.... *JMR* 30th Anniversary Guest Editorial

This February 1993 issue begins the 30th Anniversary volume of the *Journal of Marketing Research.* The academic marketing discipline, as reflected in the articles published in *JMR,* has certainly changed dramatically over this time period. To reflect on these changes and generate discussion about the future directions for marketing research, I have asked several marketing scholars to prepare guest editorials.

It is fitting that Frank Bass write the first of these guest editorials. Professor Bass is a former editor of the *JMR* and a recipient of the William O'Dell Award for the best paper published in *JMR,* the Paul D. Converse Award for outstanding contributions to marketing science and theory, and the Richard D. Irwin/American Marketing Association Distinguished Marketing Educator Award. In addition to his research published in the leading marketing and management science journals, Professor Bass has made significant contributions through his former doctoral students who are professors in leading management schools across the world.

—Barton A. Weitz, Editor

FRANK M. BASS*

The Future of Research in Marketing: Marketing Science

The beginning of serious research on marketing topics applying advanced research methods coincides roughly with the founding of *JMR*. Over the intervening period this journal has been the primary vehicle for the publication of basic research in marketing.

In the February 1964 issue of *JMR*, William R. Davidson, President of the American Marketing Association, in a piece entitled "Introducing the *Journal of Marketing Research,*" pointed out the need for the new journal as a complement to the more broadly appealing *Journal of Marketing*. He commented, "Essentially, the focus of *JMR* is on methodology and on the philosophical, conceptual, and technical problems of research in marketing." He further said, "More widespread interest in scientific methods in marketing has greatly stimulated interest in marketing research . . . ." Founding Editor Robert Ferber, a principal force behind the establishment of this journal, wisely foresaw the need for a publication outlet for the increasing volume of technical papers addressing marketing topics. Then as now, technical papers were not fondly received by persons who could not understand them. Change is generally resisted and scientific development in marketing to the present state of affairs has not come about without resistance or controversy. Fortunately, in my opinion, the resistance has been futile and the development of science in marketing inevitable. An old Arab saying best describes the outcome

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of the controversy: "The dogs bark, but the caravan passes."

In discussing fruitful directions for future research in marketing, it is useful to examine the nature of developments of basic research in marketing over the past 30 years or so. Gains in fundamental knowledge have been substantial but, more important, what has transpired has been the development of a system for further development of science in marketing. The system involves methodologies, databases, and, most important of all, analytical and conceptual frameworks—models—that have captured the fundamental character of what we have learned.

The tremendous growth of methodologies and databases has had a major impact on marketing practice by providing information about particular issues, but in the long run it is the development of a knowledge base that will yield the greatest returns to the investment made in marketing science.

One increasingly finds the word "science" associated with marketing. There is a Marketing Science Institute, a scholarly journal, *Marketing Science,* an annual Marketing Science Conference, and a variety of other activities in which the word "science" is used in conjunction with the word "marketing." Moreover, in 1982 the National Science Foundation established a program in Decision, Risk, and Management Science in which marketing is a recognized and integral part. *JMR* has played a pivotal role in the development of fundamental marketing knowledge and is an appropriate forum for a discussion of fruitful directions for further advancement.

In this piece, I attempt to show that marketing has indeed become a science and argue that this development provides the basis for suggestions for future research. Because science is a process, it may be useful to understand the potential significance of individual research efforts to the whole.

THE NATURE OF SCIENCE AS RELATED TO MARKETING

Definition of Science

Support for claims about what has evolved from the basic research activities in marketing over the past 30 years or so must be based on a comparison of a characterization of this research with accepted definitions of science. These definitions are to be found in the philosophy of science. Nagel (1961) has stated that science has grown out of common-sense concerns of daily life, but that this historical continuity does not mean science is merely common sense organized and classified. Science seeks to provide *generalized explanatory statements about disparate types of phenomena* and to provide critical tests for the relevance of the attempted explanations. Goldstein and Goldstein (1978) define science as an activity characterized by three features: (1) it is a search for understanding, for a sense of having found a satisfying explanation for some aspect of reality, (2) the understanding is achieved by means of statements of general laws or principles—laws applicable to the widest possible variety of phenomena, and (3) the laws or principles can be tested experimentally. In today's world, it is only natural that the common-sense concerns of daily life would include issues involving marketing.

Empirical Generalizations

If science seeks generalized explanatory statements of phenomena, as indicated by Nagel, what generalized explanations and what phenomena derive from marketing inquiry such that a claim can be made that a marketing science exists? Before we turn to examples, it is useful to examine the nature of phenomena and of "generalized explanation." A phenomenon is described in *Webster's* as "In scientific usage, any fact or event of scientific interest susceptible of scientific description and explanation." In our usage, I think, it is a pattern or regularity that repeats over different circumstances and that can be described simply by mathematical, graphic, or symbolic methods. A generalized explanation is simply a theory that explains the phenomenon and that has other implications.

Ehrenberg (1982) notes that

> . . . the lawlike relationships of science are descriptive generalizations, often at quite a low level. But the variables which do not appear in the equation greatly aid our understanding (e.g. that the type of gas, the type of apparatus, etc. do not matter). They are also the building-blocks of higher level theory and explanation.

Ehrenberg (1975) also has characterized lawlike relationships as having the following properties: "They are of limited generality, rather than universal; they are approximate rather than exact; they are not necessarily derived from theory; and they are broadly descriptive rather than directly causal."

The approximate as opposed to the exact quality of scientific relationships has also been discussed by Simon. In 1968 he wrote:

> At the very least, one would think, the statements of fact should be amended to read "nearly inversely proportional" or "approximately inversely proportional." But how near is "nearly," and how approximate is "approximately?" What degree of deviation from the bald generalization permits us to speak of an approximation to the generalization rather than its disconfirmation? And why do we prefer the simple but approximate rule to the exact facts?

Simon further points out that the theory of statistical tests gives us no real help in choosing between an approximate generalization and an invalid one. He wrote:

> If the generalization is just that—an approximate summary of the data then it is certainly not falsifiable, or testable. It becomes falsifiable or testable when (a) it is extended beyond the data from which it was generated, or (b) an explanatory theory is

constructed, from which the generalization can be derived, and the explanatory theory has testable consequences beyond the original data.

Marketing Science

A marketing science has come about not so much because of a conscious search for empirical generalizations and for generalized explanations as because of the development of a critical mass of scholars devoted to the study of relationships central to marketing using methods of ever-increasing power and data of ever-increasing scope, detail, and variety. There has been a predisposition for deduction, or theory, to guide research, but in science it is also possible for the observation to come first and for the explanation to follow. Science is a process in which data and theory interact so that what begins as a theory leading to observation may ultimately require revision because additional observation may be inconsistent with some aspect of the theory. The Michelson-Morley experimental outcome was inconsistent with Newtonian theory, thus necessitating a new theory.

Central to the argument I advance here is the idea that marketing science, like science generally, is a process and that persons who seek fruitful directions for further research would be best guided by a recognition of the relationship of their effort to the greater scheme of things. Issues such as the generality of results, the degree of consistency of observation with theory, and the extension of theories to predict new observations are likely to be of increasing importance in advancing fundamental knowledge.

Marketing affords several examples of a process, or stream of research, in which data and theory interact to produce generalizations about phenomena. Only a few of these examples are discussed here. Perhaps the best science is that which has an element of surprise. After all, science is not, as indicated by Nagel, merely common sense. If the examples discussed here now seem obvious, they were not obvious at the time the phenomena were being uncovered. Explanations and extensions of the examples of empirical generalizations are ongoing and in each instance a sense of mystery remains about the implications from possible refinement.

EXAMPLES OF EMPIRICAL GENERALIZATIONS IN MARKETING

Stochastic Models of Choice and Brand Switching

Prior to the late 1950s and even afterward the preconceptions and theories in the social sciences about choice behavior were deterministic. The notion of "choice probability" was foreign. In economics the outcome of consumer utility-maximizing effort was deterministic and in psychology the concept of "choice probability" was outside the mainstream of thought. The Luce (1959) choice axiom set into motion a stream of thought and measurement that continues to this day. Multiattribute models have been incorporated into the stochastic choice framework through the Luce axiom, giving rise to logit models that are currently popular in empirical work.

In marketing there was a strong predisposition to regard customers as either "loyal" or "not loyal." Loyal customers always chose a brand and unloyal customers chose the brand only occasionally. In thinking about market share, the notion was of a dichotomy consisting of "our" customers and the customers of competitors. Under this concept brand switching meant that a customer had changed evaluation of brands and had decided that a different brand was better. The notion that customers were regularly dividing purchases between several brands without changing attitudes or evaluations was unheard of. This kind of thinking, of course, had an impact on the evaluation of marketing strategies and on decision making in marketing.

In the late 1950s and early 1960s Ehrenberg (1972), in examining the purchase incidence of frequently purchased low-priced consumer products as measured through consumer diary panel data, observed that the distribution of the number of purchase occasions of a brand or of a product category for a fixed period of time such as a year was highly skewed. This distribution could be approximated by the negative binomial distribution. These results held for data from Britain, Europe, and the United States. Here was a generalization of substance. What did it mean? Penetration statistics, or the fraction of the population that made at least one purchase of the brand in, say, a year, might be 70% for a brand with a market share of 30%. The indications were that consumers were regularly buying more than one brand and that the fraction of the market with some potential to buy the brand was much greater than would be indicated from market share statistics. Ehrenberg's observation was surprising because it was inconsistent with preconceptions about brand loyalty.

The Ehrenberg generalization is an example of a scientific development in which observation preceded explanation (or theory). If the negative binomial describes the distribution of the number of purchase occasions, why and how does it come about? Ehrenberg observed that if for an individual the distribution of the number of purchase occasions for a brand in a specified time period was distributed as Poisson, given that the mean rate of purchase for that consumer was mu, and if the distribution of mu over the population of consumers was gamma, the compound gamma-Poisson would be negative binomial. The gamma distribution accounts for heterogeneity of preference in the population and the Poisson is the limiting distribution of the binomial and thus reflects a zero-order stochastic process.

In the early 1960s a variety of stochastic processes were being explored for marketing application. They included Markov and linear-learning models. Massy, Montgomery, and Morrison (1970), in an important work, reviewed the literature on and studied the nature of stochastic processes, which seemed to describe or be consistent with brand switching behavior of consumers. The phenomenon observed by Ehrenberg can be measured in more than one way—either by counting the number of purchase occasions of a brand for an individual consumer and then measuring the fraction of the consumers who purchased the brand x times during a specified time period or by observing the sequence of brand choices of consumers and reporting the fraction of adjacent choice occasions that involved a switch of brands. The compound gamma-Poisson distribution postulated by Ehrenberg to account for the distribution of purchase occasions implies the existence of a zero-order stochastic process at the level of individual consumers. Many researchers have been predisposed to believe that purchase event feedback, or non-zero-order behavior, should characterize brand choice behavior. Testing for the order of the process is not a simple matter and many studies of the issue led to conflicting results. However, a very comprehensive study of consumer brand choice behavior of individual families (Bass et al. 1984) indicated that when the stochastic process was stationary, the majority of consumers, but not all of them, were behaving in a manner consistent with the zero-order process. Science does result in surprises and surprises result in additional investigation.

The search for generalized explanations of observed phenomena is an ongoing process in science. Chatfield and Goodhardt (1975) observed that if the distribution of purchase probabilities for brands over the population is multivariate beta (Dirichlet), and if the purchase rates are independently distributed as gamma, and if purchase timing for all brands is the same for each consumer, and if purchase timing is distributed Poisson over the population, the distribution of purchase occasions will be negative binomial. Thus Chatfield and Goodhardt derived another rationale or explanation for the negative binomial distribution. I studied brand switching data that had been developed from experimental data (Bass 1974) and found that experimental data on brand switching matched fairly well with diary panel data. I developed a model of brand switching behavior. These results were later modified and extended by Bass, Jeuland, and Wright (1976), who showed that one set of assumptions led to both brand switching phenomena and purchase incidence phenomena. Jeuland, Bass, and Wright (1980) provided a further extension.

Explanations of the brand switching and purchase incidence phenomena are somewhat limited in that (1) they are equilibrium models and assume stationary behavior and (2) they do not incorporate decision variables. These models do, however, provide the framework for developing models that are not so restrictive. For example, among others, Bass and Pilon (1980) and Guadagni and Little (1983) developed dynamic models of market share behavior that results from an aggregation of individual behavior (or from homogeneous parameters over a population of consumers) and does include decision variables. Models of this type provide enhanced explanation and understanding of econometric studies based on aggregative data.

Only part of the stochastic choice and brand switching story has been told here. There have been many other extensions and searches for models that are consistent with the empirical generalization. My purpose in presenting this story is to show that an empirical generalization exists and to illustrate that its existence sets into motion a process of refinement and extensions. This story is, I think, the stuff of science.

Diffusion of New Products

In the preceding example the empirical observation (by Ehrenberg) came first and explanations and theories came later. In science this sequence is the more common one. Simon (1968) wrote, ". . . histories of science written in terms of the processes that discover patterns in nature would seem closer to the mark than histories that emphasize the search for data to test hypotheses created out of whole cloth." But not all empirical generalizations come about prior to theory. In the case of diffusion of innovations, theory preceded observation.

In 1969 I developed a new product diffusion model of the demand growth for new products. As new products—especially new technologies—are introduced, the demand for them grows over time. Even when the new product represents a substantial improvement over existing products, it takes time for the information about the qualities of the new product to diffuse through the population of potential buyers. The Bass model is a mathematical representation of observation and ideas developed by social scientists studying the adoption of innovations. The principal ideas are that there are innovators and imitators among the population of buyers. Contagion effects similar to those found in epidemiology operate in spreading information and through social forces distribute the adoption of the new product among potential buyers through time. I developed a differential equation indicating that the conditional probability of adoption of a new product at time t is a linear function of the number of previous adopters. The solution to this differential equation yields the probability density function of time to adoption. The adoption rate for the new product will be proportional to the density function. The function rises to a peak and then declines. The parameters of the function have interpretations related to market potential, innovation, and imitation. The implication of the theory is that the adoption of the new product will follow a certain pattern. Many dozens of applications have shown that, in fact, the observed adoption patterns are consistent with the implications of the theory.

The model has properties such that it is possible to guess the values of parameters before a new product is introduced. A method of guessing in the no-data case is explained and illustrated by Lawrence and Lawton (1981). There have been many successful applications of the model in practice. It has been especially useful in forecasting the timing and magnitude of the peak in the adoption rate. Many extensions and variations of the model have been reported and more are coming forward all the time (see, e.g., Mahajan, Muller, and Bass 1990). Recent extensions have been developed by Norton and Bass (1987, 1992) to address a series of generations of high technology products in which later generations succeed earlier ones.

The diffusion process is now a well-established phenomenon and there is a generalized explanation for it. Implications and extensions of the theory are still being developed. Many of them involve the incorporation of decision variables in the model for planning purposes. Recently, Bass and Krishnan (1992) developed a generalization of the Bass model (generalized Bass model) that permits the inclusion of decision variables in a way that is consistent with the basic model. It provides an explanation of deviations from the smooth curve implied by the model and at the same time permits an examination of the effects of shifts in the values of the decision variables.

Response Models

There is a vast literature on the topic of sales and share response to decision variables such as advertising, price, and promotion. This stream of research began as a series of isolated studies, each study involving a different model, different variables, different measures, and different products. Because of the isolated nature of the studies, generalization was missing. However, as the number of studies grew, generalizations emerged. Blattberg and Neslin (1989), for example, have examined the literature on promotion and developed generalizations of the following type: (1) brand switchers account for a significant portion of the immediate increase in volume due to sales promotion, (2) immediate-term promotional cross-elasticities are asymmetric, and (3) various forms of promotion have separate impacts, which may or may not interact and are usually difficult to disentangle. Qualitative conclusions such as these may lead to a search for conditions under which exceptions exist. The same would also be true of generalizations based on many empirical studies showing that the response to advertising is usually small and the response to promotion is generally strong. The value of these conclusions could be enhanced by the development of generalized explanations.

In the case of the "carryover effect" of advertising, a data interval bias was first observed by Clarke (1976) in a comparison of the lag coefficient over several studies. This observation set into motion a series of articles on this topic. Bass and Leone (1983, 1986) showed theoretically that a data interval bias exists and that this bias has properties consistent with Clarke's observation. The lag coefficient will diminish and the advertising coefficient will increase as the data interval employed in the analysis increases. Numerous articles have suggested ways to recover parameters for data intervals of brief duration when data are available only for longer periods. Though the existence of a data interval bias is not disputed, a question remains about an "optimal" data interval. For the data interval generalization, a generalized explanation has been developed, but useful extensions may yet emerge to address additional issues such as the question of the "optimal" data interval.

Strategy Studies

One of the more interesting empirical generalizations that has emerged from studies of corporate strategy is the experience curve. The discovery that costs (and prices) of high technology products decline with learning as experience (measured by accumulated output) grows has led to significant implications for strategic decisions. This empirical generalization was first discovered in the production of airframes and popularized and exploited by the Boston Consulting Group (1968). Its implications have been explored in numerous studies in economics and marketing.

Many cross-sectional studies utilizing the PIMS database have searched for generalized relationships. Among these studies are a series of explorations of the relationship between the order of entry of a brand in the market and the long-run market share of the brand (e.g., Robinson and Fornell 1985). This stream has led to extensions with cross-sectional and time series data such as the recent study by Kalyanaram and Urban (1992).

One could say that, almost by definition, empirical strategy studies are focused on the development of conditional generalizations.

CONCLUDING COMMENTS

A guide to fruitful directions for future research in marketing may be found in the recognition that what has transpired in the past 30 years has been the development of a marketing science. Science has three elements: (1) empirical generalization, (2) generalized explanation, and (3) a process of extension, revision, and updating. Basic research in marketing has these elements.

The building block of science is empirical generalization (phenomena). There is no general prescription for the discovery of phenomena, but it is important to recognize that, along with the other two elements, discovery of phenomena is what science is about. Replication, exception, confirmation, extension, and revision, as well as the development and discovery of new phenomena, will further advance marketing science.

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