EFFICIENCY CONCEPTS IN FOOD DISTRIBUTION

A Commissioned Report

Prepared for

Policy Coordination Branch

Department of Consumer and Corporate Affairs

by

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December, 1979

Calgary, Alberta

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I. BACKGROUND

The document A Food Strategy for Canada prepared under the joint auspices of Hon. Eugene F. Whelan, Minister of Agriculture and Hon. A.C. Abbott, Minister of Consumer and Corporate Affairs identified the Government of Canada's objective of increasing efficiency in food distribution and retailing. Specifically,

> The government undertakes to concentrate on the competitiveness of food processing, distribution and retailing by:
>
> (i) applying to this sector, as a matter of priority, its programs to rationalize structure;
> (ii) strengthening its ability to monitor performance of this sector, including the effective utilization of modern technology and evidence of unnecessary costs of product differentiation;
> (iii) enhancing the productivity and efficiency of this sector; and
> (iv) directing the stream of competitive policy in an appropriate manner, to study this sector.
>
> The government will use and develop its food policies to encourage the food system to promote, on a continuous basis, food and food services in the simplest, most economical and most direct manner and in the most nutritious and useful form to meet the needs and demands of consumers. In this regard, the government will:
>
> (i) provide regular price information to consumers in a selected set of basic foods;
> (ii) strengthen its food inspection services and work with the provinces towards a set of national food inspection guidelines;
> (iii) while protecting producers and consumers from short-run distributions in world commodity markets, strive to enhance the productivity, efficiency and competitiveness of food production, processing, distribution, and retailing sectors; [379, pp. 19-20]

The concept of efficiency in food has received some attention in the area of production. However, the area of food distribution has had little study, particularly with regard to efficiency of the system as a whole as contrasted with some emphasis on food retail chains. As a result, this study has been commissioned by The Department of Consumer and Corporate Affairs.

Objectives

Specifically, the objectives of this study are to report on the following:

1. A review of the concepts of economic efficiency that are relevant to the individual enterprise engaged in food distribution (wholesale and retail);
2. Develop empirically testable concepts of economic efficiency that will be relevant to multi-enterprise firms and the distribution system as a whole;
3. Based on the concepts developed in (2), develop hypothesis that would provide the necessary bank for future empirical studies of efficiency in food distribution;
4. Present a seminar in Ottawa at which a first draft of the paper will be discussed among the author and interested government and industry representatives.

Vested Interest Groups

There are a number of vested interest groups who are "pushing" the government with regard to food policy. These include:

1. Consumers -- who want lower food prices.

2. Concerned Citizens -- who want to read detailed government policy statements rather than just hearing generalities.

3. Companies -- who want a clear statement of government policy, particularly in the area of anti-trust.

4. Civil Servants -- who want to do a good and thorough job at their work.

These vested interest groups are considered as the concept of efficiency is explored and developed in this paper.

General Research Process

There are two fundamentally different approaches to research (and learning). These are:

1. Inductive -- Process of reasoning from a part to the whole, from particulars to generals, or from the individual to the general. (380, p.427)

2. Deductive -- Process of reasoning from the general to the particular. (380, p. 215)

The following identifies key terms and the sequence for each approach:

PROCESS	KEY TERMS
Inductive ↓	1. Facts are not collected directly by this researcher, but are synthesized through assimilation of articles, books, and reports by other researchers in the area of food distribution
	2. Concepts are a mental image of a thing formed by a generalization from particulars, (380, p. 171)
	3. Hypotheses are a tentative theory or supposition provisionally adopted to explain certain facts and to guide in the investigation of others. Hypotheses are also something assumed or conceded merely for the purposes of argument or action. (380, p. 409)
	4. Theories are the analysis of a set of facts in their ideal relations to one another and are a more or less plausible or scientifically acceptable phenomena (380, p. 881) Theories imply a greater range of evidence that hypotheses. (380, p. 409)
↑ Deductive	

Because a theory or a set of theories are not explicitly developed for food distribution, an inductive approach is used for this report.

Literature Search and Methodology

In order to gather the relevant facts for this report, the following sources were used;

1. Manual search of Social Sciences Citation Index, Business Periodicals Index, Public Affairs Information Service, Journal of Farm Economics, American Journal of Agricultural Economics and the Canadian Journal of Agricultural Economics.

2. Card catalogue and browsing in the Economics, Agricultural Economics, Marketing, and Management sections of the libraries at Princeton University and The University of Calgary.

3. Computer bibliographic search of data bases including: Agricola, Economics Abstracts, National Technical Information Service, and Dissertation Abstracts.

4. Telephone calls to knowledgeable people in the food distribution industry.

5. Personal interaction with members of the Food Distribution Research Society at the 1979 Annual Meeting in Portland, Oregon. Attending were representatives from the major trade associations in the United States and Canada, industry executives, academics, consultants, publishers, and government researchers in the area of food distribution.

On the surface, the research in the area of food distribution for this paper seems quite clear. However, in order to meet the objectives, there are some important implications:

1. Efficiency is easily defined and understood;

2. Current and future states of efficiency are measurable;

3. Actions and interactions of food industry operators, researchers, and government can positively influence efficiency;

4. Consumers are the ultimate beneficiearies of greater efficiency in the food distribution system.

While the implications appear to be self-evident, the term "efficiency", as currently used by researchers and practitioners in the industry, does not adequately cover these points, particularly with regard to consumers. A review of the historical uses of the term "efficiency" follows, along with indications of measurement difficulties.

II. DEFINITIONS AND USES OF THE TERM "EFFICIENCY"

"Efficiency" as used in Engineering

The term "efficiency" originally was used in an engineering context:

$$\text{Efficiency}^{335} = \frac{\text{Power Output}}{\text{Power Input}}$$

Power is the time rate of doing work and can be measured in terms of foot-pounds per second, horsepower, watts, kilowatts, calories per second, joules per second, coulombs per second, or British thermal units per minute. It is clear that both power input and power output are measurable (or convertible) in the same units and that efficiency is a ratio without any units and can also be expressed in percentage terms.

This concept of efficiency appears to have been transposed from engineering to the disciplines of marketing, management, economics, and agricultural economics.

"Efficiency" as used in Marketing Literature

Because very little conceptual thinking with regard to efficiency has occured in the 1960's and 1970's, this review of marketing authors is based primarily of editions published in the 1960's, but founded on thinking in the 1930's and 1940's by the "fathers" of marketing thought.

Alexander, Surface, and Alderson (282, p. 181) focused on the internal operations of a retailing organization and stated that the three chief factors that make up this element of efficiency are the:

1. Innate caliber and ability of the executive personnel
2. Setting within which the managerial staff must work
3. Incentives the establishment can offer to the executives to stimulate their efforts.

Converse, Huegy, and Mitchell (307, pp. 462-471) discussed (but did not define) the operating efficiency of retailers, using a number of yardsticks:

- Performance in any period compared with operating results for earlier periods
- Performance compared with that of others in the same business
- Specific tests in terms of planned sales per person, planned days receivable, planned sales per square foot, planned stock turnover.

Converse, Huegy, and Mitchell (307, pp. 605-617) also discussed, but did not define marketing efficiency. They stated:

> In a narrow sense, efficiency may be thought of as savings in costs, doing the task with smaller expenditure of money or less labour or other measure of input. Measures of efficiency in this sense are best when they can be stated in physical terms, such as tonnage moved per man. We are often forced to measure efficiency in dollars because no physical measure is available, but this method presents difficulties because of changes in the value of the dollar. Also, increased efficiency may be reflected in improved services without any increase in costs, or it may be accompanied with less than proportional increases in costs. (307, p. 607)

Alderson, (281, p. 423) noted that:

> Distribution cost analysis has been successfully applied in the past to problems of efficiency for individual marketing units. Less progress has been made in evaluating the efficiency of a complete system or marketing flow such as the movement of a major agricultural crop from grower to consumer.

Fisk, (319, p. 15) indicated that:

> Efficiency is a broad concept referring to the outputs produced by all productive factors in combination. It is easy to say that the goal of marketing organization is efficient performance, but nobody yet knows how to get the most output for the resources used in marketing. That marketing productivity is below productivity in manufacturing and farming is a matter of great social concern.

Beckman and Davidson (292, p. 789) distinguish between productivity and efficiency:

> First, productivity is a ratio of output, or the results of production, to the corresponding input of economic resources, both during a given period of time.
> . . . Economic efficiency is closely related to productivity, but it is a more far-reaching concept. Efficiency implies some definite economic goal such as accomplishing the greatest amount of work in the best possible manner with the least expenditure of time and resources. In fact, there is no such thing as efficiency in general or inefficiency per se. What may be judged as efficient by one measuring rod may be quite inefficient when measured by a different standard.

Further discussion by Beckman and Davidson (292, p. 790) distinguished between:

Physical efficiency -- relationship between quantity of goods manufactured and quantity of goods, labor, machine time, and supervision consumed.

Business efficiency -- relationship between dollars spent and income earned.

Human/Social efficiency -- relationship between the human costs incurred and the satisfactions received

Marketing efficiency -- qualitatively judged by presence and extent of specialization, standardization, use of labor-saving devices, changing institutional structure, competition, research, and organized training.

Baligh and Richartz (287) published a book on vertical marketing systems that has some application for this report. Their research did not explicitly define "efficiency" and it appears that a cost minimization approach was taken for single product producers and retailers (287, p. 21). Further, Baligh and Richartz caution: that "the models developed below have application only as broad theoretical frameworks and not as perfect tools for the solution of specific problems (287, p. 15)."

The more contemporary marketing and marketing management writers focus on the operational efficiency for individual firms. Table 1 on the following page summarizes the performance indicators used by a number of key researchers and sources on information.

TABLE 1 -- SUMMARY OF PERFORMANCE INDICATORS TO ASSESS "EFFICIENCY" FOR INDIVIDUAL FIRMS

Stern and El-Ansary (367, pp. 260-268) and McCammon (34)

- Net profits/net sales (profit margins)
- Net sales/total assets (asset turnover)
- Net profits/total assets (return on assets)
- Total assets/net worth (leverage ratio)
- Net profits/net worth (return on investment)

Leed and Mead (344, pp. 63)
Merchandise Strategy Conditions:

- Product quality or condition
- Product quality control
- Selection of merchandise
- Packaging and unitization
- Display methods
- Price identification
- Promotion and advertising
- Customer service and convenience
- Employee appearance
- Housekeeping and maintenance

Leed and Mead (344, pp. 60)
Performance Objectives

- Sales
- Gross margin
- Contribution to expenses
- Net profit
- Payroll $ or %
- Sales per man-hour
- Shrinkage
- Store conditions

Norwood (352, pp. 22)

- Percent gross margin
- Dollar sales per store
- Percent contribution to overhead
- Dollar cash over and short
- Dollar NSF cheques
- Dollar sales per manhour
- Dollar inventory
- Inventory turns
- Dollar sales per store

Bass and Bates (288)

- Net sales
- Number of items
- Selling area (square feet)
- Average transaction size
- Sales inventory
- Sales/square foot of selling area
- Sales/man-hour
- Store payroll as % of net sales
- Gross margin percentage
- Operating expense percentage
- Operating profit percentage (before tax)

-- in terms of comparisons for

- typical convenience food store versus conventional supermarket
- typical super store versus conventional supermarket

-- and comparisons for

- upscale supermarkets
- specialty food stores
- limited assortment food stores

-- in terms of

- net profit/net sales
- net sales/total assets
- net profit/total assets
- total assets/net worth
- net profit/net worth

-- and also analysis for

- sales and units for chain stores, voluntary and cooperative group stores, and independent stores
- percent of units and sales for conventional supermarkets, food departments in discount department stores, super stores, convenience food stores, other grocery stores, and specialty food stores

Comparisons as a Basis for Efficiency Measurements

Each of the variables in Table 1 can be used to compare a firm's efficiency with past performance and with budgets including:

- Actual ($, units, or %)
- Budget ($, units, or %) or target
- Actual better or worse to budget
- Actual better or worse as % to budget
- Year-to-date ($, units, or %)
- Year-to-date better or worse to budget
- Rolling 12 months (or 13 periods) average ($, units, or %)
- Rolling 12 months (or 13 periods) average compared to budget
- Store by store or area by area comparison.

In addition to the previous "efficiency variables" in Table 1 and the comparisons, it is also possible to compare some of the variables relating to the efficiency of one firm to the industry as a whole, based on data compiled by Dun and Bradstreet, Statistics Canada, Progressive Grocer, and Management Horizons, Inc.

"Efficiency" as used in Management Literature

Some writers in the management discipline have explicitly defined efficiency. For example, Becker and Neuhauser (20, p. 50) define organizational efficiency as:

The degree of goal attainment	=	The discounted present value of the ratio of benefits to costs (in comparison to other alternatives)	=	$\frac{\text{Output and Discounted Future Output}}{\text{Input, including production costs and maintenance costs}}$

Becker and Neuhauser (20, pp. 40-41) also define related terms:

-- Productivity, like efficiency, is expressed as a ratio of outputs to inputs. Unlike efficiency, productivity is concerned with only a subset of all inputs, such as labour productivity.

-- Performance seems to be a catch-all term for a variety of approximate measures of efficiency, including morale, innovation, and the like.

-- Effectiveness is equated by some management writers with the degree of goal achievement, while other management writers perceive effectiveness to be broader in scope than efficiency.

Reddin (360, pp. 5-6) discusses efficiency and effectiveness and concludes that "job descriptions often lead to an emphasis on what could be called managerial efficiency: the ratio of output to input. The problem with this is that if both input and output are low, efficiency could still be 100 percent." Reddin describes efficiency versus effectiveness as follows:

EFFICIENCY	EFFECTIVENESS
Do things right	Do things right
Solve problems	Product creative alternatives
Subsequent resources	Optimize resource utilization
Follow duties	Obtain results
Lower costs	Increast Profits

Among the "fathers" of management literature, Drucker (68) defines efficiency as output divided by input or the extent to which the result was produced at least cost. Barnard (381, p. 51) stated that although effectiveness has been generally viewed as the degree to which operative and operational goals have been attained, the concept of efficiency represents the cost/benefit ratio incurred in the pursuit of these goals. Herbert Simon (305, p. 8) stated that the formal organization attained efficiency when it employes resources to that alternative which produces the greatest result.

In 1912, Emerson, as quoted in Dale (311, p. 121) stated twelve principles of efficiency. These include.

1. Ideals - clearly defined goals
2. Common sense - less attention to bigness for its own sake
3. Reliable, immediate, adequate, and permanent records
4. Dispatching - production scheduling and control
5. Standards for work, parts, designs and procedures

In the management systems area, Churchman (291, p. 147) concluded that:

> . . . concentration on efficiency per se may be a very inefficient way to manage a system, from the overall point of view. In other words, the "one best way" may not be the optimal way for the whole system.
> . . . the management scientist's argument against efficiency is that it is always conceived in relation to a small segment of the social organization.
> . . . cost reduction in many instances may actually increase the system's cost.

"Efficiency" as used in the Economics and Agricultural Economics Literature

Beacham (289, p. 142) indicated that:

> "Efficiency" is a most difficult and elusive concept. Economics cannot be defined with any precision and is used in many different contexts with different meanings. But it does seem very necessary in a treatise in industrial organization to say something about it. If we think of the economic system as a whole, and at a particular time, we would say that it is operating with maximum efficiency if resources are fully employed and so distributed that human wants are satisfied to the maximum extent possible.

(p. 143).

> Very little progress has been made with the exploration of these aspects of industrial efficiency which obviously raise some difficult problems of measuring capital.

(p. 159)

> From all this we see that industrial efficiency is a very nebulous concept. But we may perhaps draw some very tentative and general conclusions from our discussion and from some of the recent literature on the subject. There is no objective physical measurement of industrial efficiency although comparative labour-productivity figures are useful indicators of trends. The most rewarding use of such measures is probably in connection with detailed comparisons of firms producing closely similar outputs.

Ritson (203) used a traditional economics graphical perspective in discussing production, exchange, and output efficiency. He concluded that a departure from the Pareto optimal conditions may be termed as loss in economic efficiency.

Hopkin, Barry, and Baker (118, p. 61) indicated:

> "In terms of economic theory, efficiency criteria specify that the productivity of capital be equalized at the margin for all users and in all geographical areas. This condition requires that all users have equal access to the capital market, all lenders have equal knowledge and willingness to allocate funds where the returns to capital are the highest (after adjusting for risk and differences in costs of establishing and servicing the loans), and there are no institutional impediments to flows of funds."

Speight's book, Economics and Industrial Efficiency, (225, p. 1) differentiated between technical and economic efficiency. According to Speight, technical efficiency could have any one of three meanings, based on: (1) adequacy in reliability based upon the demands made on the system, (2) reference to some quantitative standard, or (3) doing a job in the cheapest way possible -- or what comes to the same thing, obtaining a given output from the lowest possible output.

Speight (225, p. 4) went on to say that "the true cost of anything is always the foregone alternative, the value of anything is always something else." Further, he elaborated (225, p. 4) that:

> "an economic system is economically efficient in so far as it is technically efficient, and in so far as it succeeds in rationing out scarce resources, and the scarce products of these resources, in the most desirable way. But 'most desirable' is really a question-begging phrase. What is the most desirable collection of products and the most satisfactory destribution of the national income? There are no objective answers to these questions. Every age and every society live their own answers. We shall use consumer-satisfaction as the test, and say that we make the best use of our limited resources if we satisfy consumers' wants to the maximum degree possible with those resources. . ."

Speight (225 p. 10) also concluded that:

> Profit is not necessarily a good test of efficiency from society's point of view: There are big profits to be made in any large city out of the efficient organization of vice. But granted that the State is able and willing to ban socially undesirable enterprises

and business practices, profit is some indication of efficiency. We can at least say that business losses are prima facie evidence that resources have been wasted; they could have been turned to more productive accounts elsewhere.

Southworth and Johnson (223, p. 371) quote Bains' approach in discussing marketing efficiency. Bain was concerned with:

1. Prices: costs and profit margins approach the level that is just sufficient to reward investment at the going rate; it should also provide an incentive for risk bearing and the introduction of innovations designed to save costs or improve services.

2. Size and number of firms.

3. Service provided.

Because there can be no absolute standard, efficiency is generally measured by comparison within and between marketing sectors. Analysis of efficiency by comparison between channels or areas within the developing countries is complicated by differences in the nature of the services provided and problems in setting a value on them. It is also difficult to determine which are maintained by social pressure and tradition.

Heady (110, p. 96) stated that the measure or criterion of efficiency is the maximum output of product for a given amount of factors.

The necessary conditions for economic efficiency (110, p. 95) are that resources must be combined in such a manner that they could be arranged to give: (a) greater physical product with the same collection of resources or (b) the same physical product with less of one or more of the resources. The sufficient condition can be defined only when price relationships are employed to denote maximum profits for the firm, or when other choice indicators are employed to denote the maximum of other economic objectives.

Timmer (409, p. 94) distinguished between allocative and technical efficiency:

There are at least two very important ways in which this maximizing process might fail in the real world. The whole core of economic theory is concerned with one of these: the marginal revenue products of some or all factors might be unequal to their marginal costs. If this is true, the allocative decision is said to be inefficient.

The second important source of failure in the maximizing process has received far less theoretical treatment in the economic literature, but is potentially more important quantitatively (in terms of wasted resources). This is the extent to

which firms actually produce on the technical production function that yields the greatest output for any given set of inputs. A failure in this regard means that the firm is technically inefficient.

With regard to allocative efficiency, Timmer (409, p. 101) went on to say:

> Allocative efficiency is the central issue in microeconomic theory. The model of perfect competition developed in the two centuries since Adam Smith determines the allocation of society's scarce resources to meet insatiable desires in such a way that no one can be made better off without someone else becoming worse off. In short, society will reach a pareto optimum if all the assumptions of the competitive model are fulfilled.
>
> But, what if all the assumptions are not fulfilled? In particular, what if firms have a substantial degree of market power and exercise considerable influence over the price for the goods they produce? Harberger and Schartzman have provided the empirical answer: not much is lost -- in face, less than 1 percent of GND for the United States economy.
>
> The losses are small because the resources that are not used because of monopolistic output restrictiveness used in other (competitive) industries.

O'Connor and Hammonds (184, pp. 667 - 668) compared measures of economic efficiency in comparing central fabrication - versus - carcass - meat - handling systems. They stated:

> Since Farrell's series of articles in the late 1950's - early 1960's, the most generally accepted method for examining efficiency in the literature of agricultural economics has been the linear programming approach.
>
> The Farrel-Fieldhouse model estimates the efficient unit isosurface (EUIS) which is, in this case, an approximation of the production function for handling of meat products in a retail store. By definition, this surface defines the minimum input-output ratios for alternative combination of input and scales of operation. The level of technical efficiency estimated for each firm is a function of the relative distance from the axis to the EUIS and from the axis to the point representing the individual firm.
>
> The UOP profit model proceeds along a different factor. Observing that different firms producing roughly homogeneous outputs man do so with differing factor intensities if they face differing input-output prices, Lau and Yotopoulos develop a model incorporating both input and output-price levels.

On the following page, Table 2 presents conceptual frameworks by Douglas, Warrack, and Farmer and Richman. The discussion of efficiency by these authors was more comprehensive and detailed than any of the previous authors presented in this paper. In turn, the work of these previous authors is much more precise than other uses of the term "efficiency"

It should be noted that efficiency involves comparisons, so that a "new" system with less input (costs) for the same output is, by definition, more efficient than the "old" system.

Table 2. Summary of Key Frameworks for Efficiency Concepts

Author	Efficiency Concepts	Subcomponents	Variables
Douglas[317]	Technical efficiency	Output	- Sales volume, gross margin, value added, number of transactions
		Input	- Labour, capital, management.
		Ratios	- Output per man hour, transaction size, service per transaction
	Managerial efficiency	Decision areas	- Use of decision models for location and movement of merchandise; managerial policies.
	Social efficiency	Pareto optimality	- Redistribution of income, governmental regulations.
		Indirect benefits and costs	- Effects of advertising on consumers; pollution.
		Welfare criteria and time	- Resource mobility, rate of innovation, prices and price responsiveness, market structure.
Warrack[268]	Marketing efficiency	Operational	- Marketing organization, logistics, and cost-reducing technologies
		Exchange	- Competition, market structure, and pricing
Farmer & Richman[74]	Total system efficiency	Problems	- Measurement, knowledge, uncertainty, goals, subsystem optimization, resource mobility.
		Total country	- Real per capita GNP, rate of growth or real per capita GNP, rate of utilization of inputs, useability outputs, degree of competition, planning efficiency. (Measurement is difficult, so rank order by country).
	Firm efficiency	Calculate for each firm	- Profitability, exports, useable output per man, plant utilization, prices relative to foreign firms, long-run innovation effectiveness.
	Intrafirm efficiency	Compare firms	- Output/person, output sold/total production, change in sales volume/change in investment, total production costs/total output, spoilage/total output, total distribution costs/total output sold, total output so. total fixed capital, number of people leaving/total personnel, working capital/fixed capital, working capital/total output, working capital/total output.

III. CONSUMER EFFICIENCY

The most noticeable deficiency in the literature is the lack of a perspective of consumer efficiency in food distribution. This is somewhat surprising because marketing scholars have considered the consumer to be a fundamental part of distribution channels for at least thirty years now.

For example, in Stern and El-Ansary's book, Marketing Channels (367) there are five diagrams from different sources in the first chapter and each diagram shows the consumer to be part of the distribution channel. The most dated source of these diagrams is taken from a Vaile, Grether, and Cox article in 1952 and shows the consumer to be part of the distribution channel, although producers, wholesalers, and retailers are considered as the commercial channel (367, p. 16).

Indeed, Stern and El-Ansary discuss the consumer and food distribution:

> From an interorganization management perspective, the extent to which any given institution and agency within the channel participates in the various flows should determine the compensation received by that unit for its role in the total channel system. It is this notion that allows a more complete picture of the consumer's role in the system. The more the commercial channel subsystem expects the consumer (industrial or household) to assume an active role within the system, the greater should be the consumer's compensation. Thus, when the present system of food supermarkets replaced the previous system of food distribution through small neighborhood stores, the consumer was called upon to engage more fully and participate more deeply in facilitating the flow. In order to be more efficient shoppers, housewives are now required, by the present system to allocate more resources during any one shopping trip than they did in the past, to make selections without in-store assistance, to transport themselves and the food they buy longer distances, and to store more merchandise and thereby hold larger inventories. While there has been a concomitant reduction in housewives' participation in the negotiation flow (due to the development of brand-name merchandise and the existence of a one-price system), there can be little doubt that the effort which they are required to spend to make the system work is considerable. Compensation for the consumer's participation must follow; such compensation is found in the lower prices paid for food under the present system than the previous one, inflation aside. (367, pp. 17-19)

Consumer Satisfactions

It is particularly evident with the relatively greater sales increases registered by convenience food stores, restaurants, and fast food outlets over the last 5 years compared to retail supermarkets, that consumers are making choices regarding why and where food is purchased. Although there was no literature found that indicated why consumers buy food, it appears that there are at least the following market segments:

1. Physiological (for example: survival, have stomach feel full, and nutrition)
2. Social (eating with other people)
3. Entertainment (get away from house and children)
4. Psychological (for example: oral gratification, something to do with the hands while watching television, salve depression, and the like)
5. Variety and taste

It is important to note as well that since the mid-1960's, marketing scholars and practitioners have taken the view that a product is the set of satisfactions received by the consumer and is not necessarily related to the physical attributes manufactured into the item. In short, rather than following a product from "seed to consumer" contemporary marketers follow the demand information passed from consumers to producers and then the physical product from producer to consumer.

Consumer Choices

Depending on the particular market segment that a consumer fits at a point in time, and how the consumer values money, time, taste, variety, and other motivations, the marketing systems in developed countries provide consumers with at least the following choices to obtain food:

1. Large retail chain supermarkets
2. Large retail independent supermarkets
3. Large retail supermarkets that are part of a buying group (for example: I.G.A.)
4. Large retail supermarkets owned by consumers
5. Independent convenience food stores
6. Franchised convenience food stores
7. Chain convenience food stores
8. "Box" stores
9. Warehouse supermarkets
10. Limited assortment stores
11. Specialty food stores (for example: bakeries, soda pop, and meats)
12. Chain, franchised, and independent fast food outlets
13. Chain, franchised, and independent restaurants
14. Food departments of department stores
15. Direct delivery (for example: milk and bread)
16. Home grown vegetables and fruits
17. Farmer's markets
18. Vending machines
19. Mail order
20. Institutions (schools, hospitals, airlines, and social services)
21. Consumer buying groups and cooperatives

In addition, there are some delivery systems which are operational in a few places or are futuristic. These include:

- Telephone order systems (Stephenson's in Pittsburgh, Pa. and Telemart)
- Home order systems through cable T.V. as identified by Davidson and Doody (312)
- Food retailing beyond the supermarket as identified by Padberg (355)
- Focus on nutrient delivery systems rather than food, *per se*, as identified by Cain (301, 302, 303, 304).

Historical Perspectives

It is interesting to note that most of the academic research and governmental legislative effort (other than ingredient labels) has looked at

market structure of producers and large chain retail supermarkets. Of prime concern have been operational productivity, prices, profits, number of firms, and at the producer level -- tariffs, subsidies, and quotas.

While these efforts are laudable and hypotheses regarding increased efficiency in these sectors are presented, it appears that the next step in significant short-run and long-run improvements in food distribution must come from the consumer. In the short-run, it is unlikely that cost savings of more than the current profit margins of about 2% can be realized through tinkering with a system that has already had 40 years of tinkering and adaptions for consumers. Further, in the long-run, most marketing scholars contend that consumers determine distribution channels as firms learn to adapt to consumers wants and needs.

Research Perspectives

A comprehensive diagram of the United States food system compiled by long-time food distribution analyst, Dale Anderson (283, p. 41) clearly shows that food losses at the consumer level was at least twice the food losses of the processing, wholesale distribution, and retail sector combined.

Further, a presentation of the adviseability of a sharp focus on consumer efficiency was made by the author at the 1979 annual meeting of the Food Distribution Research Society. The presentation was well received by the members.

Some Advantages of a Consumer Efficiency Perspective

Investigation of the efficiency of the consumer has the following advantages:

1. Real cost savings to consumers in the short-run. Consumer inefficiencies appear to be far greater than production and distribution inefficiencies.

2. The "heat" of higher consumer food price indexes is focused back on the consumer rather than on producers or government.

3. Consumers can be made more aware of the economic consequences of their choices and thus become more rational.

4. Consumers can be made more aware of the nutritional aspects related to food.

5. Conceptually, market structure will rationalize consumer choices as consumers become more rational.

6. Food and agricultural policy can focus on consumer goals rather than production or structure goals.

Definition of Consumer Efficiency

One way of stating consumer efficiency would be to state: "Given that a consumer's income is fixed, how can the consumer spend less on food?" However, this statement, while generally correct, is not sufficiently analytical for this paper. In order to define consumer efficiency in a way similar to the historical use of efficiency in an operations or marketing context, the following is presented:

$$\text{Consumer Efficiency} = \frac{\text{Consumer outputs}}{\text{Consumer inputs}} \quad \text{Compared to an "ideal" consumer}$$

Consumer inputs are defined as:

Dollars paid for food from all sources
+ Dollar value of time spent searching for information regarding food
+ Dollar value of time spent searching for food
+ Dollar value of time spent transporting food
+ Dollar value of time spent eating food
+ Dollar value of storage space for food
+ Some measure of the dollar value for use of capital equipment and space for preparing food
+ Dollar value of energy consumed in searching for, transporting, preparing, and eating food -- including automotive expenses and kitchen energy costs
+ Some measure of the aggregative effects of consumers, including pollution control

Outputs are defined in terms of:

Some relative measure of utility that can be transferred into dollar terms, including aspects of:

- Market segmentation and associated costs for food purchased at different institutions including the implied value that consumers place on time and entertainment utility

- Market segmentation in terms of the implied value that consumers place on how money is spent on food for:

  - survival
  - nutrition
  - variety and taste
  - social aspects
  - entertainment
  - psychological purposes

IV. GENERAL CONCEPTS OF EFFICIENCY

After reviewing the relevant literature from the disciplines of marketing, management, economics, and agricultural economics, there are some generalizations that can be drawn regarding "efficiency":

1. There is considerable ambiguity in terms of how each writer uses the term "efficiency".

2. Most of the writers consider efficiency as a measure of output/input, directed towards some goal.

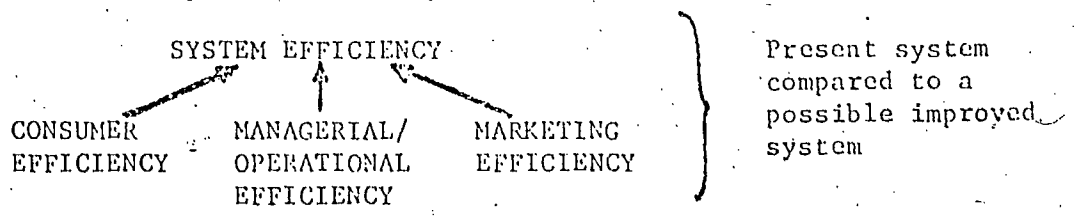
3. The goal can be measured in terms of comparisons to earlier periods, other firms, and plans.

4. Measurements of inputs and outputs are difficult, but possible. However, the key to increased efficiency is not so much the initial measurement, but in comparison to a goal, ideal, or an improved approach.

5. The literature identifies separate aspects for managerial, marketing, and system efficiency.

6. Consumer efficiency is discussed hardly at all.

Further, a general concept of efficiency can be structured as follows:



In order to increase system efficiency, there are two basic approaches:

1. Assume that the future distribution system remains somewhat similar to the current system and that system efficiency can be increased if:

   - Consumer efficiency is increased, and/or
   - Managerial/operational efficiency is increased, and/or
   - Marketing efficiency is increased.

2. Assume that the system efficiency can be increased through dramatic restructuring of the food distribution system.

In either case, a new system will have greater system efficiency if the inputs (costs) are less and the outputs the same for either consumer, managerial, or marketing efficiency.

As the basis for future study, hypotheses are generated from the general concept of efficiency, using the following overall structure:

EFFICIENCY COMPONENT	COMPARISON AS BASIS FOR HYPOTHESES REGARDING INCREASED EFFICIENCY
System -- current	1. Canada compared to U.S.
	2. U.S. compared to rest of world
	3. Comparison of differences by province
	4. Comparison of ideal and actual use of published information
Consumer	5. Compared to ideal, rational consumers in the areas of: A. Knowledge and motivation B. Information gathering C. Energy costs
	6. Compared to consumers from other countries
Managerial/operational	7. Compared to management techniques available in the areas of: A. Interface with sources of information B. Accounting periods C. Assessment of advertising effectiveness D. Labour unions E. Management information systems F. Universal product code and scanning G. Transportation H. Energy conservation I. Training of personnel
Marketing	8. Comparisons of retail food prices by city -- tied to market structure and concentration of trade
	9. Relative prospects for increased concentration of trade in future
	10. Comparison of conglomerates and vertically integrated systems with total independents
System -- future possibilities	11. Comparison of total industry reconstruction and current system
	12. Comparison of current system and additional choices for consumers

The following pages present hypotheses regarding increased efficiency in the food distribution system based upon the general concept of efficiency. For each hypothesis, some background context and literature is printed.

Current System Efficiency -- Canada Compared to the U.S.

Because Canada is a developed country and has a political atmosphere that allows entrepreneurs to start new businesses, the Canadian consumer generally has the same types of choices available in the United States. Further, in the analysis done by Don Tigert (382, p. 23) he concluded:

> "It seems to me that Canada has a very efficient retail food distribution system, which operates with relatively high sales per square foot, low prices and relatively low profit margins".

Tigert's research (382, p. 10) said the 10 largest Canadian retail food chains had 25.5% greater sales per square foot than the ten largest U.S. chains. At the same time, Tigert found that the before tax returns were fairly close (1.49% for the U.S. and 1.64% for Canada). It would seem logical that analysis of why the difference narrows at the bottom line will aid system efficiency. Tigert feels that the answer probably lies in higher average equity investment in Canadian stores and the profitable General Merchandise or Department Store divisions for U.S. companies.

HYPOTHESIS 1: Canadian consumers are served by a relatively efficient food distribution system, compared to the United States.

MEASUREMENT:

1. From the consumer's view, a comparison of the prices of like items (and development of comparable aggregate price index).
2. From the consumer's view, a comparison of percentage of disposable income spent on food.
3. From the perspective of the distribution system, comparison of inputs and outputs for Canada and the U.S., based on analysis similar to Anderson's (283, p. 41) analysis of the U.S.
4. Updating of the analysis completed by Tigert (382).

Current System -- U.S. Compared to Rest of the World

The U.S. food distribution system has generally been acclaimed to be the most efficient in the world. In 1969, Applebaum (383, p. 3) stated: "food distribution in the United States is highly efficient. It is more efficient than in any other system of distribution in the world. We can be proud of our achievements." Paarlberg (354, p. 12) stated that the "U.S. has the most efficient food assembly line in the world."

At the same time, no comparable statistics were uncovered to prove or disprove whether these statements by well known food distribution experts are valid.

HYPOTHESIS 2: U.S. consumers are served by the most efficient food distribution system in the world, compared to all other countries.

MEASUREMENT:

1. From the consumer's view, a comparison of the prices of like items (and development of comparable price indexes).
2. From the consumer's view, a comparison of the percentage of disposable income spent on food.
3. From the perspective of the distribution system, a comparison of inputs and outputs for all countries similar to Anderson's (283, p. 41) analysis of the U.S.

rent System -- Comparison of Differences by Province

One of the fundamental characteristics of systems is that if part of the system is improved without affecting other parts of the system, then the total system is improved. Thus, it seems logical that if the efficiency of a geographical part of the Canadian food distribution system is improved, then the entire system is improved.

HYPOTHESIS 3: There are differences in the food distribution system by province in Canada and the overall system efficiency can be increased if the less efficient sections of the country can be improved to match the more efficient sections of the country.

MEASUREMENT:

1. Measurement of inputs and outputs by province, through use of the Statistics Canada product commodity survey and a methodology similar to Anderson's (283, p. 41).

2. Identification of structural differences by province (or area).

3. From the consumer's view, a comparison of prices of like items.

4. From the consumer's view, a comparison of percentage of disposable income spent on food.

5. From the product commodity survey, and Statistics Canada data, an analysis of food distribution by channel.

6. Identification of relative inefficiencies in terms of structure, operations, and consumers by province.

Current System Efficiency -- Analysis of Current Data and Collection Procedures

It appears that there is a great deal of information and statistics (for example, Statistics Canada, Dun and Bradstreet, Progressive Grocer) regarding the operation of the various levels of the food distribution industry. However, it appears that this information is used relatively little in the industry for a variety of reasons including: delays in dissemination, incompatible formats for comparison to the firm, and lack of managerial interest. If the current data were analyzed, the deficiency in the collection procedures and use could be corrected.

HYPOTHESIS 4: Managerial efficiency can be increased through greater use of current data and revised data collection parameters and procedures.

MEASUREMENT:

1. Interviews with Statistics Canada, other governmental agencies, and industry representatives.
2. Industry questionnaire coordination through trade associations -- designed to evaluate the use of Statistics Canada, Dun and Bradstreet, and other industry statistics.
3. Analysis of the current data sources and an evaluation of the possible uses of the data of particular interest.
4. Analysis of the current data collection procedures and an analysis of the product commodity survey in evaluating the distribution channels for food by province for Statistics Canada.
5. Determination of what data should be collected, by whom, and how the data could and should be used so as to increase managerial efficiency through lower head office costs.
6. The measurement of efficiency would be in terms of lower input costs due to better management practices and reduced costs for reporting. Outputs to consumers would be assumed to be constant. Some assessment of possible long-run consequences of strategic planning could be made. Of course, an industry strategic information group costs much less overall than if each firm did the same analysis.
7. In addition, it should be possible to develop a model for policy formulation for the government.

Consumer Efficiency -- Knowledge and Motivation for Buying Food

As previously identified, there are many different motivations for buying food. In addition, with the growth of convenience food stores, restaurants, and fast food outlets, it is clear that consumers are valuing satisfactions other than price and to some extent, location.

At the same time, no articles were found relating to consumer motivations for buying food. When a lack of empirical knowledge exists, often it can be expected that analysis can identify previously unknown "costs". Further, communication to consumers of these "costs" regarding motivations for buying food is expected to at least identify, if not reduce, some current inefficiencies generated by consumers.

HYPOTHESIS 5A: The Canadian food consumer is rational based on the information processed, but is less than rational compared to an ideal consumer, with regard to knowledge and motivation for buying food.

MEASUREMENT/ RESEARCH:

1. Analysis of consumer's motivations for spending in different food outlets, based on published sales data and questionnaire surveys.
2. Analysis of consumer knowledge with regard to buying food, particularly in the area of nutritional information, meal planning and diets.
3. Analysis of an "ideal" consumer with regard to knowledge and motivation for buying food and comparison to the "actual" consumer.
4. Questionnaires would be used to gather data for (1) and (2).
5. The focus for Hypothesis 5A is information <u>before</u> a consumer starts shopping for food.

Consumer Efficiency -- Information Gathering and Processing

There has been some research relating to consumer ratings and choice of retail food stores, for example; Handy (331), Watkins (372, 373, 374) and Welsh (396). At the same time, it appears that there has not been an equivalent or greater assessment of the store selection process by Canadian food consumers.

It would appear that the most viable sources of food price information are through newspaper ads, first-hand comparison of price, and some input on Cable T.V.

If it were possible to analyze the various costs associated with information gathering (and the energy costs for shopping in multiple stores), and the information communicated to consumers, then consumer efficiency would be expected to rise.

HYPOTHESIS 5B: If Canadian food consumers were as rational as an "ideal" consumer with regard to information gathering, then consumer efficiency would be increased.

MEASUREMENT:

1. Analysis through questionnaires of the trade-offs valued by consumers in terms of price savings, time for trade and information gathering in terms of retail food store selection.
2. Analysis of a representative group of items in terms of price, location in a city, energy costs for travel, and travel time.
3. Analysis of consumer groups -- particularly those who gather information and those who do not, along with analysis of coupon users and non users.
4. Market research regarding the number of people who use newspaper and Cable T.V. price comparisons.
5. Investigation of potential advanced information systems for food distribution through Cable T.V.
6. Analysis of an "ideal" consumer with regard to information gathering and purchase of food items.
7. Comparison of actual consumers and "ideal" consumers based upon assumptions of "current mix of items" and "ideal" nutritional mix.
8. The faces for Hypothesis 5C is consumer shopping for food.

Consumer Efficiency -- Awareness of Energy Costs

Given that consumer incomes are fixed in the short-run, the rise in energy costs for some parts of the country may well put lower income (and the elderly) families in a budget squeeze in choosing between energy and food. Further, it does not appear that most consumers are aware of the energy costs associated with selecting, storing, and preparing food. Clearly, if consumers are more aware of energy costs, it would seem logical that these consumers would act accordingly and consume less energy. If energy input costs were less, and the outputs to consumers were the same, consumer efficiency would increase as would total system efficiency.

HYPOTHESIS 5C The greater the awareness of consumers to energy costs associated with food distribution, the greater the consumer efficiency in action. Further, it is expected that there is a direct correlation between consumer's perceptions of energy costs related to food distribution and:

- concerns over food prices
- income (particularly the elderly)
- motivations to save energy in searching for, transporting, and preparing food.

Further, it is hypothesized that there are significant differences by province due to differential energy costs.

MEASUREMENT:

1. Analysis of current energy costs associated with searching for, transporting, and preparing food.
2. A large scale questionnaire designed to analyze consumer's attitudes towards energy conservation (perhaps co-sponsored with another government department) and food costs.
3. Analysis of the data in order to determine consumer awareness of energy costs and low cost alternatives.
4. Assessment of lower energy costs (and higher consumer efficiency) associated with greater awareness and related action for food transportation and preparation

Consumer Efficiency -- Canadian Consumers Compared to Consumers From Other Countries

The previous hypotheses have focused on the relative consumer efficiency of Canadian food consumers. The question that arises: how efficient are Canadian consumers compared to consumers in the rest of the world. Considering the hypermatches in Europe and the greater percentage of disposable income spent on food in foreign countries, it would appear that foreign consumers would be forced to be more efficient. On the other hand, it may be that because Canadian consumers are so efficient, that they spend a lower percent of disposable income on food. Another answer could be that the food distribution system in Canada is more efficient than in other countries, but the consumers are not.

HYPOTHESIS 6: Canadian consumers are no more or less efficient than consumers in other developed countries.

MEASUREMENT:

1. Assuming the outputs would be the same, any differences in consumer efficiency are due to changes in consumer inputs.
2. Analysis of the energy costs, information gathering process, and food items costs for a standard Canadian diet in other countries -- compared to equivalent costs using the buyer profile for foreign countries.
3. Analysis of an "ideal" world food consumer with regard to information gathering and purchase of food items, assuming possible diet changes.
4. Comparison of actual Canadian consumers with actual food consumers in foreign countries and with an "ideal" world food consumer.

Management Efficiency -- Sources of Definition

Based upon the lack of active participation of Canadian food distribution firms in the Food Distribution Research Society, it appears that Canadian food distributors are not making use of external information sources to improve their firm's profitability through lower costs at the same output level.

Further, there are important system effects related to cooperative efforts in the areas of special studies including:

- U.S. Department of Agriculture (245-26D)
- Management decision models including own or lease, sophisticated inventory management, sales analysis, and customer analysis
- computers

It would seem that the logical place for development of management skills is at annual conventions of the Canadian Grocery Distributors Association. Rather than using the conventions as hunting, fishing and travel social clubs (along with some technical product information), substantially greater managerial input is required.

One negative consideration is that the major retail food chains may be reluctant to cooperate due to fears regarding government and consumer reactions concerning collusion and top management fears regarding proprietory information.

A positive aspect is that because there is one main trade association in Canada (CGDA) compared to NAWGA (North American Wholesale Grocers, SMI (Supermarkets Institute), and NARGUS (National Association of Retail Grocers in the United States) and others, it may be possible to achieve greater communication and system efficiencies faster in Canada than in the United States. Further, it is clear that a central clearing house

for statistics and general information is much more efficient through lower system costs than if each firm had their own specialists.

HYPOTHESIS 7A The managerial efficiency of Canadian food distributors can be increased through lower firm input costs and lower system costs if the distributors were aware of all the sources of information regarding strategy, tactics and operations,

MEASUREMENT:

1. Interviews or questionnaires with all food distributor wholesalers, retail food chains, and members of the CGDA in order to determine the current use of:
   - articles for Progressive Grocer, the Journal of Food Distribution Research
   - Management decision models
   - Computers
   - Training progress for all levels of management

2. Assessment of the willingness of firms to mutually support cooperative research in strategy, tactics and operations.

3. Evaluation of the increased managerial efficiency through aggregation of the potential lower costs generated through centalization of common tasks and greater in-house implementation.

Managerial/Operational Efficiency -- Financial Reporting Survey

Because the financial data of food distribution companies is used as the basis for interfirm comparisons and is often the basis for Statistics Canada input, it is important that the data be consistent for aggregative purposes. Thus it may be useful for a private firm such as Price Waterhouse (or the Department of Consumer and Corporate Affairs) to produce a Canadian equivalent of The Food Industry: 1978 Survey of Financial Reporting and Accounting Developments.

Further, many U.S. food distribution companies have converted their accounting systems to four week periods instead of monthly data. Generally, these firms are the more sophisticated in managerial skills and have greater control of the internal operations of the firm. If it can be shown that companies with more advanced accounting (and reporting) practices are more managerially efficient (that is profitable), than those with less accounting sophistication, then the less profitable firms will have a motivation to change. The result would be better managed food distribution companies with lower inputs and the same outputs to consumers.

HYPOTHESIS 7B: The greater the level of accounting sophistication at each level of the food distribution process, the greater the managerial efficiency (relative profit ability) of the firm.

MEASUREMENT:

1. Development of a list of levels of accounting sophistication including:
   - monthly profit and loss statements for retailers
   - period reporting for wholesalers
   - sales forecasting and merchandise budgeting.
2. Development of a statistical means to link accounting sophistication and profitability.
3. Collection of data through analysis of financial reporting practices in conjunction with company representatives and the accounting firms auditing each company in the food distribution industry. A detailed questionnaire distributed through the trade associations would probably be the best means of collecting data.
4. The increase in managerial efficiency assures that the less profitable firms would adopt more sophisticated accounting tools if the hypothesis is proved correct. Managerial efficiency would be calculated based on the current system compared to the more ideal system. The inputs would be total costs as a percentage of sales for each level of food distribution (reduced through greater sophistication). Output to consumers would remain constant.

Managerial Efficiency -- Advertising Effectiveness

Based upon Mahatoo's studies, Canadian firms generally perform less market research than United States firms. Further, there appears to be some reluctance of U.S. firms to share market research techniques with Canadian subsidiaries, in general. In addition, because a slightly greater percentage of Canadians live in urban areas and because the Canadian retail food industry is more concentrated than the United States, it would seem that Canadian food distributor firms would be more efficient (lower cost with same output to consumers in goods and communication) than the United States.

HYPOTHESIS 7C Canadian food distributor firms are less efficient in terms of advertising effectiveness than firms in the United States and considerably less efficient than is possible.

MEASUREMENT:

1. Assessment through statistical analysis of the percentage of sales dollars allocated for advertising by media for U.S. and Canadian food retailers.

2. Assessment through questionnaires and personal interviews of the techniques and for measuring advertising effectiveness.

3. Assessment of relative cost savings and efficiency if the most advanced and cost effective market research techniques were implemented in Canada

Managerial Efficiency -- Labour Unions

In some lines of trade, labour unions have become so strong that management is no longer able to negotitate and must capitulate to union demands or seek government/judicial legislation or arbitration. Further, Hammonds (330) indicates that about 65% of the retail operating costs are labour costs, while Harp (333, p. 18) indicates that about 48% of the total food distributors costs are labour costs.

> As Applebaum (285, p. 36) stated in 1977:
> Food retailing is labour intensive at the store level. The technological innovations and improvements which have come into use in distribution processes in recent years have thus far failed to reverse the increasing labour costs which accounts for nearly 2/3 of the firm's operating expenses. At best, the technical improvements have only dampened the trend in rising operating costs.
>
> It's doubtful that the food retailing industry will be able in the years ahead to reduce the trend of increasing labor costs as a percentage of sales. Thus, unless an unforseeable breakthrough emerges in retailing technology, the retail gross margin in food distribution will eventually increase. These increases will have to be passed to consumers or firm after firm will go bankrupt.

A key question then relates to whether managerial efficiency throughout the food distribution system is hampered by labor unions, either at present or through some possible "feather bedding" when optical scanners are used.

HYPOTHESIS 7D There are some areas in the current or future food distribution system in which managerial efficiency is reduced by labour union contracts or probable future demands with regards to work scheduling and saleries.

MEASUREMENT:

1. 20 year comparison of wage rates for the food distribution industry and other sectors for Canada and the U.S.

2. Interviews or questionnaires to food distribution firms regarding possible reduced managerial efficiency due to labour contracts or demands, particularly with regard to separation of tasks, work scheduling, salaries, paid holidays, overtime, scanners, and automated warehouses.

3. Equivalent input from labour unions.

4. Assessment of possible reduced managerial efficiency due to labour unions.

Managerial Efficiency -- Management Information Systems

While some research has been done regarding use of computers in food distribution companies in the U.S. by LaLonde (395, p. 32) and in simulation models by Feemster (392) at Pillsbury, it does not appear that there is:

(1) Any measurement of the state of the art of Canadian food distribution companies regarding management information systems (MIS) and computer use.

(2) A generalized, organized MIS format at the wholesale or retail level to logically tie together all the ratios, components, and comparisions that are shown in Table I.

(3) A generalized, organized MIS format to fully utilize the managerial benefits of computers, particularly in the areas of cost analysis, inventory management and the benefits possible through use of scanners at the wholesale and retail levels.

HYPOTHESIS 7E Managerial efficiency of Canadian food distribution firms can be increased (through lower costs at the same output level) by greater use of management information system designed through cooperative efforts.

MEASUREMENT:

1. Through questionnaires and interviews, an assessment of the state of the art in MIS use by Canadian food distribution firms.

2. Through cooperative effort with a U.S. organization assessment of the state of the art in MIS use by U.S. food distribution firms.

3. Development of "model" MIS for wholesale and retail distribution firms.

4. Development of advanced management techniques in the area of financial, inventory, and sales management.

5. Estimation of the increased staff costs (both for a central development group and in-house support people) and the reduced expenses.

Managerial Efficiency -- Universal Product Code and Scanning

Use of the universal product code (UPC) and scanners has been widely heralded as a major aid to reduced labour costs in retail stores by Bloom (280) and Anderson (284, p. 46). Anderson estimated the savings at $30,000-35,000 per year in a $60,000/week store -- or about 1%. Over the past five years, it appears that Canada has lagged behind in implementation of UPC and scanners. At the same time, there does not appear to be neither a comprehensive body of knowledge proving the benefits of scanners, nor a well-developed management program to utilize the data available.

HYPOTHESIS 7F Canada has been lagging behind the United States and the rest of the developed world in use of UPC and scanners. As a result, the food distrubtion system is less efficient than it could be.

MEASUREMENT:

1. Survey of the literature and field scanning within the U.S., Europe and Canada.

2. Analysis of
   - fulfillment of the "promise" of lower operating costs and thus high efficiency
   - design of management information systems to make use of the input data
   - percentage of supermarket items that have UPC codes, including non-food items
   - legislation regarding price making and use of scanners
   - reaction of labour unions.

3. Estimation of the "true" increase in efficiency if scanners are used for an appropriate number of stores in Canada.

agerial Efficiency - Transportation

LaLonde (342, p. 10) quoted C. Jackson Grayson, former head of the U.S. Price Commission as saying that transportation efficiency could be lowered by as much as 25% if package and pallet sizes were standardized. LaLonde further stated that "it would appear that the efforts of food managers to improve the productivity of the food industry should be to improve standardizing package and pallet sizes and product identification codes". Anderson (284, p. 46) also quoted 25% as the additional costs for loading non-standardized pallets.

Among other authors, R.O. Harrison (410, p. 47) identified the unit trains and backhauls as areas for improving efficiency. He suggested standardization of shipping containers unit travel, and cooperative efforts. Feaster and Grinnel (387, p. 109) stated that:

> If significant savings are to be made in trucking and related distribution costs, selective implementation of innovations will be necessary. It is difficult to generalize the cost savings involved for the various innovations as most have applicability only to limited situations.
>
> (387, p. 111) Major savings can be achieved only through increasing load utilization factors throughout the transportation system with a reduction in the relative share of resources devoted to this economic function.

Feaster and Grinnel (387, p. 111) estimated the wholesale to retail transportation costs at 5% of the consumer's food dollars and that if the innovations of wind reflectors on trucks, piggy backing, backhauling and reduction of vehicle weight were introduced, it would be possible to effect a savings of 0.3% of consumer expenditures.

HYPOTHESIS 7G: Canadian food distribution firms are largely aware of ways to improve transportation efficiency, but have not acted due to a lack of definitive research.

MEASUREMENT:

1. Assessment (through interviews and questionnaires) of the level of awareness of executives for Canadian food distributors regarding transportation routing, shipping containers, backhauls, piggy backing, unit loads, unit trains, truck wind deflectors, slip sheets, and pallet sizes.

2. Assessment of the literature regarding possible savings.

3. Estimation of the increased managerial/operational efficiency due to increased system transportation efficiency through lower costs.

Managerial Efficiency - Energy Conservation

Articles by Zahn (378), Wright (403), Bettman (404), Perez (405), and Young (406), have summarized some of the efforts by some in the food distribution industry to conserve energy and reduce costs, which according to Harp (333, p. 18) are about 3% of the total operating costs.

At the same time, it is clear from these articles that there are isolated examples, at best, of energy analysis and cost savings for the industry as a whole. Given that "necessity is the mother of invention", the rapid rise of energy costs over the past 4 years has now made conservation an area where some savings can be made to justify research and capital costs. Further, it appears to the researcher that cooperative industry efforts at research in the energy area are most efficient if coordinated through an industry-wide group as contrasted to each firm proceeding independently.

HYPOTHESIS 7H: Canadian food distribution firms can improve managerial/operational efficiency through increased energy conservation motivated by increased research and awareness.

MEASUREMENT:

1. Calculation of all energy usage and costs (consumers included) in the food distribution industry.

2. Assessment (through interviews and questionnaires) of the awareness of food industry executives regarding energy costs, conservation, possible research, and costs benefits of implementation.

3. Analysis of the possible increased efficiency through lower costs associated with energy conservation.

4. Identification of areas for future energy research.

Managerial Efficiency - Training of Personnel

Better training of personnel has been identified as an area for improving managerial/operational efficiency by Anderson (284, p. 46) and Feaster, Grinnel and Crawford (388, p. 134). As previously indicated, about 2/3 of the operating costs of retail food stores are labour costs and should be a major focus for increased efficiency. Based upon interactions with people in the industry, the researcher believes that there are one "cluster" of employees who are older, long-time employees and another "cluster" of younger, transient, relatively inefficient employees.

Further, Feaster, Grinnel and Crawford (388, p. 134) stated that "to help realize potentials for increased efficiency possible from optimum conventional and super stores, it is necessary for the firms management and store employees to be motivated and well-trained".

HYPOTHESIS 7I: Improved training of personnel will reduce employee turnover and lower labour costs, thus increasing managerial efficiency.

MEASUREMENT:

1. Analysis of current ages of personnel and personnel training techniques, turnover, and absenteeism in the food distribution industry.
2. Review of the literature regarding training in the food distribution industry.
3. Evaluation of the relative benefits from improved training programs.
4. Assessment of the improved efficiency in terms of possible lower labour costs, decreased turnover, and decreased absenteeism.

Marketing Efficiency - Retail Food Prices and Market Structure

Among the great number of articles regarding retail food prices and market structure in the food industry are those by Araji (11), Babb and Minden (13), Brandow (28, 29, 30), Brunk (36), Buse and Brandow (43), Collins (56), Fan (73), Folz (79), Foytik (83), Garoian (96), Ghosh (99), Goldberg (100), Heimstra (112), Kilmer (127), Lerner and Patil (143), Logan (146), Mehren (160), Morgan (170, 171), Mueller (173, 175, 175), Nelson (179), Ogren (185), Padberg (187, 188), Preston (197), Robinson (204), Smith (218, 219), Sosnick (222), Handy and Padberg (332), Marion and Sproleder (468), and Mallen and Savitt (409).

Despite all these studies, Marion and Sporleder concluded that "although what we know about industrial performance may be an 'island protruding from a sea of ignorance', at least we have that island".

At the retail grocery store level, the gross margins are not very great (less that 2% after taxes). Based upon some preliminary research coordinated by the author, it appears that retail grocery prices are adjusted downward for certain items due to the shopping of competitor's prices and the meeting of competitor's prices on specials.

At the manufacturing level, the pricing structure for many lines of trade, based upon the researcher's experience, is not rationalized according to costs, but is determined either by negotiations with distributors or with power exerted by distributors. This includes "price" aspects of discounts, rebates, and cooperative advertising. Thus "price" can be a function of costs, services and market structure (which also can influence costs and services).

With regard to structural changes in the industry, Padberg (356, p. 60) noted that:

"After decades of structural change (in the U.S.), we are coming to a most uncomfortable era - stability. It seems likely that the basic shape of industry which we will live with for a while is before us. The rate of future change is likely to be shortly quite static."

HYPOTHESIS 8A: The greater the number of retail competitors, each of which could buy in the same quantities from processors or wholesalers, the lower the prices paid by consumers and the less the variance of price among competitors. Thus, marketing efficiency is increased.

MEASUREMENT:

1. Determine the prices of like items by major city in Canada.

2. Identify the costs of these items paid by retailers, along with the gross margins and transportation costs.

3. Assess the impact of the number of competitors on the prices paid by consumers, after netting out the impact of transportation, quantity breaks, and costs.

HYPOTHESIS 8B: Marketing structure changes in the Canadian food distribution industry will not be as great in the future as in the past.

MEASUREMENT:

1. Assess the literature studies and forecasts regarding structure.

2. Assess the current market structure, city by city in Canada.

3. Determine whether further structural changes are likely.

Marketing Efficiency - Prospects for Increased Concentration of Trade

There are three major forces working toward probable increased concentration of trade in the future particularly at the retail level. These are:

1. Increasing age of managers of the smaller, independent firms.
2. Increasing capital costs to open new businesses.
3. Forecasts (self-fulfilling prophecies).

Based upon the researcher's experience in the wholesale and retail business (including food distribution), there are many managers who are getting old (over 55) and do not have relatives ready to take over their firm. One of the reasons for this situation has to do with the attitudes of many people under 30 years of age. Often these people want to "do their own thing".

Another reason has to do with the generally declining status of small and independent businessmen as outlined in John Bunzel's, Myth of the American Small Businessman. A supporting demographic factor for this decline is the increasing percentage of people in urban areas, which are dominated by the larger food distribution firms.

A second aspect of possible increased concentration of trade relates to the increasing capital requirements. Due to inflation, larger stores, and investment in scanners, a 30,000 square foot retail store in the 1970's requires about $500,000 in capital, while a 15,000 square foot store in the 1960's needed only $100,000 of capital (57, p. 53). The aspect of fewer and larger stores was also seen by Cain (304, p. 36). However, a leveling off in store size as economies of sizes slow, was forecasted by Anderson (283, p. 46).

With regard to forecasts of the future, it seems unlikely that business, on its own initiative will move toward less concentration of trade. Further, only 7% of food industry representatives from all sectors believe that it is likely that the U.S. federal Government during the 1980's will force major

food chains to break up into smaller companies (22, p. 65). Because forecasts can have a self-fulfilling role, this is a supporting reason for increased concentration of trade.

HYPOTHESIS 9: An age analysis of top management and shareholders of small independent and small chain companies will show:

- A large proportion of top mangement in the 55-65 age group.
- A high percentage of owner/managers who do not have qualified relations to take over the business.
- Difficulties in attracting top calibre, well-trained young people into the food distribution industry.

MEASUREMENT:

1. Questionnaire distributed through trade associations. The Key questions would relate to ages of top management and plans for succession.

2. Assessment to determine whether forecasts for increased concentration of trade have an analytical basis, particularly with regard to capital requirements.

Future System Perspectives -- Possible Total Industry Restructuring

There is disagreement among academics (280, p. 373), government people, industry, and the general populace regarding how the food distribution industry should be structured. On one extreme, some people feel that there should be no government involvement. On another extreme, there are those who feel that total government control is needed to keep food prices within reason. Some traditional economists may still claim that small unit "pure" competition is best. Industry people generally claim that the current structure is better than any other alternative.

With all of these approaches comes the question: suppose that it were possible to develop a hypothetical, ideal food distribution system. Assuming that the food consumption of consumers remained the same as the current output, what would the best structure be in terms of input costs? This approach would assume that retail stores and distribution warehouses could be as few and as situated wherever the system efficiency was the greatest.

HYPOTHESIS 11: It is possible to construct an "ideal" retail food distribution system which is significantly more efficient than the current system.

MEASUREMENT:

1. Analysis of the optimal size and location of retail food stores.

2. Analysis of the optimal size and location of wholesale distribution centres.

3. Simulation of the food distribution system through use of models similar to those described by Ballou (391).

4. Analysis to determine whether a food distribution system is more efficient with total government ownership, private enterprise, similar to the current system, or pure competition.

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SUMMARY

Hammonds (330, p.11) stated:

"As we move to a more stable economy, the public becomes more critical of industry inefficiencies. We must realize that for food distribution, the easy efficiencies have already been adopted. Retailers are looking at major efficiency improving innovations requiring cooperation of a long list of related groups and sectors: labor, government officials and regulators, the academic community, consumers and consumer act groups, wholesalers, grocery manufacturers and banks."

It should be clear from the previous background and hypotheses that at least the level of cooperative effort outlined by Hammonds is required if the Canadian food distribution industry is to become more efficient.

With regard to future directions of research, it would be extremely useful to:

1. Identify the relevant costs and possible system benefits that could occur if each hypothesis were researched.

2. The hypotheses should be prioritized by relative benefits to costs, so that the greatest possible impact can be achieved.

3. Further efforts are required to establish a food distribution management and innovations group that can centrally coordinate (at relatively low cost) management innovations for Canadian companies. Of particular importance are: UPC, transportation, energy, inventory control, advertising effectiveness, labor, and management information systems.

4. Further efforts are required to establish cooperative efforts between various sectors of the government (Department of Consumer and Corporate Affairs, Department of Industry, Trade, and Commerce, Statistics Canada) and industry trade associations and labor unions.

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APPENDIX I -- BIBLIOGRAPHIC SEARCH

I. Bibliographies Used

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Telephone Calls and Personal Discussions

- Dr. Bert McCammon, Professor of Business and Business Research Director, University of Oklahoma.
- Dr. Al Bates and Dr. Steve Bass, Managent Horizons, Inc., Columbus, Ohio.
- Garry Philbrick, Computer System Consultant, formerly Head of Computer Systems at Managent Horizons Data Systems and the Kroger Company.
- Ray Bertrand, President, Canadian Grocery Distribution Association, Montreal, Quebec.
- Approximately 50 members (most long-term) of the Food Distribution Research Society, including Dale Anderson and Harold Bricker who are completing a major compendium of articles relating to productivity.
- Walter Heller, editor, Progressive Grocer.
- Gerald Peck, President, North-American Wholesale Grocers Association (NAWGA).
- Lewis Norwood, President, North American Retail Grocers (NARGUS)
- Food Marketing Institute, St. Joseph's College, Philadelphia, Pa.
- Dr. Jack Runyon, President of Food Distribution Research Society and Head, Agricultural Marketing Research, U.S. Department of Agriculture.
- Dr. Vern Smith, Chief, Wholesale and Retail Division, Distribution Services Branch, Department of Industry, Trade, and Commerce, Ottawa, Ontario

Note: Other than the few instances as resulted in the report, none of these sources were aware of any detailed work regarding efficiency concepts, particularly with regard to the scale required for this report.

3. Computerized search through the University of Calgary system tied to Lockheed, using the following data bases:

   - AGRICOLA
   - NTIS (National Technical Information Services)
   - Foods Adlibra
   - Economic Abstracts
   - Comp. Diss. (Dissertation Abstracts)

   Using the following terms:

   - Food and
   - Market structure wholesales, retailers, distribution, retail, wholesale, retailing, wholesaling, industry, grocery industry, policy, and
   - Efficiency or effectiveness or productivity

   The computer printouts were scanned to determine useful articles and books.

4. Manual literature search through

   - Social Sciences literature index
   - Business Periodicals Index
   - Public Affairs Information Service
   - Canadian Business Periodicals Index

   for the terms efficiency and food/grocery industry.

5. Manual search through all the issues from 1950 on for:

   - Journal of Food Distribution Research
   - Journal of Agriculture Economics
   - Journal of Farm Economics

6. Manual search through the card catalogues and shelves at:

   - Princeton University
   - RutgersUniversity
   - University of Calgary