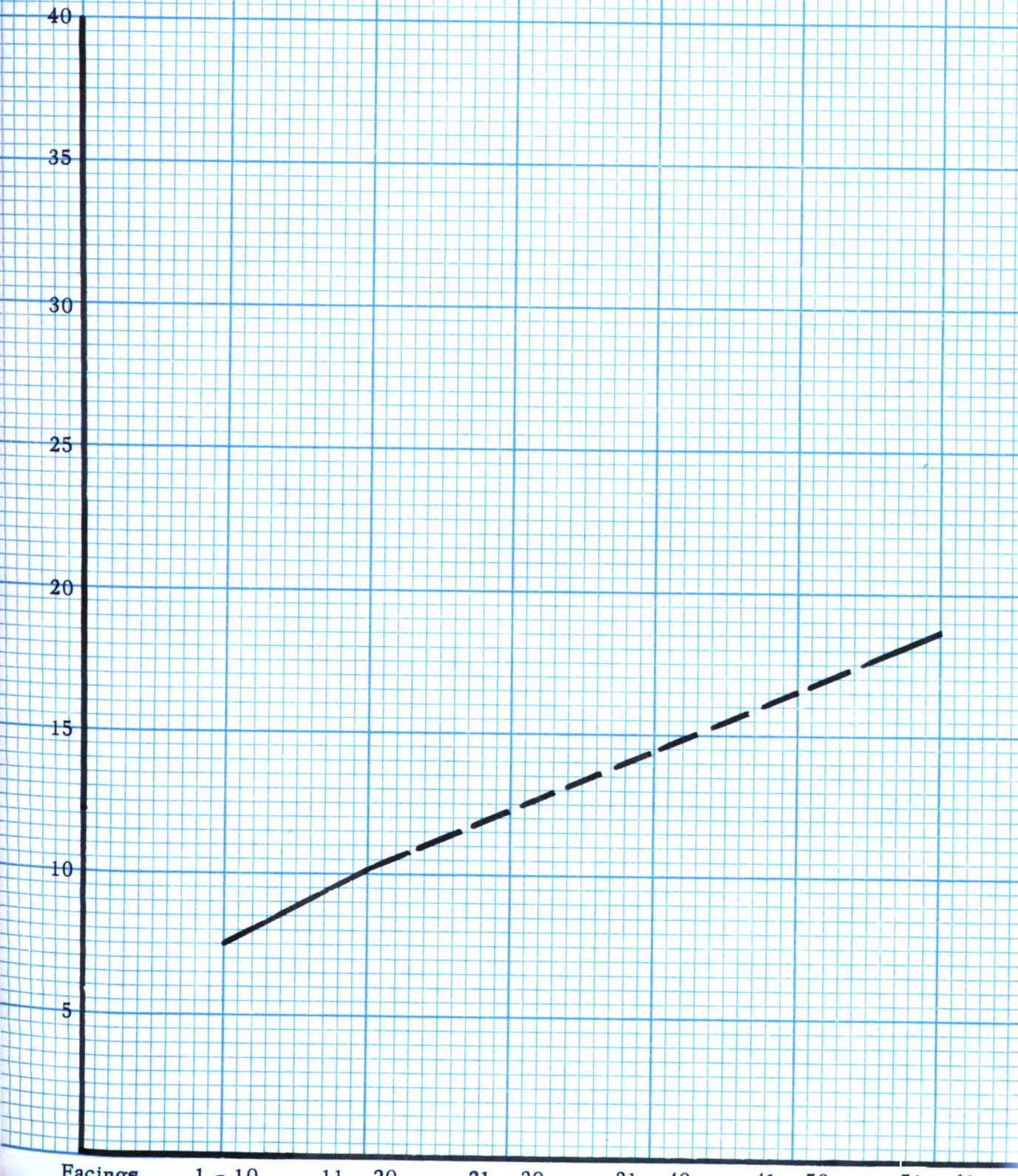


CHART VIII

Percentages

40

35

30

25

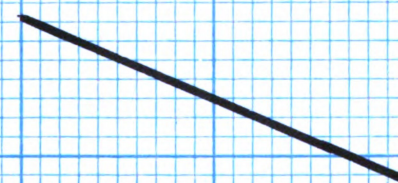
20

15

10

5

Facings 5 6 10 11 15 16 20



## CHAPTER IV

### SUMMARY AND RECOMMENDATIONS

From any survey of this type many questions and hypotheses are raised. It would be fallacious to assume that any concrete conclusions might be drawn from the small sample used in this survey. The survey can, however, serve as a guide and as a study in methodology for further observation in the paper departments of super markets.

#### Hypothesis I

Information obtained concerning the location of the paper department in super markets stimulates the imagination. Perhaps there is an ideal location for this department. It is conceivable that sales in the paper department are stimulated when located in close proximity to the soap department regardless of their location in the store. Departments other than the soap department may have an equal influence on the sale of paper in different seasons. The author feels that additional study would bear out some of these hypotheses to the advantage of both manufacturer and retailer.

The use of 18 grids might not be sufficient in all sizes of stores. A grid system set up in consideration of traffic flow within the store would prove to be of more value. It would be ideal if a group of controlled stores could be utilized

for future study. The paper department could then be moved at designated time intervals to different locations within the stores for the purpose of testing the effect of each location. Other departments could be moved to test the companionship of the paper department to these departments. The author would like to believe that there is a psychological order for the arrangement of a super market and that the paper department has one or more definite locations wherever it may be.

### Hypothesis II

Out-of-stock conditions have plagued the manufacturer and retailer for years. This condition, however, seems to have improved in the last few years. Many studies have been conducted on "brand out-of-stock" but this does not show the out-of-stock on individual package sizes. It was the author's hope that this study might reveal some trend on out-of-stock on individual packages. This, however, could not be accomplished because of the rare out-of-stock conditions found in the stores.

The chances of the super market experiencing an out-of-stock condition on paper products seems to be rather high. It was observed in the nine stores that shelf stocks were allowed to go drastically low before adding another case. When the stock men were questioned about this practice the universal answer was that they did not want to leave half of a case in the stock room. By close scrutiny this idea tends to evolve two hypotheses. The first of these would be that the shelf space for the paper department is not adequate. The second would be that the manufacturer is not packing the paper in convenient size cases.

### Hypothesis III

Proper space allocation cannot be over-emphasized in today's super markets. Many store managers are beginning to realize that some of their shelf space is wasted as far as productivity goes. Since productiveness of shelf space is so vital to the operation and progress of the modern super market, and since a maximum of efficiency is the best guarantee of maximum productiveness, studies on space allocation are of great value in store layout and store allocation plans.

From this study of nine stores it was found that a point of maximum return in facings was present in three of the eight product categories. This is far from conclusive evidence that such a maximum return point does exist. Here again additional surveys would have to be made to prove this hypothesis.

This study also seems to indicate that perhaps a seasonal arrangement for the paper department would be advantageous. If a point of maximum returns on facings for the product categories of paper towels, food wraps and sanitary items could be established, the additional space could be given to seasonal items such as paper napkins and picnic items. From the graphs, paper napkins seem to follow the same trend as picnic items. The author does not believe, however, that paper napkins are as seasonal as picnic items.

No study on facings or space allocation would be complete without considering brand preference in paper products. It is conceivable that ten facings comprised of two brands of a product would yield more gross

profit than fifteen facings comprised of five brands. Unfortunately, time did not allow a breakdown by brands for the nine stores studies in this survey.

#### Correlation Between Total Paper and Toilet Paper Sales

Although the correlation between the store's total toilet paper sales and their percentage of total paper business is revealing, it is of little value until additional surveys are conducted. The author has knowledge of another survey being conducted on the paper departments of six additional super markets in another trading area. The same two variables that correlated to .9983 in the author's survey, correlated to .989 in the other trading area. Both of these correlations would fall in the one-tenth of one percent level of significance.<sup>4</sup>

An interesting analogy to this study on correlation would be the effect an increase in toilet tissue sales would have on total paper sales. Relying solely on the statistical proof of the correlations, the two variables are not independent. Only additional sampling will prove whether or not the two variables are dependent.

There are many studies that can be made through marketing research to aid both the manufacturer and retailer. Mr. A. C. Nielsen in his 1954 report to retail food stores listed nine areas where earnest research is needed.

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4. Ronald Fisher and Frank Yates, Statistical Tables for Biological, Agricultural and Medical Research, Table VI, "The Values of Coefficient of Correlation for Different Levels of Significance," Hafner Publishing Company, Inc., New York, 4th Edition, 1953, p. 54.

Consumer buying habits  
Consumer motivation  
Variations in shopping days  
Frequency of shopping visits  
Characteristics of shoppers  
Choosing store locations  
Improving display methods  
Improving package designs  
Proper inventory levels in store and warehouse<sup>5</sup>

It is the author's hope that the methodology used and the trends shown in this survey may prove to be advantageous to both manufacturer and retailer.

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5. "The Nielsen Report to Retail Food Stores," A. C. Nielsen Company, Chicago, Illinois, 1954, p. 35.

## APPENDIX

### Audit Form Used For Surveying Stores

Name of Store \_\_\_\_\_

Location of Store \_\_\_\_\_  
\_\_\_\_\_

Date and Time of Audit \_\_\_\_\_

<u>BRANDS</u>	1. Price	2. Facings	No. on 3. shelves	No. in 4. backroom	Total units 5. beginning
Toilet Tissue					
Food Wraps					
Facial Tissues					
Paper Napkins					
Paper Towels					
Picnic Items					
Paper Plates					
Paper Cups					
Straws					
Spoons and Forks					
Sanitary Items					
Sandwich & Garbage Bags					
Shelf Rolls & Lining					
Baking Cups					

			Date_____	Time_____		
Previous Inventory	Facing	No. on shelf	No. in Backroom	Total	Received	No. sold

## TOTAL PAPER SALES IN DOLLARS

Store	Location of Paper Dept.	Date	Toilet Tissue	Facial Tissue	Food Wraps	Paper Towels	Paper Napkins
A	D	7/19	450.19	183.21	111.14	126.35	116.84
		7/26	398.66	170.32	230.25	95.94	138.13
		Total	848.85	353.53	341.39	222.29	254.97
B	I	7/19	196.26	84.28	45.36	30.20	28.72
		7/26	78.88	62.41	65.73	17.10	23.29
		Total	275.14	146.69	111.09	47.30	52.01
C	E	7/19	143.27	109.37	57.73	12.90	16.44
		7/26	135.44	69.60	100.45	17.16	21.07
		Total	278.71	178.97	158.18	30.06	37.51
D	E & F	7/19	73.17	24.95	35.98	23.63	112.51
		7/26	55.95	39.84	39.33	32.81	52.71
		Total	129.12	64.79	75.31	56.44	165.22
E	I	7/19	47.81	24.72	19.76	2.99	6.83
		7/26	84.25	37.20	21.14	8.28	20.59
		Total	132.06	61.92	40.90	11.27	27.42
F	B	7/19	136.34	62.27	116.87	25.65	26.48
		7/26	140.97	54.97	74.05	29.06	25.19
		Total	277.31	117.24	190.92	54.71	51.67
G	E	7/19	229.94	112.35	30.24	67.27	66.31
		7/26	151.16	103.19	133.23	60.84	30.43
		Total	341.10	215.54	163.47	128.11	96.76
H	E	7/19	161.73	128.67	68.37	82.14	64.22
		7/26	165.33	81.69	115.38	21.09	44.65
		Total	327.06	210.36	183.75	103.23	108.85
I	D	7/19	158.27	81.92	146.87	31.01	51.34
		7/26	184.20	213.14	96.74	46.54	63.22
		Total	342.47	295.06	243.61	77.55	114.56

Sani- tary	Picnic Items	Misc.	Total Dollars
112.40	322.03	41.38	1463.54
94.74	195.46	7.76	1331.26
<u>207.14</u>	<u>517.49</u>	<u>49.14</u>	<u>2794.80</u>
14.96	39.21	1.05	440.11
30.36	62.19	.82	341.05
<u>45.59</u>	<u>101.47</u>	<u>1.87</u>	<u>781.16</u>
70.07	29.08	.69	439.55
52.62	44.72	.69	441.75
<u>122.69</u>	<u>73.80</u>	<u>1.38</u>	<u>881.30</u>
* - -	25.47	7.56	304.25
* - -	15.57	5.58	241.69
	<u>40.94</u>	<u>13.14</u>	<u>545.94</u>
14.63	12.61	7.80	137.15
30.45	22.62	8.15	232.68
<u>45.08</u>	<u>35.23</u>	<u>15.95</u>	<u>369.83</u>
36.67	23.81	6.94	435.03
38.81	28.07	6.49	397.61
<u>75.48</u>	<u>51.88</u>	<u>13.43</u>	<u>832.64</u>
* - -	103.01	10.95	620.07
* - -	46.71	8.50	534.08
	<u>149.72</u>	<u>19.45</u>	<u>1154.15</u>
70.26	36.40	8.75	620.54
64.94	- - -	14.16	507.12
<u>135.20</u>	<u>36.40</u>	<u>22.91</u>	<u>1127.66</u>
* - -	98.90	7.30	575.61
* - -	82.28	1.15	687.37
	<u>171.28</u>	<u>8.45</u>	<u>1262.98</u>

\*Sanitary Items not located in paper departments.

Percent of Store Paper Volume in Dollars to Total Paper Volume  
of All Stores

Store	Toilet Tissue	Facial Tissue	Food Wrap	Paper Towel	Paper Napkins	Sani- Tary	Picnic Items	Misc.	Total %
A	28.3	21.5	22.6	30.4	28.0	32.8	43.9	33.7	28.6
B	9.1	8.9	7.3	6.4	5.7	7.2	8.6	1.2	8.0
C	9.3	10.8	10.4	4.1	4.1	19.4	6.2	.9	9.0
D	4.3	3.9	4.9	7.7	18.1	- -	3.4	9.0	5.5
E	4.4	3.7	2.7	1.5	3.0	7.1	2.9	10.9	3.7
F	9.2	7.1	12.6	7.4	5.6	11.9	4.4	9.2	8.5
G	12.7	13.1	10.8	17.5	10.6	- -	12.7	13.3	11.8
H	10.9	12.7	12.1	14.1	11.9	21.4	3.0	15.7	11.5
I	11.4	17.9	16.1	10.6	12.6	- -	14.5	5.7	12.9

## TOTAL PAPER SALES BY UNITS

Store	Toilet Tissue	Facial Tissue	Food Wrap	Paper Towel	Paper Napkins	Sani- tary	Picnic Items	Misc.	Total Units
A	3852 <u>3233</u> 7085	968 <u>845</u> 1813	391 <u>843</u> 1234	648 <u>481</u> 1129	772 <u>923</u> 1695	180 <u>165</u> 345	1027 <u>684</u> 1711	150 <u>34</u> 184	7988 <u>7208</u> 15196
B	1454 <u>482</u> 1936	395 <u>265</u> 660	166 <u>227</u> 393	162 <u>86</u> 248	167 <u>152</u> 319	30 <u>43</u> 73	376 <u>257</u> 633	9 <u>4</u> 13	2759 <u>1516</u> 4275
C	951 <u>867</u> 1818	424 <u>185</u> 609	223 <u>333</u> 556	65 <u>91</u> 156	82 <u>119</u> 201	85 <u>73</u> 158	102 <u>153</u> 255	3 <u>3</u> 6	1935 <u>1824</u> 3759
D	724 <u>501</u> 1225	137 <u>206</u> 343	118 <u>125</u> 243	118 <u>173</u> 291	397 <u>194</u> 591	- - - - - -	147 <u>45</u> 192	48 <u>48</u> 96	1689 <u>1292</u> 2971
E	450 <u>850</u> 1300	102 <u>155</u> 257	76 <u>82</u> 158	16 <u>45</u> 61	35 <u>142</u> 177	21 <u>35</u> 56	50 <u>84</u> 134	36 <u>35</u> 71	786 <u>1428</u> 2214
F	904 <u>1101</u> 2205	239 <u>216</u> 455	341 <u>237</u> 578	129 <u>138</u> 267	92 <u>127</u> 219	63 <u>79</u> 142	80 <u>133</u> 213	49 <u>31</u> 80	1897 <u>2062</u> 3959
G	1472 <u>1423</u> 2895	592 <u>389</u> 981	112 <u>513</u> 625	345 <u>304</u> 649	299 <u>203</u> 502	- - - - - -	583 <u>206</u> 789	85 <u>76</u> 161	3488 <u>3114</u> 6602
H	1625 <u>1071</u> 2696	479 <u>369</u> 848	288 <u>346</u> 634	416 <u>104</u> 520	373 <u>243</u> 616	124 <u>95</u> 219	169 - - - 169	83 <u>82</u> 165	3557 <u>2310</u> 5867
I	1403 <u>1750</u> 3153	423 <u>894</u> 1326	555 <u>390</u> 945	159 <u>238</u> 397	282 <u>292</u> 574	- - - - - -	335 <u>273</u> 608	31 <u>8</u> 39	3157 <u>3845</u> 7002

## Percent of Store Paper Volume in Units to Total Paper Volume of all Stores

Store	Toilet Tissue	Facial Tissue	Food Wrap	Paper Towel	Paper Napkins	Sani- tary	Picnic Items	Misc.	Total %
A	29.0	24.9	22.9	30.3	34.6	34.7	36.3	27.5	29.3
B	8.0	9.1	7.3	6.0	6.5	7.3	13.4	1.5	8.3
C	7.5	8.3	10.3	4.1	4.1	15.9	5.4	.7	7.3
D	5.0	4.7	4.5	7.8	12.0	- -	4.0	11.7	5.7
E	5.4	3.5	2.9	1.6	3.6	5.6	2.8	8.7	4.3
F	9.1	6.2	10.7	7.1	4.4	9.3	4.5	9.8	7.6
G	11.0	13.5	11.6	17.4	10.2	- -	16.7	19.7	12.7
H	11.1	11.6	11.8	13.9	12.5	22.0	3.5	20.2	11.3
I	13.0	18.1	17.6	10.6	11.7	- -	12.9	4.7	13.5

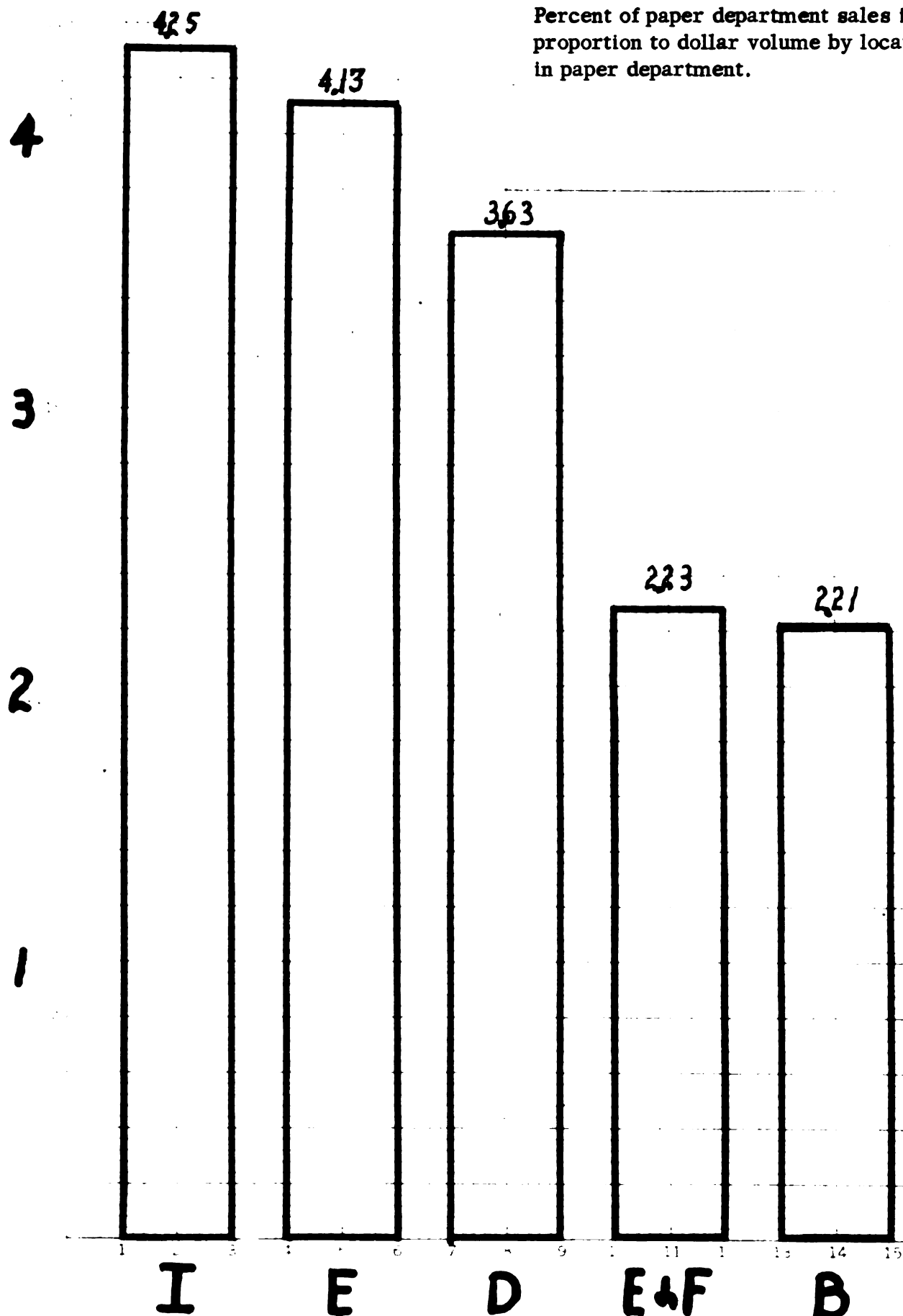
<b>Store</b>	<b>Computed Total Annual Sales by Stores</b>	<b>Computed Average Weekly Sales by Stores</b>	<b>Average Weekly Paper Product Sales by Stores</b>	<b>Derived Percentage of Paper Sales by Stores of Total Sales by Stores</b>
A	1,927,000.00	38,540.00	1,397.40	3.63
B	352,000.00	7,040.00	390.58	5.55
C	564,000.00	11,080.00	440.65	3.97
D	611,000.00	12,222.00	272.97	2.23
E	264,000.00	5,280.00	184.92	3.50
F	940,000.00	18,800.00	416.32	2.21
G	893,000.00	17,260.00	577.08	3.34
H	564,000.00	11,080.00	563.83	5.09

## Average Facings By Product Categories for all Stores

Store	Toilet Tissue	Facial Tissue	Food Wraps	Paper Towels	Napkins	Sani- tary	Picnic Items	Misc.
A	43.5	16.7	9.3	32.8	23.4	31.1	5.2	3.0
B	19.3	9.8	31.6	6.6	7.6	6.3	16.8	8.0
C	23.0	14.0	19.0	2.7	6.5	- - -	13.5	1.0
D	26.7	13.1	8.0	24.8	22.8	- - -	6.0	6.0
E	30.5	12.5	5.5	8.0	6.5	6.0	17.0	3.0
F	22.5	11.2	4.0	7.5	7.0	8.0	14.1	7.0
G	37.9	18.8	7.0	16.7	7.7	- - -	14.6	6.3
H	21.6	11.7	7.0	8.2	9.1	14.0	- - -	11.4
I	33.5	26.7	9.9	23.3	5.9	- - -	23.4	5.0

CHART IX

Percent of paper department sales in proportion to dollar volume by location in paper department.



Percentage of Toilet Tissue Unit Sales to Total Unit Sales

<u>Store</u>	<u>Total T. P.</u>	<u>Total Paper</u>	<u>%</u>
A	7,085	15,196	46.6
B	1,936	4,275	45.3
C	1,818	3,759	48.4
D	1,225	2,971	41.2
E	1,300	2,214	58.7
F	2,005	3,959	50.6
G	2,895	6,602	43.8
H	2,696	5,867	46.0
I	3,153	7,002	45.0

Average percentage 47.29 %

Standard deviation 4.745

Derivation of Correlation of Coefficient  
of the Two Variables - Toilet Tissue  
Unit Percentages and Total Unit Paper Sales

X	X <sup>2</sup>	Y	Y <sup>2</sup>	XY
29.0	841.00	29.3	858.49	849.60
8.0	64.00	8.3	68.89	66.46
7.5	56.25	7.3	53.29	54.75
5.0	25.00	5.7	32.49	28.50
5.4	29.16	4.3	18.49	23.22
9.1	82.81	7.6	57.76	69.16
11.9	141.61	12.7	161.29	151.13
11.1	123.21	11.3	127.69	125.43
13.0	169.00	13.5	182.25	175.50
-----	-----	-----	-----	-----
100.0	1,532.04	100.0	1,560.64	1,543.79

Formula: <sup>1</sup>  $r = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}}$

$$\sum xy = \sum XY - \frac{(\sum X)(\sum Y)}{N}$$

$$\sum xy = 1,543.79 - \frac{1111.11}{9}$$

$$\sum xy = 432.68$$

$$\sum x^2 = \sum X^2 - \frac{(\sum X)^2}{N}$$

$$\sum x^2 = 1,532.04 - \frac{1111.11}{9}$$

$$\sum x^2 = 420.93$$

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1. Frederick Emory Croxton and Dudley Johnstone Cowden, Applied General Statistics, Prentice-Hall, Inc., New York 1955, p. 465.

$$\sum y^2 = \sum Y^2 - \frac{(\sum Y)^2}{N}$$

$$\sum y^2 = 1,560.64 - \frac{1111.11}{9}$$

$$\sum y^2 = 449.53$$

$$r^2 = \frac{(\sum xy)^2}{\sum x^2 \sum y^2}$$

$$r^2 = \frac{(432.68)^2}{420.93 \times 449.53}$$

$$r^2 = \frac{187,211.98}{189,220.66}$$

$$r^2 = .9894$$

$$r = \sqrt{.9894}$$

$$r = .995^2$$

2. The significance of increased correlation coefficient is .001. This is equivalent to the "T" test of the regression.

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