SYSTEMS ANALYSIS FOR MARKETING MANAGEMENT

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"Systems Analysis" appears to be replacing "Motivation Research" and "O.R." as the in-phrases of marketing meetings and speakers. In the brief time available this morning, I would like to examine the nature of his elusive process and consider its applicability to marketing management.

What is Systems Analysis?

In simplest terms, Systems Analysis is a process for analyzing systems. The concept of analysis is well understood. We use the word analysis to refer to the process by which a problem or entity is separated into constituent parts -- literally unloosened or resolved into elements. Systems Analysis might, therefore, be defined as the examination of systems to distinguish their component parts and elements separately or in relation to the whole. The real question is "What is a system?".

The year-book for the advancement of general systems theory provides the following definition:

A system is a set of objects together with relationships between the objects and between their attributes.¹

Another source indicates that "a system is an organized or complex whole; an assemblage or combination of things or parts forming a complex or unitary whole".²

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The word system can thus connote a plan, method, structure, framework, sequence or organization. These definitions suggest that the application of Systems Analysis to marketing problems will involve an examination of the elements and relationships which make up the "marketing system".

**Systems Analysis in Marketing**

Discussions of "marketing systems" are often more chaotic than systematic. We frequently fail to establish even the most rudimentary characteristics of the "systems" with which we are concerned. Are they open or closed? Static or dynamic? Rigid or adaptive? Stable or unstable? What do we mean to communicate with the word "system"? Are we using it to describe a particular conceptual framework? Or are we less concerned with structure than with function? If it is a "systems approach" with which we are enamoured, perhaps more emphasis should be placed on methodology and the specifics of procedure.

It is difficult to find a functional management area in which the gains potentially realized by effective structuring are greater than in marketing. The need for a systematic approach to marketing has been discussed frequently in literature. ³

Most managers agree on the desirability of developing structures within which the implications of factors influencing complex management decisions may be analyzed.

The system analyst proposes to approach the complexities of marketing by structuring existing knowledge and assumptions in a series of explicit, quantitative and testable assertions. The alternative is to be content with intuitive decision processes based on internalized models that cannot be communicated or evaluated because they have never been made explicit. The system analyst may begin with intuitive models. However, his objective is to make these explicit. Starting with the internalized models of managers and observers of the business environment, the system analyst would attempt to structure the insights of informed individuals so that they might be communicated with a minimum of ambiguity. He hopes to produce a usable model -- a model on which operations can be performed in lieu of operation in the actual market environment, a model that might be objectively verified or rejected with reference to data from the real world.

It is difficult to find fault with these objectives. And yet it is even more difficult to find examples of the successful application of Systems Analysis in marketing. While most managers will agree that Systems Analysis "makes all kinds of sense" as a general approach, they are quick to point out
that "certain special considerations" make it inapplicable to their market or their company. Why?

In my opinion, Systems Analysis has not been widely applied to marketing problems for human rather, than technological, reasons. Let us consider the problems posed by two characteristics of the process:

1. Characteristic: Systems Analysis requires that management devote time to problem definition and model building.

   Problem: The programmed routine of the day easily distracts many managers from the often frustrating and ill-structured demands of system definition.

2. Characteristic: Systems Analysis involves measurement and evaluation. Managers are asked to establish explicit descriptions of their environment.

   Problem: Some managers are threatened by this process. Explication fosters disagreement and Systems Analysts may lack the political power and/or organizational skill required to resolve resultant conflicts.

The Problem of Management Involvement

Management must be involved in the Systems Analysis process. A technical staff may handle the details of documentation and programming. However, management must determine the scope and focus of analysis and insure that prevailing market conditions are represented by valid measures of executive action and market response. Only management can establish meaningful priorities, criteria, measurements,
decision procedures, and standards of evaluation.

System Analysis must focus on the processes which management is attempting to influence. Systems are not designed by asking management to list "the kinds of information you would like to have?" or "your ten most important decisions?". Despite the popularity of such activities, discussions of existing reports and decision procedures have little to do with Systems Analysis. Most managers will agree that existing procedures are sub-optimal, non-systematic, irrational, or just plain confused. Given this realization, it is pointless to devote resources to the introspective analysis of current practices.

In my opinion, attempts to analyze existing corporate goals are similarly ill-fated. The successful manager has usually learned to set "realistic goals". That is to say, goals which he is confident of meeting. It is very difficult to formulate substantive analyses in terms of such goals. In this context, I am reminded of a recent dinner conversation with a friend who is the Chief Executive Officer of a corporation well known for its financial strength and goal of "x-percent before taxes". Noting that his year end P & L exuded the usual robust glow, I asked about the impact of a twelve million dollar write-off associated with an abortive new product activity with which we were both familiar. His succinct response was delivered with a smile: "I have a slush fund."
The analyst who chooses to focus on existing management goals must assume that they determine or measurably influence decision processes. In many instances this assumption is not valid. Goals are frequently relevant only in retrospect. They merely determine the language of rationalization.

This is not to say that the existing management structure is irrelevant. Systems Analysis begins with the manager's model of the market environment. The process challenges the executive to describe the environment which he is attempting to influence. This distinction should be emphasized. Systems Analysis focuses on the environment to be influenced through decisions not the decisions themselves. An understanding of the manager's perception of the market environment must be achieved before attempting to examine existing or proposed future decision procedures.

Each company's management has unique requirements; a unique perspective on the environment within and outside their firm; unique priorities; and a style of management which is the unique product of the particular personalities making up their management group. Successful systems analysis begins with these management perceptions. However, it does not necessarily promote them. Once an explicit framework has been established current perceptions may be tested and validated or rejected.
Systems Analysis is an interactive process through which management and the analyst work to refine and validate explicit models of those marketing processes which are of concern to the executive. Management's intuition and insight are thus the basis for a preliminary and qualitative analysis. While incipient models may be limited by existing procedures and prejudice, they establish a management perspective and insure that subsequent analysis focuses on actionable market processes.

Market-oriented Systems Analysis thus focuses on market processes rather than existing reports and decisions. It is concerned with the impact of management controlled variables on competitors, salesmen, trade-channels, and consumer or industrial purchasers. The objective of such analysis is to model, refine and validate or reject current management understanding of market interactions and to relate relevant measures of behavior and response to management action alternatives.

**The Problem of Being Explicit**

Abstraction is inherent in Systems Analysis. The individual who develops a model must impose structure on a situation. He must specify that which is relevant. This requirement is not unique to Systems Analysis. Whether or not a decision maker develops an explicit model, the information considered in reaching a decision is determined by his limited perception of the decision environment. We are all familiar with the observation "...it seems to me that this is basically a matter of .......", which frequently precedes presentation of highly abstract verbal models. Subjective evaluation is present whether or not an explicit model is established. However, as a model is made
explicit, the level of abstraction -- the extent to which the model builder has reduced the situation to a limited and manageable number of factors -- becomes more obvious.

The perceptiveness of the individual who has the ability to "separate the wheat from the chaff" and "get to the nub of the problem" is often lauded. Yet, when this same perception is applied to the structuring of an explicit decision model through exclusion of other than the most relevant factors, the results may appear appallingly "simple minded" and be dismissed as "naive" or "sophomoric".

Seasoned managers may become unnerved when asked to summarize factors considered in arriving at a decision and to make explicit the assumptions underlying their choice of factors. The resultant "model" is usually a simple one, and the manager is seldom happy with it. It is disturbing to recognize that a decision affecting an expenditure of tens of millions of dollars in a complex environment is made on the basis of a model that takes into account only two or three gross descriptors.

It is even more distasteful to admit that a direct relationship has been assumed between ill-defined descriptors and a complex outcome. It is far more satisfying to retain the aura of understanding that flows from ambiguous general discussion than to face the frustrations inherent in being specific. For this reason,
underlying models are seldom made explicit or, in the rare instances when a model is proposed, it is accompanied by a disclaimer that "this is only to highlight a few of the more important factors considered in this situation". "Obviously, many other things must be considered before reaching a final decision".

It is generally possible to obtain agreement from practicing marketing men on the contents of the annotated lists with which marketing texts abound. These compilations of factors to be considered in a particular decision context and their counterparts in "principles of marketing" are sufficiently ambiguous to gain acceptance from people who have substantially different views of the situation under discussion. When lists and principles are replaced by explicit and testable statements, differences of opinion will be encountered. It may be suggested, in fact, that if differences of opinion are not encountered, the model is probably not explicit enough. If explicit formulation achieves no other objectives, it should provide an unequivocal statement of knowledge or assumptions. The men who examine such a formulation should be able to focus their attention on specific points of disagreement.

Systems Analysis is rightly viewed as a vehicle for the creation of dissension. Those promoting Systems Analysis are trouble makers. They challenge the comfortable platitudes and question the bases of time honored decision rules. It is, therefore, not surprising
to find that human factors present more significant barriers to successful System Analysis than any technical consideration that can be identified. The Systems Analyst must assume one of the most influential yet ill-defined roles in the management structure. He is an agent of change.

The Marketing System

Marketing Systems Analysis must begin with a conceptual framework, a skeletal structure to which the elements relevant to marketing management may be attached. This conceptual framework must:

1. Define a set of elements that, while common to a broad range of management problems, are defined in sufficient detail to permit differentiation between relevant states of the environment.

2. Serve as a basis for description of processes as well as of elements -- provide a means of describing interactions between elements.

3. Be based on measurable entities amendable to quantitative description and validation.

Markets can be described in many diverse ways and depicted in conflicting word pictures. Despite divergent perceptions, there is a common underlying reality to which managers and academicians alike attempt to relate. Whether one listens to a brand manager describe a product line that is not moving or to a marketing professor discussing a theoretical salesman allocation procedure, certain common elements may be noted. These are the elements encompassed by Systems Analyses of marketing phenomena.
As an example, we might consider a qualitative system structure consisting of actors, observable actions, and implied actions defined as follows:

1. **Actors** - The actors within the market environment are manufacturers, distribution agents, selling agents, research agents, government, and consumer or industrial purchasers.

2. **Observable Actions** - Observable actions comprise all events that may be directly verified by observation. These include actions associated with the distribution of physical goods, communication of information, implementation of pricing policies, generation of orders and product or service consumption.

3. **Implied Actions** - Implied actions refer to processes that, although not directly observable, are assumed to underlie and support observable actions. Representation of implied processes involves intermediate variables that must be defined and measured if the existence of implied actions is to be verified empirically. Implied actions include exposure and response to advertising, establishment of effective motivation for sales forces, and the development of and change in knowledge and attitude.

The proposed structure facilitates graphic representation of interactions between market sectors as illustrated in Figure 1, which provides a macroview of product and information flow from producer to consumer. Dashed lines represent the flow of information (1) from manufacturer to consumer, retailers, and distributors; (2) from manufacturer through sales force to retailers and distributors; and (3) from distributor through sales force to retailers.
Figure 1. Macro flow chart example.
Solid lines indicate that product may flow directly from producer to consumers or indirectly through retailers and distributors. Government concern with producer-competitor communication, advertising, and product produced is also illustrated.

Figure 1 is not to be construed as a statement of structural attributes. It is merely an example designed to illustrate that interactions between elements in the marketing system may be easily expressed and rapidly assimilated in graphic form using a framework of the type proposed.

**Qualitative Definition of a Framework**

The discussion thus far has focused on interactions among actors described in terms of product and information flows. Expanded use of the proposed framework requires refinement of the structure beyond the gross proportion in which it was introduced. Working toward this end, the proposed system structure may be reformulated in terms of eight "active elements," three "elements of flow," and three "passive elements."

**Eight Active Elements**

Active elements in the marketing system are human and, as such, can originate signals as well as react to signals generated by other active elements. Eight active elements may be identified as

1. a producer, 2. his competitors, 3. distributors and wholesalers, 4. selling agents -- salesmen, 5. retailers, 6. consumers, 7. government, and 8. research agents.

Each active element may be described by its characteristic functions
defined in terms of the inputs the element receives, the variations in inputs to which the element is sensitive, the outputs the element is capable of generating and the correlations, if any, between specific inputs and outputs.

**Three Elements of Flow**

Elements of flow are the vehicles of interaction between active elements. These are the factors which a successful management is able to manipulate to achieve desired objectives. Elements of flow are unable either to initiate or to respond to signals. They are the media through which signals are transmitted, the means of energy transfer analogous to the electrons that flow in an electronic network. The elements of flow are defined as (1) product, (2) information, and (3) capital.

**Three Passive Elements**

Passive elements may be described as characteristics of the channel through which elements of flow move between active elements. While passive elements affect the signals (elements of flow) moving in the channel with which they are associated, they cannot originate signals or affect active elements directly.

Three types of passive elements are defined. These are (1) time delays that affect the movement of elements of flow between active elements, (2) dissipators that reduce the magnitude of elements of flow transmitted between active elements, and (3) storage elements that accumulate backlogs of elements of flow.
The Market Viewed as a Network

Given the perspective of a company producing and marketing a consumer or industrial product or service, the market may be thought of as a network from which management attempts to obtain particular responses. The manager is able to manipulate passive elements within the network and to control the entry of elements of flow that provide signals to which active elements may respond. He may obtain some information about the state and response of particular elements directly; however, most information relating to the effect of interactions within the system and to total system response must be imputed from analysis of output generated by the system in response to given inputs.

The impact of even qualitative structure on the description of processes within the marketing environment may be illustrated using Figure 1. Consider, for example, producer promotion directed to the consumer. In context of this structure, the problem is formulated in terms of information flow rather than in dollar expenditure alternatives.

Some information is transmitted directly from producer to consumer; other messages reach the consumery only after being filtered (delayed and perhaps partially dissipated) through the distributor. In the first instance, the consumer responds to signals received directly from the producer. In the second, the distributor and his sales force may modify or delete the producer's message before it reaches the consumer.
Description of promotion in context of this structure therefore focuses on transfer functions describing the response and the transfer characteristic of each active element to information inputs from every other active element within a given system.

This qualitative description illustrates the first step in a systems approach to the definition of elements and relationships within the market environment. Specifications for active elements, elements of flow, and passive elements must be refined to provide an explicit macro-structure for the later definition of dimensions and measurement procedures. Explicit definitions and boundary conditions -- the prerequisites of systematic quantitative analysis -- must be established.

A Four Phase Approach

Time does not permit a detailed discussion of the succeeding steps in marketing System Analysis. Characteristics of the approach may be summarized in terms of a four-phased program. A basic tenet of this approach is that system design, development, and implementation should be undertaken in an orderly, cautious fashion, with adequate provision for management review at preplanned points. This assures that all concerned understand what is being done and are convinced of its utility before resources are committed on a large scale.

The four phases of the program may be described as (1) macro-specification development, (2) micro-specification development, (3) testing and evaluation, and (4) implementation.

Macro-specification Development

The macro-specification development phase is designed to achieve two interrelated objectives. First, to acquaint management with Systems Analysis and associated model building procedures. Second, to provide an opportunity for management and analysts to establish a conceptual framework and to define objectives and theories in measurable terms.

During the macro-specification phase, major emphasis is placed on making explicit that which management knows, assumes, and hopes. Underlying assumptions about the nature of the environment are given close scrutiny.

There is a danger that in discussing policy problems one may reach apparent conclusions as a result of different people using the same words to describe different ideas. If words are ambiguous enough, it is possible to achieve agreement in form without facing fundamental disagreements as to facts. During the first stages of phase 1, every effort is made to minimize the potentialities of future problems based on such communication failures.

On the basis of conclusions reached during phase 1, boundary conditions determining the scope and detail of the system are established. The conceptual framework developed in this phase provides the structure for detailed representations formulated in later phases.
At the completion of phase 1 interactions between managers and model builders are summarized in a set of macro-specifications detailing conclusions reached regarding the nature of the problem environment. These specifications provide a broad but definite description of the facts and assumptions about the system.

Micro-specification Development

The micro-specification phase may be conveniently considered in terms of the two related but functionally separate subsections pertaining to (a) sector model design and formulation and (b) system programming and testing.

The first activity in this phase is the formulation of detailed sector models based on management hypotheses regarding the behavior of system elements verified where possible with reference to existing data. Working within the structure supplied by the macro-specifications, micro-specifications detailing the characteristics of each element and relationship among elements are developed. The micro-specifications contain detailed descriptions of each functional relationship and complete instructions for system design and programming.

Marketing Systems Analysis frequently leads to the development of relatively complex computer programs. For this reason, program coding and testing are major activities in phase 2.
Testing and Evaluation

At the beginning of phase 3 models incorporating the results of Systems Analysis must be tested for consistency and used to generate output under specified conditions. When one or more alternative representations are proposed, criteria developed in the macro-specification stage are applied to evaluate alternative models. At the conclusion of the third phase, test results are summarized in a validation report evaluating system performance in terms of measures established earlier by management.

Implementation

Initiation of activity in the fourth phase is contingent upon full management acceptance of phase 3 results. Phase 4 involves those previously associated with the System Analysis in an educational role working with operating personnel to implement operating systems. During this phase, review procedures, designed to ensure that representative functions will be monitored, and that significant changes in environmental conditions will initiate reconsideration of concepts and related policies, are established.

Organizational Considerations

When operating under a Systems Analysis program of the type just outlined it is often useful to establish a formal organizational tie between project group members. At various times, such groups have been designated as "task force," "project group," and "steering committee." In most instances they have consisted of
the major system adviser and one staff man from the advising organization or department along with one member of management and one staff representative from each department or division involved in the project. This steering committee, normally chaired by the top ranking adviser or senior corporate executive, is the coordinating and planning entity for the project. Ad hoc subgroups made up of interested members of the steering committee coordinate specific activities within each project phase.

The steering committee may perform the additional functions of lending prestige to the project group's activity and assuring effective communication. This organization also facilitates consideration of alternative approaches from several different perspectives and detection of best sources of information in addition to the more obvious functions associated with achievement of the objectives outlined previously.

A Qualification

An important qualification should be noted with respect to the suggested approach. It will work only with certain types of managers. It requires a specific management orientation and personality.

The managers involved in the steering committee must be interested in making better decisions. They must be sufficiently confident and mature to consider contradictory model structures and to choose between alternatives on the basis of rational evaluation. They must be willing to give up implicit models with which they have worked
for many years if, when made explicit and tested, these models are found lacking.

Over and above the personalities of individual managers, the environment within the company must support a free interchange of ideas. If managers are unable to separate ideas from men -- if they evaluate the worth of a concept in terms of the title of the individual proposing it -- steering committee sessions will quickly give way to corporate infighting.

Obviously no company has a management that is perfectly objective or an organization devoid of all negative attributes. In final analysis, successful implementation is dependent on the ability of proponents of Systems Analysis to communicate this concept and of management's willingness to engage in this activity, recognizing the commitment required for success.

Summary

The term Systems Analysis is increasingly misapplied to a wide range of marketing procedures which are neither systematic nor analytic. Valid Systems Analysis separates the complex market environment into constituent elements, explicitly defines each element and describes interactions among elements with empirically verifiable assertions. Human, rather than technological, factors have impeded the application of Systems Analysis to marketing problems. The programmed routine easily distracts many managers from the less structured activities of planning and system definition. Managers may be threatened by the measurement and evaluation inherent in Systems Analysis.
Marketing Systems Analysis begins with a conceptual framework and ends with the implementation of operating systems or procedures based on validated models. A qualitative system structure encompassing elements common to consumer product markets has been described to illustrate the initial output of this process. A four phase approach to Systems Analysis consisting of Macro specification, Micro specification, Testing and Evaluation, and Implementation has been outlined. Organizational characteristics facilitating the implementation of this approach have also been considered.

The potential contributions of Systems Analysis to marketing management are immense. The process, if effectively employed, offers a mechanism for achieving integrated planning, control and evaluation of marketing policy and strategies. Systems Analysis involves the marketing executive in a new style of management. He devotes increased time to broader planning functions which are now often relegated to low priority positions on the agenda to make way for fire fighting and crisis curtailment. More time is spent expanding his understanding of the environment in which his company operates and refining his insights into the planning and communication processes which are his area of expertise. He allocates substantial resources to building models -- making explicit, testing and validating or rejecting hypotheses regarding
the nature of the business environment and his impact on it.

Through Systems Analysis the executive is able to study the implications of new concepts and approaches. He is given new freedom to experiment with creative ideas and to employ imaginative approaches to the formulation and implementation of marketing policy. Because of these rewards I believe that marketing management will overcome the problems associated with valid Systems Analysis and make increasingly effective use of this new approach to management. In my opinion, it is reasonable to give an affirmative answer to the question posed at the beginning of this paper. Systems Analysis is for marketing management.
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