The Supermarket Industry at the Start of the 21st Century: Key Findings from the 2000 Supermarket Panel

Robert P. King, Jean D. Kinsey, Paul J. Wolfson, and Jonathan M. Seltzer

The 2000 Supermarket Panel gathered data on store characteristics, management practices, and operating performance from a representative, nation-wide sample of supermarkets. The Panel is unique because the unit of analysis is the individual store, and the same stores will be surveyed over time. Linking information on management practices and store and market characteristics with measures for key performance measures provides useful information for both strategic and tactical decisions. Descriptive findings are presented for stores grouped by ownership group size and format. Results from a multivariate analysis of relationships between store performance and key performance drivers also are presented.

The decade of the 1990s was a time of great change in food retailing in the United States. The total number of food stores (supermarkets, convenience stores, and others) declined by 25 percent between 1978 and 1999, from 169,500 to 127,000. Over the same period the number of supermarkets—defined here as stores "offering a full line of groceries, meat, and produce with at least $2 million in annual sales" (Food Institute 1999, p. 75)—decreased by only 6 percent, from 33,392 to 31,500. In 1999 supermarket sales accounted for more than 77 percent of all retail food store sales (Food Institute 1992, 1998, 2000). Between 1988 and 1998 median weekly sales in supermarkets increased by 14 percent in real terms to $333,411. Median store size increased by 9,068 square feet to over 40,000 square feet, but real sales per square foot fell by 22 percent to $10.16 per week (Food Marketing Institute 1999).

Major changes in several areas were the basis for significant new challenges facing supermarkets during the 1990s.

- With increasing participation of women in the labor force and rising household incomes, the share of household food dollars for food prepared at home fell to 53 percent. In an effort to recapture some of their lost share of the food dollar, supermarkets were looking for new formats, new products and services, and new partners.
- The competitive landscape was transformed by the rapid expansion into food retailing by Wal-Mart and by significant mergers and acquisitions by traditional food retailers. The concentration ratio of the top four supermarket chains increased from about 16 to 34 percent, and Wal-Mart moved into the top four chains with the opening of supercenters with full-line grocery departments (Food Institute 1992, 1998, 2000).
- New information technologies and business practices based on information sharing and collaborative decision making with key suppliers began to transform front-end and back-room operations in supermarkets. Through the establishment of standards and the development of educational materials, the Efficient Consumer Response (ECR) initiative made it easier for stores to adopt new technologies and practices designed to increase overall efficiency of the retail food supply chain (King and Phumpiu 1996). In the late 1990s, emerging systems involving the use of the Internet for transmitting data between retailers, wholesalers, and food manufacturers offered new opportunities for increased efficiency and interfirm collaboration in the food system (Kinsey 2000, 2001).

Robert P. King is the E. Fred Koller Professor of Agricultural Management Information Systems in the Department of Applied Economics, University of Minnesota. Jean D. Kinsey is a professor in the Department of Applied Economics and Co-Director of The Food Industry Center, University of Minnesota. Paul J. Wolfson is a research associate in the Amos Tuck School of Business, Dartmouth College. Jonathan M. Seltzer is project manager for the Supermarket Panel in The Food Industry Center, University of Minnesota. This research was supported by a grant to The Food Industry Center from the Alfred P. Sloan Foundation and by the Minnesota Agricultural Experiment Station.

At the end of the 1990s, stores throughout the industry faced the challenge of making the transition towards more efficient operations and new business practices as labor markets tightened and competitive pressures increased.

The Food Industry Center at the University of Minnesota established the Supermarket Panel as a means of tracking change in the industry with respect to store characteristics, store operating practices, and store performance. The Panel differs from other annual surveys in the supermarket industry (e.g.,the Food Marketing Institute's *SPEAKS* and the *Progressive Grocer Annual Report of the Grocery Industry*) in that the unit of analysis is the individual store and the same stores are surveyed over time. After a pilot test in 1999, with participation by 100 self-selected stores, 2000 was the first year of full-scale operation for the Panel. The 2000 Supermarket Panel consists of 344 stores who responded to a survey distributed to a randomly selected sample of 2000 stores. They are broadly representative of more than 31,000 supermarkets in the U.S.

This paper presents key findings from the 2000 Supermarket Panel.[1] These findings document current practices and performance and can be used as a baseline for assessing changes in years to come. In the sections that follow, we first describe data collection procedures and present a descriptive profile of the stores in the 2000 Panel. Next we introduce indices for six key management areas—supply chain management, human resource management, food handling, environmental practices, quality assurance, and service offerings—that summarize store level operating practices. We then use these indices along with variables describing market and store characteristics and competitive position in an analysis of store operating performance.

Data Collection Procedures

Data collection for the 2000 Supermarket Panel began in the fall of 1999 with establishment of the sampling frame and drawing of a random sample of stores from that frame. The relevant population was defined as the 31,127 establishments classified as supermarkets in a computerized database provided by the Food Stamp Program of USDA, which lists 166,854 establishments in the United States that accept food stamps.

Based on experience from the 1999 pilot study, response rates were expected to vary with ownership-group size. Single store independents and stores in smaller groups were considered more likely to respond than those in larger groups. To ensure representation in the Panel from stores in all group sizes, the population was grouped into five group size strata: single store, 2 to 10 stores, 11 to 30 stores, 31 to 60 stores, and more than 60 stores. Stores in strata associated with larger group sizes were sampled more intensively. The overall sample size was 2,000 stores.

The data collection process was based on mail survey methods developed by Dillman (1978). The process began in November 1999 with phone calls to each of the 2,000 randomly selected stores to ascertain the store name and address and to learn the store manager's name and title. On January 12, 2000, letters were mailed to all stores, introducing the Panel and indicating that the Panel data booklets would be mailed the following week. On January 19, 2000, data booklets were mailed with a cover letter encouraging participation and a return envelope addressed to the University of Minnesota's Center for Survey Research. On February 2, 2000, a follow-up postcard was sent to all stores in the sample. Two weeks later, a second data booklet and cover letter were mailed to all stores that had not yet responded. Data collection ended in early March.

The overall response rate was 17.2 percent, or 344 stores. Response rates are presented by stratum in Table 1. The five strata are the basis for groupings by ownership-group size in the remainder of this paper.

Table 1. Response Rates by Stratum

Stratum	Sample Size	Responses	Response Rate %
1 store	250	65	26.0
2–10 stores	250	59	23.6
11–30 stores	250	40	16.0
31–60 stores	334	48	14.4
>60 stores	916	132	14.4
Total	2,000	344	17.2

[1] See King, Wolfson, and Seltzer for a more comprehensive presentation of findings from the 2000 Supermarket Panel.

In June 2000 each participating store received a confidential benchmark report, comparing it on a question-by question basis to peer stores similar in size and format. This was the only reward stores received for participation. Concurrent with data coding and preparation of the benchmark reports, U.S. Census data based on store zip code were merged with the survey data set so that location-specific demographic variables could be included in the analysis.

A Descriptive Profile of the 2000 Supermarket Panel

Stores in the 2000 Panel reflect the high level of diversity in the industry. They are located in both urban and rural areas in forty-five states. They are owned by companies that range in size from single store independents to the largest supermarket chains, and they represent a wide range of store formats. Characteristics of Panel stores are similar to figures presented in the *67th Annual Report of the Grocery Industry* published by *Progressive Grocer* in April 2000. Table 2 compares median store characteristics for the entire U.S. from the *Progressive Grocer* report and the Supermarket Panel. Median stores from the two studies have nearly identical size and weekly sales per checkout. Panel stores have slightly lower annual sales and sales per square foot. Median sales per employee for the Panel is nearly 23 percent higher than the figure reported by *Progressive Grocer*. This may be due to differences in the definition of this variable.

Stores Grouped by Ownership-Group Size

Consolidation of store ownership was an important trend in the late 1990s. Control over a larger group of stores can be the basis for efficiency gains in procurement, distribution, advertising, employee training, and implementation of new technologies. However, the associated cost savings may be more apparent at the corporate level than in individual stores.

Table 3 shows median characteristics and performance measures for stores in five ownership-group size categories that range from single store independents to groups with more than 60 stores. Ownership-group size is based on common ownership, and a group may include stores with several different names.

For almost every characteristic and performance measure, there are striking differences in stores across these group size categories. Nearly all stores in the first two strata are wholesaler supplied, as are nearly three-quarters of the stores in groups with 11 to 30 stores. As group size increases beyond thirty stores, however, the parent company is increasingly likely to operate its own distribution system. Nationally, forty-five of the top fifty supermarket chains are self-distributing (Urbanski 2000). The percent of total food distributed to retail food stores through third-party wholesalers fell from 42 to 37 percent during the 1990s. Another 35 percent goes through self-distributing chains' distribution centers and 28 percent is delivered directly to stores by the manufacturers (Kochersperger 1998, 1999).

Table 2. Median Store Characteristics for U.S. Supermarkets

Characteristic	Median Store Characteristics	
	Progressive Grocer[1]	Supermarket Panel
Annual Store Sales	$11,600,000	$10,400,000
Selling Area	28,310 sq. ft.	28,500 sq. ft.
Weekly Sales per Checkout	$25,033	$25,000
Weekly Sales per Square Foot	$7.88	$7.42
Weekly Sales per Full-time Equivalent Employee	$3,380	$4,154

[1] *Source: 67th Annual Report of the Grocery Industry* special supplement to *Progressive Grocer*, April 2000.

Table 3. Descriptive Profile of the Panel for Stores Grouped by Ownership-Group Size.

	Single Store	2–10 Stores	11–30 Stores	31–60 Stores	>60 Stores
NUMBER OF STORES	58	83	52	26	125
STORE AND MARKET CHARACTERISTICS					
Median Selling Area (sq. ft.)	13,500	23,000	28,500	28,500	36,996
Median Store Age	32	23	24	20	13
Median Number of Stores in Group	1	4	19	44	517
Percent Wholesaler Supplied	97	94	73	54	6
Percent Located in an SMSA	41	52	67	61	71
MEDIAN PERFORMANCE MEASURES					
Weekly Sales	$81,000	$144,000	$236,050	$180,357	$295,781
Weekly Sales per Square Foot	$6.05	$6.64	$7.66	$6.39	$8.06
Sales per Labor Hour	$83.33	$98.61	$103.93	$107.26	$113.59
Sales per Transaction	$13.14	$16.72	$19.70	$18.66	$21.48
Annual Inventory Turns	19.0	16.2	15.8	15.0	20.7
Percent Employee Turnover	40.9	47.6	37.5	35.6	42.0
Gross Profit as a Percent of Sales	22.2	23.0	22.8	22.2	24.8
Payroll as a Percent of Sales	10.0	9.5	9.4	9.5	9.8
Annual Percentage Sales Growth	1.4	1.6	1.9	3.6	1.8

Table 4. Descriptive Profile of the Panel for Stores Grouped by Format.

	CON	SS/US	FD COMBO	WH	OTHER
NUMBER OF STORES	166	50	38	19	21
STORE AND MARKET CHARACTERISTICS					
Median Selling Area (sq. ft.)	20,000	38,000	40,000	52,500	29,000
Median Store Age	25	10	12	13	24
Median Number of Stores in Group	6	98	231	14	33
Percent Wholesaler Supplied	73	40	18	53	48
Percent Located in an SMSA	51	80	68	68	86
MEDIAN PERFORMANCE MEASURES					
Weekly Sales	$127,000	$345,000	$315,000	$465,000	$105,000
Weekly Sales per Square Foot	$6.61	$8.33	$8.46	$9.04	$7.17
Sales per Labor Hour	$96.92	$106.25	$122.3	$131.02	$127.50
Sales per Transaction	$16.77	$25.00	$23.73	$26.46	$19.67
Annual Inventory Turns	16.0	20.4	18.7	15.9	20.0
Percent Employee Turnover	45.2	40.7	44.3	41.6	54.4
Gross Profit as a Percent of Sales	23.0	25.0	23.5	19.25	19.0
Payroll as a Percent of Sales	10.0	9.6	10.0	7.4	9.4
Annual Percentage Sales Growth	2.0	3.0	2.7	(0.3)	0

CON = Conventional FD COMBO = Food/Drug Combination
SS/US = Superstore/Upscale WH = Warehouse

Stores in large groups clearly outperform single stores in three key performance measures—weekly sales per square foot, sales per labor hour, and sales per transaction. This overall trend holds for sales per labor hour across the intermediate group sizes but it breaks down for weekly sales per square foot and sales per transaction. Stores in groups of 11 to 30 stores have higher sales per square foot and sales per transaction than do stores in groups of 2 to 10 and 31 to 60 stores. Gross profit as a percent of sales is fairly constant across the first four group sizes but is considerably higher for stores in the largest groups, suggesting that these stores have an advantage in procurement. Payroll as a percent of sales is highest for single stores and stores in the largest groups, but is essentially constant for the intermediate group sizes. Finally, sales growth is remarkably high for stores in groups of 31 to 60 stores relative to growth rates for the other strata.

Stores Grouped by Format

Supermarket formats are changing to better respond to customers' desire for cost savings, convenience, quality, variety, and service. Table 4 shows median store characteristics and performance measures for stores grouped into five format categories: conventional, superstore/upscale, food/drug combination, warehouse, and other. Format classifications are based on responses to a question asking managers to select the format best characterizing their store from a list of eleven possible formats.

Relative to stores in other formats, those in the "conventional" and "other" categories are smaller and older. While conventional stores are the least likely to be located in a metropolitan area, those in the "other" category are highly concentrated in urban areas. Superstore/upscale and food/drug combination stores are similar in size and tend to belong to large store groups, but the food/drug combination stores are much less likely to be wholesaler supplied. Warehouse stores have the largest median selling area but their group size is relatively small.

Conventional stores have the lowest sales per square foot and sales per labor hour and the highest payroll as a percent of sales. They rank fourth out of five in inventory turns and gross profit as a percent of sales. The superstore/upscale and food/drug combination stores have solid performance in most areas and lead in median sales growth. Stores in the warehouse and other formats are noteworthy for their high median sales per labor hour, low gross margins, low payroll as a percent of sales, and lack of sales growth. However, readers should keep in mind that in this study growth refers to an individual store and not to the group or chain to which it belongs. A chain could be growing by mergers, acquisitions, or building new stores even though individual store growth is stagnant.

Store-Level Management Practices

Panel stores provided detailed information on a wide range of store-level management practices. This information is summarized in index scores for six key management areas: supply chain management, human resource management, food handling, environmental practices, quality assurance, and service offerings. These index scores facilitate comparisons among stores and in future years will help track longitudinal adoption patterns at the industry level. In this section we define each index and summarize differences in index levels for stores grouped by group size and format.

Supply Chain Practices

Supply chain management initiatives are having profound impacts throughout the food system. The ECR initiative encouraged adoption of new technologies and business practices designed to eliminate inefficiencies throughout the retail food supply chain. More recently, electronic commerce has emerged as a major issue, with considerable emphasis placed on development of business-to-business applications. The move from proprietary EDI systems to Internet-based systems is making it easier to extend the benefits of e-commerce beyond the manufacturing plant and distribution center to the store level. The Supply Chain index score is designed to serve as an indicator of a store's ability to participate in and contribute to supply-chain initiatives.

This score has two equally weighted components. The technology component measures adoption of eight store-level technologies related to supply chain management:

1. Electronic Data Interchange (EDI)
2. Electronic-assisted receiving
3. Electronic shelf tags
4. Pay-on-scan (scan-based trading)
5. Product-movement analysis/Category management
6. Scanning data used for automatic inventory refill
7. Shelf-space allocation plan-o-grams
8. Frequent-shopper/Loyalty-card program

These technologies are equally weighted, and the score for this component is simply the percent of technologies adopted.

The decision-sharing component measures the extent to which parties outside the store are involved in store-level decisions in five key areas:

1. Pricing
2. Advertising
3. Space allocation
4. Display merchandising
5. Promotions.

Store managers were asked who has primary responsibility for decisions in each of these areas for four products: apples, dry cereal, DSD snacks, and fluid milk. The score for this component is the percentage of these twenty decisions (five for each of four products) for which someone outside the store has primary responsibility.

Human Resource Practices

With unemployment at near-record lows in most parts of the country, human resource management was a critical issue for supermarkets in 1999 and 2000. Hiring, training, retaining, and motivating employees are key challenges for store managers. Stores connect with their customers through their employees, and customers will quickly go elsewhere if they have a bad shopping experience.

The Human Resource index score measures a store's adoption of progressive human resource practices. It has three equally weighted components:

1. Employee training, based on hours of training during the first twenty-six weeks of employment for new hires in cashier, deli, and other positions.
2. The proportion of all employees who are classified as full-time.
3. The use of incentive based compensation and several types of non-cash compensation, including employee stock ownership, individual health insurance, family health insurance, disability insurance, pension, and a 401(k) plan.

Each of the three components is scored on a 100-point scale, as is the overall index.

Food Handling

Food safety issues are a focus of attention for consumers, retailers, and manufacturers. Adding more ready-to-eat foods heightens the need for attention to temperature control and shelf-life. Salad bars, pre-made sandwiches, and delicatessens add to the risk for food contamination that can lead to food-borne illness and liability suits. Labor shortages and high employee turnover add to these concerns, as managers struggle to maintain service for customers while ensuring that adequate time is devoted to food safety and handling training for new employees.

The Food Handling score measures a store's adoption of practices that promote food safety and quality. It has the following six components, each of which is measured on a 100-point scale.

1. Target temperatures—conformity with recommended target temperatures for self-service meat, dairy products, and self-service deli.
2. Temperature checks—conformity with recommended frequency of temperature checks for self-service meat, dairy products, self-service deli, and frozen foods.
3. Store sanitation audits—conformity with recommended frequency for self audits and third-party audits of store sanitation practices.
4. Dating information—use of "sell by" or "use by" dates for poultry, red meat, seafood, and deli products.
5. Inventory practices—conformity with recommended inventory-rotation practices for meat, dairy, self-service deli, and frozen foods.
6. Training—provision of food safety and handling training for the deli manager, deli employees, and meat department employees.

Scores for these six components are averaged into an overall score on a 100-point scale.

Environmental Practices

Environmental issues are receiving increased attention from consumers, who are interested in buying more environmentally friendly products and in recycling waste packaging from products purchased in supermarkets. With higher energy costs and the new complexity of energy procurement in a deregulated market, there is greater interest among store managers in energy-saving technologies for refrigeration and lighting. A 1997 study of environmental practices conducted jointly by The Food Industry Center and the Food Marketing Institute found that most stores had adopted internally oriented practices such as recycling corrugated boxes, wooden pallets, and white paper. Many had also installed energy-efficient lighting and refrigeration-management programs. Fewer stores had consumer-oriented programs such as advertising "environmentally friendly products" or providing bulk selection of food products. Rarely did stores calculate energy budgets by department or collect data on waste generation (Food Marketing Institute 1997).

The Environmental Practices index score in this study measures a store's adoption of practices that promote environmental quality. It has two equally weighted components:

1. A consumer component measuring the store's offering of environmentally friendly products, organic products, and recycling services.
2. A store-operations component measuring the store's adoption of energy-efficient lighting, refrigeration management, and store waste recycling.

Each component is measured on a 100-point scale, as is the overall score.

Quality Assurance

Quality Assurance practices help ensure the high quality customer service needed to retain a customer base in an increasingly competitive environment. Monitoring customer satisfaction is one type of quality assurance. Another is auditing and monitoring the functioning of equipment and personnel that handle and rotate products.

The Quality Assurance index score measures a store's adoption of quality-assurance practices in three areas:

1. Formal assessment of customer satisfaction through use of customer focus groups, customer-satisfaction surveys, and mystery-shopper programs.
2. A marketing-programs component that measures a store's emphasis on perishables excellence and strong service.
3. A food handling component is based on the score for four components of the food handling index: temperature checks, sanitation audits, inventory rotation, and food-safety training.

These three equally weighted components of the quality assurance score are measured on a 100-point scale, as is the overall index.

Service Offerings

Faced with increasingly strong competition from food-away-from-home outlets, category killers, and supercenters, many supermarkets are expanding the range of services they offer. Inside the store one now finds fast food restaurants, banks, post offices, cooking schools, and even health clinics. Ultimately, the goal is to make the supermarket a one-stop destination for their time-starved customers.

The Service Offerings index score measures the adoption rate for the following thirteen services that are designed to increase the convenience of shopping at one store:

1. Bagging service
2. Carryout service
3. Custom meat cutting/service meats
4. Fax ordering by customer
5. Fresh prepared meals
6. Hot meals or meal components (HMR)
7. Special checkout lane for HMR meals
8. Internet ordering by customer
9. Pharmacy, prescriptions
10. Post office, mailing services
11. Teller banking/in-store banking
12. Video department
13. Strong service featured in store marketing

Measured on a 100-point scale, a store's score is simply the percentage of these services that it offers.

Scores for Management Practice Indices

Means and standard deviations for the six management practice scores are presented in Table 5 for stores grouped by ownership-group size. Variation in mean scores across group sizes is highest for supply chain practices, with the mean score increasing steadily as store-group size increases. This suggests that stores in larger groups are much better positioned to take part in supply-chain initiatives. This is expected, since larger groups may be able to exercise some buying power in technology purchases, and stores in these groups are likely to receive more support services that help them convert older systems for ordering, data management, and payment processing into electronic formats. Also, because stores in larger groups are usually part of self-distributing systems, decisions about supply chain technology adoption and decision-sharing practices may reflect benefits at both the store and distribution-center levels.

There is a general upward trend in mean scores for human resource practices, environmental practices, quality assurance practices, and service offerings. Differences across group sizes are much smaller than for the supply chain practices score, however, and trends across intermediate group sizes are less consistent. Mean scores are uniformly high with no clear trend across ownership-group sizes for the food handling index. It is noteworthy, however, that within-group standard deviations for the food handling score are relatively high. This suggests that there are important differences in this area among stores, but they are not strongly associated with ownership-group size. Within-group variability is also notably high for the environmental practices score and notably low for the human resources score.

Means and standard deviations for the six management practice scores are presented in Table 6 for stores grouped by format. Food/drug combination stores have the highest mean scores for five of the six indices. Superstore/upscale stores have the highest mean score for the environmental practices index and have mean scores nearly equal to those of food/drug combination stores in the other management areas. Mean scores for the other three formats are relatively low for supply chain practices, quality assurance practices, and service offerings. However, this may reflect the fact that these stores are less likely to be members of large ownership groups. Within-group variability, as measured by the standard deviations, is often high for stores in the "other" format due to the heterogeneity of this format category, which includes limited assortment, deep discount, and mini-club stores. Once again,

Table 5. Mean Management Practice Index Scores for Stores Grouped by Ownership-Group Size*

	Single Store	2–10 Stores	11–30 Stores	31–60 Stores	>60 Stores
Supply-Chain Practices	28.4	36.7	57.0	62.2	70.0
	(17.5)	(19.0)	(18.0)	(14.9)	(17.9)
Human-Resource Practices	39.6	41.4	45.1	43.6	50.5
	(10.9)	(9.9)	(10.3)	(9.5)	(9.6)
Food Handling	73.6	72.5	73.9	69.6	75.5
	(18.7)	(20.7)	(21.2)	(19.9)	(23.5)
Environmental Practices	48.3	53.4	62.8	58.3	79.1
	(24.9)	(26.9)	(27.9)	(29.9)	(24.3)
Quality Assurance	60.3	62.5	65.9	65.4	74.2
	(13.7)	(14.5)	(16.8)	(16.2)	(11.9)
Service Offerings	46.9	48.7	46.4	49.7	57.0
	(14.7)	(16.4)	(15.0)	(16.9)	(20.3)

* Standard deviations are in parentheses.

within-group variability is low for human resource practices. It is relatively high for supply chain, food handling, and environmental practices.

Performance Drivers—Multivariate Analysis

The descriptive profile of the Panel and summary of management index scores for stores grouped by ownership-group size and format provide useful insights on the structure of the supermarket industry and some of the factors associated with strong performance. However, exploring the data from a series of unidimensional perspectives ignores the fact that performance is ultimately the product of complex interactions among store and market characteristics and management strategies and practices.

This section presents findings from a multivariate regression analysis of five key performance measures.

1. Weekly Sales per Square Foot
2. Sales per Labor Hour
3. Annual Inventory Turns
4. Payroll as a Percent of Sales
5. Annual Percentage Sales Growth

Each of these measures was regressed on a set of twenty independent variables that can be grouped into four broad sets of performance drivers.

1. **Market Characteristics** include population density and median household income in the zip code where the store is located and a binary variable that is set to one if the store is in a metropolitan area (SMSA) and zero otherwise. These three factors cannot be changed once a store has been built, but it is important to control for them because they can have important influences on store performance.
2. **Store Characteristics** include store selling area, a set of binary variables for alternative formats (superstore/upscale, food/drug combination, and warehouse, with conventional being considered as the "base case"), ownership-group size, a binary variable that is set to one if the store is part of a self-distributing group and zero otherwise, and a binary variable set to one if the store has a union workforce and zero otherwise. Although it may be difficult, if not impossible, for a store manager to change any of these seven store characteristics in the short run, it is important to control for these factors in analyzing store performance. Quantifying the effects of these variables also can be useful in "what-if" analyses of the effects of store-group mergers or a shift to a union workforce.
3. **Competitive Position** performance drivers include binary variables indicating whether the manager identifies the store as a price leader,

Table 6. Mean Management Practice Index Scores for Stores Grouped by Format*

	CON	SS/US	FD COMBO	WH	OTHER
Supply-Chain Practices	45.7	66.8	67.0	54.9	44.2
	(25.6)	(18.2)	(18.6)	(20.7)	(25.4)
Human-Resource Practices	42.0	49.0	50.0	49.6	48.0
	(9.6)	(8.9)	(9.9)	(13.6)	(13.4)
Food Handling	74.2	77.1	81.1	71.9	77.5
	(18.8)	(22.2)	(19.9)	(21.5)	(20.1)
Environmental Practices	56.3	85.0	81.6	74.6	42.1
	(27.4)	(18.5)	(20.1)	(22.5)	(32.3)
Quality Assurance	65.5	74.9	75.3	66.8	63.1
	(13.0)	(14.0)	(11.8)	(15.1)	(14.6)
Service Offerings	48.7	61.8	63.2	41.7	33.0
	(15.0)	(15.2)	(15.6)	(16.5)	(23.0)

CON = Conventional
SS/US = Superstore/Upscale
FD COMBO = Food/Drug Combination
WH = Warehouse
OTHER = Other Format or Missing Data

* Standard deviations are in parentheses.

Table 7. Results for Performance Driver Regressions

	Weekly Sales per Square Foot	Sales per Labor Hour	Annual Inventory Turns	Payroll as a Percentage of Sales	Annual Percentage Sales Growth
MARKET CHARACTERISTICS					
Population Density	0.000318 **	0.003460 **	-0.001403 **	0.000091	5.82E-06 *
	(2.26)	(2.59)	(-2.64)	(1.05)	(1.69)
Median Household Income	-1.67E-05	0.000149	-0.000147	0.000023	1.52E-06 **
	(-0.55)	(0.62)	(-1.34)	(1.28)	(2.00)
Located in an SMSA	1.099328	-3.784021	4.347022	-0.820637 *	0.003438
	(1.41)	(-0.63)	(1.49)	(-1.75)	(0.18)
STORE CHARACTERISTICS					
Store Seling Area	-0.000128 **	-0.000180	2.93E-06	0.000028 **	-1.13E-06 **
	(-5.44)	(-1.04)	(0.03)	(2.00)	(-2.03)
Superstore/Upscale Format	2.77381 **	-7.544134	0.782148	-0.497960	0.009430
	(3.07)	(-1.10)	(0.22)	(-0.95)	(0.43)
Food/Drug Combination Format	1.39192	3.811093	-11.72965 **	-0.389432	0.011631
	(1.44)	(0.52)	(-3.10)	(-0.68)	(0.42)
Warehouse Format	3.213255 **	17.40229	-8.884632 **	-1.989344 **	-0.072871 **
	(2.27)	(1.60)	(-2.07)	(-2.31)	(-2.07)
Ownership-Group Size	0.000099	0.003050	0.001221	-0.000076	-2.38E-05 **
	(0.23)	(0.93)	(0.63)	(-0.28)	(-2.16)
Member of Self-Distributing Group	-0.108153	-3.922164	5.455817 *	0.426705	0.022031
	(-0.14)	(-0.66)	(1.87)	(0.96)	(1.08)
Union Workforce	2.343512 **	20.10519 **	8.892669 **	0.522329	0.008623
	(3.31)	(3.64)	(3.53)	(1.24)	(0.50)
COMPETITIVE POSITION					
Price Leader	1.784106 **	7.603953	-1.103641	-0.822755 **	0.040094 **
	(2.82)	(1.59)	(-0.46)	(-2.18)	(2.61)
Quality Leader	0.235278	-2.144325	8.906931 **	0.263640	0.039484 **
	(0.29)	(-0.35)	(2.98)	(0.53)	(1.98)
Service Leader	1.251749 *	-4.283095	-3.489916	-0.172080	-0.028266
	(1.77)	(-0.75)	(-1.26)	(-0.39)	(-1.62)
Variety Leader	-0.110656	2.556559	0.632459	-0.020356	0.015933
	(-0.15)	(0.45)	(0.26)	(-0.05)	(0.85)
MANAGEMENT PRACTICES					
Supply Chain Score	0.035420 **	0.114545	0.027276	-0.035799 **	0.000466
	(1.99)	(0.86)	(0.49)	(-3.27)	(1.03)
Human Resources Score	0.047093	0.224849	0.218579 **	0.014772	-0.001364 *
	(1.58)	(0.94)	(2.07)	(0.82)	(-1.78)
Food Handling Score	-0.020414	-0.084483	0.054585	0.002126	0.000544
	(-1.01)	(-0.53)	(0.70)	(0.18)	(1.03)
Environmental Practices Score	0.017459	0.183858	-0.097083 **	-0.002796	0.000140
	(1.22)	(1.54)	(-2.07)	(-0.33)	(0.40)
Quality Assurance Score	-0.001923	0.285348	-0.221524 0	-0.015392	-0.000496
	(-0.06)	(1.19)	(-1.90)	(-0.82)	(-0.64)
Service Offerings Score	-0.015498	-0.071979	-0.011718	0.023053	-0.000663
	(-0.66)	(-0.38)	(-0.14)	(1.42)	(-1.16)
constant	5.801580 **	57.80958 **	23.32619 **	9.839279 **	1.021216 **
	(3.01)	(3.70)	(3.07)	(8.24)	(18.93)
NUMBER OF OBSERVATIONS	141	120	88	146	128
ADJUSTED R^2	0.3635	0.3583	0.2479	0.1230	0.2658

Numbers in parentheses are t-statistics.

** and * denote significantly different from zero at 5% and 10%, respectively.

quality leader, service leader, and/or variety leader. These four competitive position indicators are not mutually exclusive—a store could be both a quality and a service leader, for example. These indicators are not fully under the manager's control, since a new competitor could take away leadership in one or more areas. Nevertheless, it is useful to examine how a store's competitive position in each of these areas is associated with alternative performance dimensions.

4. **Management Practices** are summarized by the store's scores for the six key management areas: supply chain, human resources, food handling, environmental practices, quality assurance, and service offerings. These are performance drivers that can be affected by conscious management decisions either at the store level or at store-group headquarters.

All twenty explanatory variables were included in the regression analysis for each of the five performance measures.[2]

Table 7 presents parameter estimates and t-statistics for the five regression models. When reviewing the results for each performance measure it is important to keep in mind that they measure statistical association between variables, while controlling for other factors. Also, they indicate correlation but not causation. Only with multiple years of data for the same stores will it be possible to attribute changes in performance to changes in store characteristics or management practices.

Weekly Sales per Square Foot

This measure of efficiency in use of store selling area is higher in markets with higher population density, where the cost of retail space is generally higher. It is also significantly higher for stores with a union workforce and for stores that identify themselves as price and service leaders. Relative to conventional stores, which are treated here as the base format, stores in the superstore/upscale and warehouse format categories have significantly higher sales per square foot. In general, stores in these formats are larger than conventional stores. *Within* any format, however, increases in selling area have a significant negative association with sales per square foot. Of the six management area scores, the supply chain index has a statistically significant positive relationship with weekly sales per square foot. This suggests that added attention to this area may help stores make better use of space.

Sales per Labor Hour

This measure of labor efficiency is significantly higher in markets with higher population density and in stores with a union workforce. It also tends to be higher for stores that identify themselves as price leaders and stores that have higher environmental practice scores, but the parameter estimates for these variables are not statistically significant at the 10% level. These results are consistent with expectations, but the small number of statistically significant performance drivers suggests that factors outside the scope of this analysis, such as the "people skills" of the store manager, may have important impacts on this performance dimension.

Annual Inventory Turns

Efficiency in managing inventory is strongly linked to market and store characteristics, being negatively associated with population density and with the food/drug combination and warehouse formats. Being part of a self-distributing group and having a union workforce have significant positive associations with inventory turns. The result for warehouse stores is somewhat surprising. One possible explanation that cannot be tested with these data is that these stores make greater use of "buying-on-deal" procurement practices that might lead to higher inventory levels. This practice is inconsistent with a push to adopt new supply chain management measures, but it is still a popular business strategy. Quality leadership and the human resource

[2] With so many variables in the analysis, there were often missing values. In fact, only sixty-two stores had valid responses for all performance measures and all explanatory variables. Therefore, two sets of regressions were run. The first used only the sixty-two stores with no missing values. The second used as many stores as possible for each performance regression. A statistical test developed by Hausman was used to test for significant differences between model results for the restricted and unrestricted samples. Complete results for both sets of regressions are presented in Appendix B of King, Wolfson, and Seltzer. Results from the two sets of regressions are quite similar qualitatively. Only results from the models with the largest possible number of observations are reported here.

score have statistically significant positive relationships with annual inventory turns, while the environmental practices and quality assurance scores have significant negative relationships. Recalling that the regression results indicate association rather than causality, the negative relationships for environmental practices and quality assurance may suggest that stores with low inventory turns need to invest in energy-saving technologies like refrigeration management and in quality-assurance practices that ensure food safety.

Payroll as a Percentage of Sales

This is the only one of these five performance measures that stores try to minimize rather than maximize. Among the market and store characteristics and competitive position variables, then, the statistically significant negative relationships for location in an SMSA, the warehouse format, and price leadership all imply better performance in this area. On the other hand, holding other factors constant, payroll as a percent of sales tends to increase with store selling area. Among the management practices, a higher level for the supply chain score has a statistically significant negative relationship with payroll as a percent of sales. This suggests that adoption of supply chain management technologies and business practices improves labor efficiency.

Annual Percentage Sales Growth

Sales growth is generally higher for stores located in areas with higher population density and household income. All other factors being equal, sales growth is significantly lower for stores with larger selling areas and stores that belong to larger store groups. Relative to conventional stores, sales growth is also significantly lower for warehouse stores. Stores that identify themselves as price and quality leaders have significantly higher sales growth rates. Finally, among the management practices, only the human resource score has a statistically significant relationship with sales growth, and it is negative. Overall, these results suggest that sales growth may be driven more strongly by a store's environment and location than by the choice of in-store management practices.

Results Across Performance Measures

While the regression analysis measures relationships between the performance drivers and individual performance measures, it is also useful to look at the qualitative results across performance measures. For example, market characteristics clearly have important impacts on all dimensions of performance. In general, stores in more densely populated, more affluent areas perform better.

There are several interesting patterns for store characteristics. It is noteworthy that larger selling area within a particular format is associated with weaker performance for three of the five measures. This points to the critical importance of using space effectively. The significant positive relationships between presence of a union workforce and three of the performance measures are also important. While labor costs are usually higher with unionization, these results suggest there are offsetting gains in efficiency. Finally, it is noteworthy that there are relatively few significant links between group size and membership in a self-distributing group and the five performance measures, and one of those relationships is negative. This suggests that wholesaler-supplied stores that operate independently or belong to a small ownership group are competitive.

Among the competitive position variables, price and quality leadership have the strongest links to superior performance, indicating that strategic planning efforts should focus on building strength along these dimensions. Finally, among the management areas, supply chain and human resource practices are most closely linked to strong performance.

Concluding Remarks

The 2000 Supermarket Panel is a data-rich "snapshot" of the industry at the start of the 21st century. It offers useful insights for both strategic and tactical decisions. As the Panel continues to gather data over the years and builds a longitudinal data set it will be easier to distinguish between cause and effect in relationships between operating practices and performance. This will provide unique insights into the success of various retail-food-store formats and better understanding of the impacts of new technologies and business practices. Many

predict that stores will change dramatically in the next decade. The Supermarket Panel will be the basis for a stream of data and analysis that will both track and inform the transformation and revitalization of retail food stores.

References

Dillman, Don A. 1978. *Mail and Telephone Surveys: The Total Design Method.* New York: Wiley.

The Food Institute. 2000. *Food Industry Review.* Fair Lawn, New Jersey: The Food Institute.

——— 1999. *Food Industry Review.* Fair Lawn, New Jersey: The Food Institute.

——— 1998. *Food Industry Review.* Fair Lawn, New Jersey: The Food Institute.

——— 1992. *Food Industry Review.* Fair Lawn, New Jersey: The Food Institute.

The Food Marketing Institute. 1999. *Speaks, 1999.* Washington D.C.: Food Marketing Institute.

——— 1997. *Report on Environmental Practices,* Washington D.C.: The Food Marketing Institute.

Hausman, J. A. 1978. "Specification Tests in Econometrics. *Econometrica* 46:69–85.

King, Robert P. and Paul F. Phumpiu. 1996. "Reengineering the Food Supply Chain: The ECR Initiative in the Grocery Industry. *American Journal of Agricultural Economics* 78(December):1181–1186.

King, Robert P., Paul J. Wolfson, and Jonathan M. Seltzer. 2000. *The 2000 Supermarket Panel Annual Report.* St. Paul, MN: The Retail Food Industry Center, University of Minnesota. <http://agecon.lib.umn.edu/mn/tr00supa.pdf>

Kinsey, Jean. 2001. "Electronic Systems in the Food Industry: Entropy, Speed and Sales" *Tracking a Transformation: E-Commerce and the Terms of Competition in Industries.* BRIE-IGCC Economy Project. Washington D.C.: Brookings Institution.

——— 2000. "A Faster, Leaner, Supply Chain: New Uses of Information Technology," *American Journal of Agricultural Economics* 82(December):1123–1129.

Kochersperger, Richard H. 1999. *1999 Food Industry Distribution Center Benchmark Report.* Washington DC: The Food Marketing Institute and Food Distributors International

——— 1998. *1998 Food Industry Distribution Center Benchmark Report.* Washington DC: The Food Marketing Institute and Food Distributors International

67th Annual Report of the Grocery Industry. 2000. Supplement to *Progressive Grocer* April.

Urbanski, Al. 2000. "America's 50 Largest Supermarket Chains" *Supermarket Business* 55,4 (April 15): 1–24.