AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

obtaining sufficient harvest labor and cuts his harvesting cost by approximately 60%. The retailers who handled the product were very pleased with it since it greatly reduced the amount of in-store labor needed to properly market a quality asparagus product, greatly reduced spoilage problems, and virtually eliminated loss due to spear damage from consumer handling. In-store observation and testing by the Rutgers Food Science Department indicated an in-store shelf life of approximately five to six days. When the asparagus were held at ideal conditions the shelf life approached two weeks. The consumer benefits by purchasing this pack because she is actually paying less for usable asparagus (assuming that approximately 40% of hand harvested asparagus is too fibrous to eat, she is actually paying $ .95 for a pound of edible asparagus). Finally, in this age of environmental concern, we all benefit because the waste asparagus is left at the farm rather than being transported to the city and then transported out again as garbage. This yields both a saving in social cost and actual transportation costs.

******

STORE DESIGN AND LAYOUT FOR MANAGEMENT DECISION

by
Clyde Cunningham
University of Missouri
Columbia, Missouri

A preliminary report on a study of an "ideal" layout for medium sized supermarkets.

Today the food retailer finds himself in a competitive cost-price squeeze. Food retailing is undergoing important changes. Among these are (1) expanding total sales, (2) declining number of stores, (3) expanding sales per store, (4) increasing sales per employee, (5) increasing hourly wages, (6) expanding sales area in stores, (7) increasing number of food and non-food items, and (8) increased emphasis on discount pricing. In addition, the retailer has become increasingly aware of his responsibility to the consumer. The need for designing, building, and operating efficient retail facilities that effectively serve the consumer is central to this effort.

The supermarket is the focal point where the consumer comes in contact with the food distribution system. It is here that she develops her image of the retail firm and impressions of the food industry. Store layout planning has an important role in that the layout provides the framework for developing the image and establishing an efficient retail operation. As such the layout must serve four important functions.

1. Effectively serve the consumer--it should make it easy for the customer to move through the store and obtain the desired merchandise with a minimum of confusion, congestion and delay.

2. Improve store efficiency--it should minimize labor and handling needed in moving merchandise through the store while satisfying the merchandising objectives.

3. Maximize sales--it should provide for a merchandising arrangement that assures maximum exposure for all merchandise carried, considering space costs, product movement, profitability and perishability.

Table 1. Size of the 25 Supermarkets in the Sample

	Range[1]		Median[1]
	Highest	Lowest	
Weekly sales per store	$109,711	$20,397	$39,082
Total Store area	29,990 sq.ft.	7,200 sq.ft.	16,000 sq.ft.
Sales area[2]	20,920 sq.ft.	5,304 sq.ft.	9,184 sq.ft.
Front-end	3,450 sq.ft.	515 sq.ft.	1,404 sq.ft.
Backroom	8,647 sq.ft.	960 sq.ft.	4,680 sq.ft.
Sales area/total store	75.6%	47.6%	59.1%
Front-end/total store	14.7%	4.4%	8.5%
Front-end/total sales area	29.8%	6.0%	14.4%
Backroom/total store	37.7%	13.3%	28.5%
Backroom/total sales area	73.4%	18.1%	50.0%
Sales/sq.ft. total store	$4.23	$1.40	$2.59
Sales/sq.ft. total sales area[3]	$7.25	$2.12	$3.60

[1] The figures in this table are not additive since they represent the extremes and median for the entire sample of 25 stores and do not represent any individual store.

[2] Excludes front-end.

[3] Sales area includes front-end.

******

4. Implement the desired image--it should provide space and an arrangement of the departments consistent with the desired image goals.

In order to give proper attention to these functions, it is necessary that considerable time be spent in planning the layout. Even though it is often necessary to compromise the ideal, careful planning will help to minimize the built-in costs that often result when layout decisions are made in a hasty or piece meal fashion.

This study was designed to evaluate typical store layouts of representative food firms located throughout the United States. The objective was to determine and evaluate present methods, procedures, guidelines, and criteria used by food distribution firms in planning layouts for new supermarkets.

The data used in this study were provided by firms representing the corporate chains, independent chains, cooperatives and voluntary independents. Twenty-three firms located in 14 states across the country participated and provided 25 stores. The basic information was obtained from a copy of the store layout plan submitted by the firm and the corresponding operating statement. The firms were asked to provide a layout of their best store plan. This layout should represent the one they believed provided the performance they desired, that they were currently recommending, and that they intended to use in the future. Additional information was provided by personal interviews with the representatives of each of the participating firms who had the responsibility for developing store layouts.

Medium size stores were deliberately selected, thereby attempting to find an area of uniformity in all the firms studied. The convenience store and the extra large supermarket--including extensive non-foods--probably would be considered as separate distinct operations.

A main objective of this study was to determine if there was a typical or "prototype" store. If a basic plan could be identified, then it might be used as a guide. This would not necessarily mean that all

stores would be stereo-typed or look alike. The layout principles could be used, with individual identity maintained. Individual food firms typically prefer to differentiate their own stores and to project an image consistent with their particular goals and objectives. Techniques that are used for this purpose include: identifying signs and symbols, decor, merchandising mix, type and number of services provided, pricing and promotion policies, quality of perishables, type of building construction, etc. While recognition is given to the importance of these items, they will be considered only as they affect the layout of the entire store or specific departments.

Preliminary Findings

The stores included in this study did exhibit some differences in the types of store layout plans used in different sections of the country. Stores in Kansas City and East generally have a one-way traffic pattern while stores in Denver and West generally provide a two-way traffic pattern.

The two-way traffic design locates the meat department on one side more consistently than across the back of the store. Produce was consistently located on the opposite side of the store. Therefore, meat and produce departments would be located either first or last in the shopping pattern--depending on where the customer started shopping.

With a one-way traffic pattern and products located for impulse buying, departments could be located as bakery first, then produce, with meat across the back, dairy, and frozen foods last in the shopping pattern. The preliminary analysis indicates that sales could be higher with a one-way traffic flow.

The operating statements for the stores do not provide adequate information on the operation of individual departments in most cases. The "big three"--grocery, meat and produce continue to exist. Dairy, frozen food, eggs, non-foods, etc., are generally incorporated in the grocery sales figures. This is the conventional method of reporting as illustrated by the operating statements observed, and tends to support the argument that management may not be fully aware of what these other departments are doing.

There is considerable variation between stores in percent of total sales for each department. Percentagewise, the spread was greatest in the produce department. No one store ranked consistently, high or low in the percent of total sales in the three major departments.

Total Store

Table 1 provides a profile of some of the major dimensions of the 25 stores analyzed in the sample. Total store sales are based on weekly sales for each store and indicate that there was a wide range for the sample--$109,000 to $20,000. The median approximated $40,000 per week. This variation in sales suggests that sales per square foot of total store area and of sales area may be more meaningful measures for comparison of the store operations. These are presented in Table 1.

The store size varied from approximately 30,000 square feet of total store area to a low of 7,200 square feet. Total sales area ranged from 47.6 percent of total store space to 75.6 percent. The backroom area is typically divided into areas used for other purposes. Other purposes include employee lounges, compressor rooms, managers' offices, etc. Table 1 contains figures for the total backroom. The portion of the backroom devoted to the storage and handling of grocery, meat, and produce is identified in the tables describing those particular departments (Tables 2, 3, 4).

The front-end area typically includes checkouts, courtesy booth, cart storage and managers' offices. Ten stores in the study have conference rooms, customer rest areas, liquor storage, etc., and this space was charged to the front-end. Based on the data, the front-end space could represent about 10 percent of total store space.

Sales area as a percent of total store space varied from a high of 75.6 percent to a low of 47.6 percent. Three stores in the study were above 70 percent and only two stores had less than half the total store space devoted to sales area.

The backroom ranged from a high of 37.7 percent of total store area to a low of 13.3 percent. Six stores had more than 30 percent

Table 2. Profile of the Grocery Departments[1/]

	Range[2/]		
	Highest	Lowest	Median[2/]
Percent of total store sales	73.3%	59.3%	69.3%
Percent gross margin	22.3%	14.4%	18.4%
Percent of total sales area	90.8%	66.7%	80.2%
Grocery storage/grocery sales[3/]	60.3%	10.3%	36.4%
Grocery storage/grocery sales[4/]	60.1%	8.4%	28.5%
Grocery storage/total backroom	80.0%	36.5%	58.1%
Grocery sales area[4/]	20,323 sq.ft.	5,163 sq.ft.	8,993 sq.ft.
Grocery backroom area	8,376 sq.ft.	944 sq.ft.	4,420 sq.ft.
Linear feet of gondolas[5/]	1,859 ft.	570 ft.	990 ft.
Weekly grocery sales	$76,969	$14,308	$25,839
Sales/sq.ft. sales area[4/]	$6.24	$1.69	$3.01
Sales/linear ft. of gondolas	$68.72	$14.45	$28.63

[1/] Grocery department includes sales in all departments except meat and produce.

[2/] The figures in this table are not additive since they represent the extremes and median for the entire sample of 25 stores and do not represent any individual store.

[3/] Does not include front-end area.

[4/] Includes front-end in grocery sales area.

[5/] Calculated as to length of gondolas -- does not represent shelf space.

******

of total store space devoted to storage. Backroom space for the stores in the study appears to be somewhat larger than is needed for the most efficient operation.

Grocery Department

The grocery department includes figures for all departments except meat and produce. A profile of the grocery department is presented in Table 2. Groceries, as a percent of total sales, ranged from a high of 73.3 percent of total to a low of 59.3 percent, with a median of 69.3 percent. Eleven of the stores in this study were above 70 percent while only one was below 60 percent.

The range in gross margin was from a high of 22.3 percent to a low of 14.4 with a median of 18.4 percent. Seven stores had a gross margin of 20.0 percent and above, while only two were below 15 percent.

The ratio of grocery sales area to total sales area varied from a high of 90.8 percent to a low of 66.7 percent with a median of 80.2 percent. Seven stores were above 85 percent while only two were below 76 percent.

Grocery sales per square foot ranged from a high of $6.24 to a low of $1.69 with a median of $3.01. Four stores were above $4.00 while only two were below $2.00 in grocery sales per square foot. The linear footage was calculated measuring the length and both sides of the gondolas and does not include total shelf space. There was no way to determine the exact amount of shelf space included in each store from the floor plan. Sales per linear foot ranged from $68.72 to a low of $14.45 with a median of $28.63.

Eleven of the stores had a grocery backroom storage area that was less than one-third of the size of the grocery sales area (when the front-end area is not included in the grocery sales area). The grocery backroom used as much as 80.0 per-

Table 3. Profile of the Meat Department

	Range[1]		Median[1]
	Highest	Lowest	
Percent of total store sales	33.6%	18.7%	24.7%
Percent of total sales area	14.6%	4.4%	6.9%
Percent gross margin	38.4%	15.0%	20.8%
Percent meat storage and preparation to meat sales area	320.3%	70.9%	153.5%
Square feet in meat sales	1,428 sq.ft.	360 sq.ft.	720 sq.ft.
Square feet in meat backroom	7,224 sq.ft.	944 sq.ft.	4,420 sq.ft.
Linear feet display space	769 ft.	28 ft.	72 ft.
Weekly dollar sales	$33,091	$4,720	$9,128
Sales/square feet of sales area	$45.95	$6.71	$15.20
Sales/linear feet of display	$318.18	$7.24	$126.70

[1]The figures in this table are not additive since they represent the extremes and median for the entire sample of 25 stores and do not represent any individual store.

******

cent of the total backroom storage space in one store while the median for the group was 58.1 percent.

Meat Department

Table 3 contains a profile of the meat departments in the study. Meat sales as a percent of total store sales ranged from a high of 33.6 percent to a low of 18.7 percent with half the stores doing better than 24.7 percent in the meat department. Half of the stores had weekly meat sales of $9,000 or more, and six stores exceeded $15,000 per week. Five of the stores had meat gross margins of 25 percent or more while the median for all stores was 20.8 percent and the lowest was 15.0 percent.

The study stores exhibited a wide range in sales per square foot in the meat area from a high near $46.00 to a low of $6.71. Interestingly enough the store with the highest sales per square foot was right at the median (720 sq. ft.) in meat sales area. Eight stores exceeded $20.00 while five were below $10.00 in sales per square foot in meat.

The meat department appears to make its best total contribution to store operations when located across the back of the store with a traffic flow from right to left. Most of the stores had the meat sales area located across the back although six placed it on one side. Four of these stores had the meat department situated first in the shopping pattern. The aisle widths ranged from six to nine feet for the study stores.

The meat sales area occupies from 14.6 percent of the total sales area to a low of 4.4 percent. Four stores had less than 5 percent of the total sales area allocated to meat sales and four stores had more than 10 percent devoted to meat sales.

The storage and preparation area includes the cooler space, preparation area and a portion of the loading and receiving area. The total backroom area used for meat preparation and storage ranged from a high of 41.2 percent to a low of 13.5 percent. When comparing the meat storage and preparation area to the respective meat sales area, five stores had more than twice as much backroom space as sales area. The median was approximately one and a half times as much space in storage and preparation as in the sales area.

Store operations have been observed where the backroom area would not support the sales area as the product volume could not be produced to meet the demand during heavy shopping periods. This study points

Table 4. Profile of the Produce Department

	Range[1/]		Median[1/]
	Highest	Lowest	
Percent of total store sales	11.9%	4.7%	6.5%
Percent of total sales area	18.7%	4.6%	10.8%
Percent gross margin	38.7%	21.0%	31.0%
Percent produce backroom to produce sales area	193.9%	21.3%	61.5%
Square feet in produce sales	2,704 sq.ft.	384 sq.ft.	856 sq.ft.
Square feet in produce backroom	1,181 sq.ft.	153 sq.ft.	624 sq.ft.
Linear feet display space	185 ft.	48 ft.	97 ft.
Weekly dollar sales	$9,694	$1,178	$2,375
Sales/square feet of sales area	$6.09	$1.42	$2.88
Sales/linear feet of display	$67.32	$11.04	$27.11

[1/] The figures in this table are not additive since they represent the extremes and median for the entire 25 stores and do not represent any individual store.

******

up the wide variability between the sales area and backroom space. Interviews with store planners indicated that not many changes were presently being planned for the meat backroom. However, some believe there will be less backroom space used for meat, an increase in the use of boxed beef, wider cooler doors, and fewer meat rails. At the present time, there appears to be a need for more research in this area to resolve some of the uncertainties and determine efficiencies that can be incorporated into the meat backroom.

Produce Department

The produce department has generally been considered as the area that adds color to the store, attracts the shoppers attention, and contributes effectively to the store image. This was further supported by the fact that two-thirds of the stores located the produce department first in the shopping pattern.

Table 4 provides a profile of the produce departments in the study stores. Ten stores had weekly produce sales greater than $3,000, with five above $5,000. At the other end of the scale five had sales below $1,500 per week in the produce department. Seven stores had more than 7 percent of their total sales in the produce department with half of the stores doing better than 6.5 percent. The store with the highest sales per square foot of sales area in the produce department had 7.6 percent of its sales area devoted to produce sales. This represented a produce sales area approximating 1,600 square feet which was considerably larger than the median of 856 square feet for the sample.

Half of the stores in the study had a product gross margin greater than 31 percent and seven of them were above 35 percent. Only three stores had a gross margin below 25 percent.

Approximately 11 percent or more of the total sales area was allocated to produce sales in 50 percent of the study stores. The backroom storage and preparation space allocated to produce included holding areas, trimming and wrapping areas, cooler, and receiving areas. Half of the stores had a produce backroom that was equal to or less than 61.5 percent of the produce sales area. Four stores had a produce backroom that was larger than the sales area.

Other

This preliminary report covers some of the findings in our survey of what the re-

tail firms that participated consider to be their best plans. A more comprehensive report on the survey is being prepared and will be available in a few months. It will include diagrams of layouts for future consideration, including an analysis of a composite of the best three stores in the survey. In addition, information will be provided on (1) some of the other departments in the store, (2) the role of the store planners, and comments on the use of refrigerated equipment. Finally, a handbook for store layout will be prepared using the results of the survey, available published data, and interviews with knowledgeable professionals.

******

EVALUATION OF ALTERNATIVE SYSTEMS OF HANDLING MILK AND ICE CREAM PRODUCTS IN SUPERMARKETS

by
Eric C. Oesterle
Purdue University
West Lafayette, Indiana

Study alternative systems designed to increase efficiency in the dairy departments.

Who

This investigation is funded by the Milk Industry Foundation and The International Association of Ice Cream Manufacturers, Washington, D.C. Other sponsors include Tyler-Clark Equipment Company, Indianapolis Division of Bordens, the Standard Division of National Tea Company and the Department of Agricultural Economics at Purdue University.

Why

Purpose of the study is

1. To evaluate alternative methods of handling dairy and ice cream products in supermarkets, with emphasis being given to fast moving, demanded items.

2. To develop systems of scheduling labor for supermarket dairy and ice cream departments based on time studies of selected handling systems. Improved work methods in selected key functions such as pricing and stocking will be detailed.

3. To provide guidelines for implementation of specific, improved handling systems for supermarket milk and ice cream departments which can become an integral part of a merchandising assistance program offered by dairy supply firms for their supermarket accounts.

What

The evaluation consists of three phases

1. Analysis of the Current Dairy and Ice Cream Operations in two selected Indianapolis supermarkets as to product movement, inventory investment, space allocation, labor inputs, vendor inputs and spoilage for major product classifications and individual products within classifications.

2. Modification of Current Operations to incorporate concepts of self-service selling with emphasis being given to labor scheduling, space allocation, strategic use of demand items in the display arrangement, elimination of slow moving items, family grouping of items as an aid to shopping and vertical or eye level merchandising.