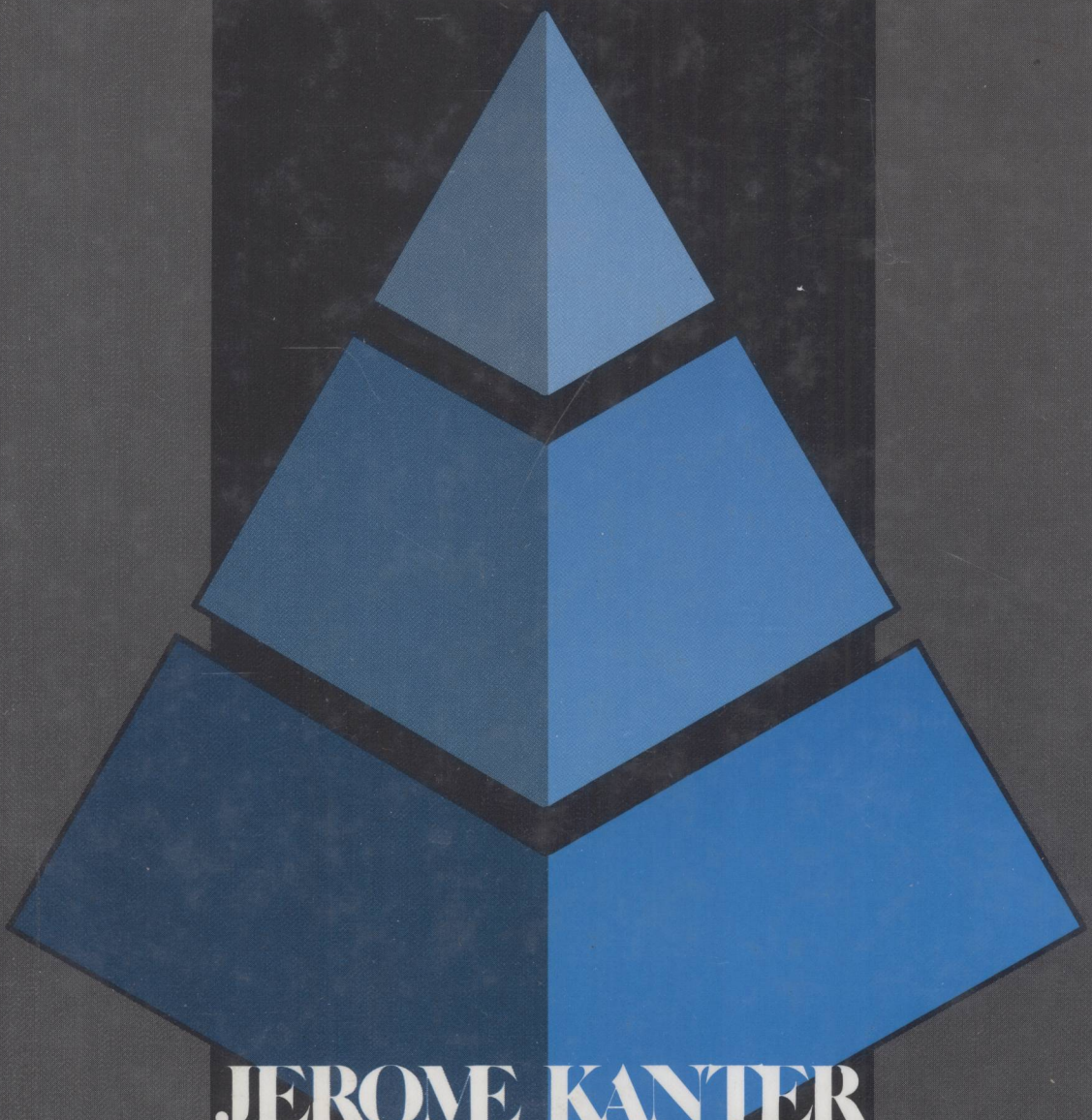
THIRD EDITION

MANAGEMENT INFORMATION SYSTEMS



JEROME KANTER

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Management Information Systems

To Carolyn
who knows what she has meant to my work and to me

Preface

Management information systems provided the "wish-fulfillment syndrome" of the seventies. The syndrome develops this way: when one has a serious problem and an approach emerges that, although only partially understood, appears to bear some relation to the problem, this approach tends to become the solution. The next phase is "nonfulfillment backlash." As this backlash occurred, writings on MIS took on negative and apologetic tones, attendance at courses on MIS dwindled, and the term itself was avoided by professionals. The backlash has tended to obscure the role of MIS in the eighties.

MIS, properly defined and understood, has untapped potential for business—indeed it may prove to be the only way to maintain a competitive industry posture. This book puts MIS in proper perspective so that business managers can understand what such systems can do and—equally important—what they cannot do.

A major problem has been the proliferation of books and magazine articles that purport to deal with MIS. The term "management information system" has been used to describe systems ranging from the preparation of an inventory report showing updated ending balances to the simulation of how new products will fare in complex marketing environments. The most rudimentary systems books, many devoted solely to describing the input, output, and processing characteristics of computers, have been titled as treatises on management information systems. In another vein, the businessman has come to think of MIS as being synonymous with the total sys-

tems concept, where one grandiose system is designed to encompass the entire operation of a company, providing meaningful and timely reports upon which managers can base immediate decision and action. This is hard for the businessman to swallow, since he wonders how a computer is going to quantify the information that he knows is subjective and psychological in nature and that often is as important as the quantitative type.

Also associated with management information systems is the idea that such a system assists management at all levels in the organization, including top management. MIS has come to mean automated board rooms where corporate executives can obtain the daily profit-and-loss picture, the current sales situation, or the instantaneous cash-flow position by pushing a button on a graphic display console.

Thus, on the one hand, MIS has meant something as basic as a simple order-processing or inventory system, and on the other hand, it has been used to refer to advanced simulation applications and direct board-room interaction with the computer. It's confusing, to say the least.

This book clarifies the situation. It provides a comprehensive explanation of what an MIS is and what it can do for management. It is intended for the technically oriented, non-data-processing manager, and it should serve well as a text for a basic course in MIS or in the design of MIS at the college or graduate level. It should also prove useful to the data processing manager who is seeking to broaden the managerial rather than the technical aspects of his job.

OBJECTIVES OF THE REVISION

While planning this third edition, I thought seriously about changing the title to "Information Resource Management." IRM represents a more global way of looking at information systems, centering on information rather than on the computer or the system. It recognizes that information is as valuable a resource as the more traditional ones of money, material, people, and facilities and should be treated and managed as such. It places emphasis on the process as opposed to the product. The product—in this case the computer—is still significant, but under the IRM concept the balance shifts to the management process. I agree with this concept and have incorporated it in the book. This edition recognizes that a successful MIS resides in the general environment of IRM. A new chapter entitled "Information Resource Management" has been added. I conclude, however, that MIS remains a valid term and, properly conceived, defines the information process that is the objective of management. In my mind, the principles of MIS in the book are not at all inconsistent with IRM—the two terms fit.

The objectives of the revision are to:

- Update sections where technology, terms, and processes have changed.
- Emphasize the concept of information resource management and its implications for managing and controlling the MIS function.

- Expand the discussion of data base, end-user languages, and the growing significance of these capabilities to MIS.
- Describe the growth and management impact of mini- and microcomputers, office automation, distributed data processing, and decision support systems—trends that are coming to the fore.
- Emphasize MIS long-range planning, the need to develop an MIS mission or direction statement, and the importance of their consistency with corporate objectives.
- Elaborate on MIS control tools such as capacity planning, structured design and programming techniques, charge-out systems, risk analysis, and security and back-up systems.
- Analyze a new survey I conducted on the involvement of management in MIS and other research focused on MIS impact on management.
- Organize for easier reading and more logical flow of information.
- Update bibliography, case studies, and references.

ORGANIZATION OF THE BOOK

The book has eleven chapters compared to ten in the previous edition, and they have been organized a bit differently. Chapter 1 defines what a management information system is and how one is built to mirror the business processes of the enterprise. Chapter 2 moves the MIS discussion into the realm of information resource management and explains why the latter is essential as the environment for successful MIS. Chapter 3 stresses the concept that before discussing information systems, the business itself must be understood. The chapter analyzes business as a system in its own right, indicating the business processes or subsystems that comprise it and then exploring the underlying information systems and data elements that support the business processes. The importance of data base is stressed in Chapter 4, while the role of communications and distributed data processing is reviewed in Chaper 5. Chapter 6 scans the history and evolution of the information processing industry. Chapter 7 describes the life cycle of MIS application development—the steps that an application goes through on its way to productive operation. Chapter 8 explores the management tools necessary to plan and control the life-cycle process. Chapters 9 and 10 swing back to the main theme and focus of the book, the emphasis on the word "management" in MIS. Finally, Chapter 11 looks at the future of MIS and information resource management.

STUDY AIDS

Study aids are provided throughout for the use of instructors and students employing the book as a text. Each chapter concludes with several short cases, which can be used as a foundation for classroom assignment and discussion. The cases elaborate on

major issues discussed in the chapter and are based on actual company experiences. Pertinent questions are appended to each "case" to stimulate analysis and discussion.

A bibliography is included. In addition, there are comprehensive case studies in the appendices which can be used to stress the principles of system design, system trade-offs, and the analysis of specific application subsystems within an MIS framework. The Rolco case is particularly beneficial as an extended class assignment. I have used it quite successfully in a course I teach on MIS. Individual case histories and company experiences are embedded in each chapter.

The book is not an exhaustive treatise of management information systems. It presents a framework for those seeking understanding of MIS as well as for those responsible for the planning and implementation of MIS within a business environment. Guidelines are presented for successful employment of MIS concepts. The book explores MIS from the management and business viewpoint; its thesis is that this is the correct viewpoint. While the framework established is heavily influenced by the efforts of Anthony, Deardon, and Churchill of the Harvard Business School, Simon of Carnegie-Mellon University, Forester of MIT, and Carroll of The Wharton School, I have not followed the typical scholarly approach in writing the book. I share with other business people a discouragement in trying to wade through a book filled with references, footnotes, quotations, and critiques of other people's works. With this in mind, I have emphasized readability and understanding. The book is intended for the business manager, not the scholar, and therefore refrains from the "wordsmanship" and "quotesmanship" that characterizes many of today's business books. What others call a systems taxonomist, for example, I call simply a person who classifies systems, and others' information technology methodologist is in my book a systems person.

Tackling the subject of MIS is an ambitious undertaking. My goal is to advance the basic understanding and employment of business-oriented management information systems. My viewpoint on MIS emanates from the following background:

Manager of a data processing department in a large manufacturing and distribution company.

Assistant controller in charge of accounting and financial control operations in a manufacturing company.

Assistant to the plant manager of a manufacturing company in developing organizational and informational systems to improve plant operations.

Designer and implementor of applications, including management information systems, for use by companies in several industries.

Manager of a planning department using the output of computers to aid marketing and planning functions.

Active learner having knowledge of surveys and studies of information systems and direct contact with MIS professionals and practitioners.

Consultant to companies employing MIS in a wide variety of industry settings.

Instructor and lecturer in computer sciences at Babson College; Amos Tuck Business School, Dartmouth; Northeastern University; the Harvard Business School; and Cambridge and Oxford Universities in England.

In undertaking this book, the most important credential I possess is an emotional involvement in using, developing, and installing MIS and portions of MIS in various companies and a belief in its importance.

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I would like to thank the following Honeywell people for use of material and for their review of portions of the book: Jerome Lobel for security and privacy, John Field for project control, Jim Hannigan for MULTICS, Oliver Miles for communications and Floyd Johnson for end user languages.

My gratitude to Carol Dello Russo, Bessie Koshivas and Beverly Butters for their invaluable editing and typing assistance, to Eileen Ward for her outstanding library and research skills, and to fellow consultants John Warren, Jack Walsh, Carol Mazuy, and Frank Chen for their significant contributions during the past two years that we have worked together.

JEROME KANTER

Management Information Systems

Contents

Chapter **1**

MIS—Establishing the Framework

This chapter builds an analytical framework in order to facilitate a meaningful discussion of management information systems. Some time ago I read a provocative *Harvard Business Review* article asserting that management had not been affected by computerized information systems and probably would not be for at least another five years. A long rebuttal was printed several issues later, citing example after example of how management had been affected by the computer. In carefully reviewing both the article and the rebuttal, I saw that the two authors were talking about completely different levels of management, and I felt that there would be a surprisingly high level of agreement between the two writers if the semantic barrier were removed. Thus I think it is well worth the effort to define terms and to establish a generalized framework from which to view the often misinterpreted management information system concept.

Before dissecting each term, I will define an MIS. An MIS is a system that aids management in making, carrying out, and controlling decisions. *Decision making*, including the process leading up to the decision, can be termed planning, and *management* can be defined as the planning and control of the physical and personnel resources of the company in order to reach company objectives. This definition of management differs from others—one of which is getting things done through people—but I feel it is more definitive. Getting things done through people, plus the selecting, training, and motivating of people, is assumed part of the control function,

for implementing and controlling the decisions made will obviously require the motivation of people. Referring back to the MIS definition, we can simplify it by saying that *MIS is a system that aids management in performing its job.* Later chapters will analyze the manager's job in greater detail and will indicate in which areas computerized management information systems can make the greatest impact and in which areas its impact is doubtful, even in the future. The following analysis should aid this discussion.

ELEMENTS OF A MANAGEMENT INFORMATION SYSTEM

We begin by looking at the basic elements or ingredients of a management information system. The term MIS is well conceived in that if one understands the three words or parts that comprise it, one can obtain a basic understanding of the whole. This point may seem obvious, but it is not true of certain other technical terms or the so-called buzz words that form the argot of a new industry.

The Classic Management Triangle

Figure 1.1 indicates three levels of business activities or processes carried out in operating a company. These three levels were first described by Robert B. Anthony in 1965 and are still used to portray the functioning of a business enterprise.

The first level, *operational control*, indicates processes performed to control the basic product or services produced by the company. In a manufacturing company, examples of operational control are the processes that move a product from one assembly point to the next and the actions that take place at each assembly point. In a

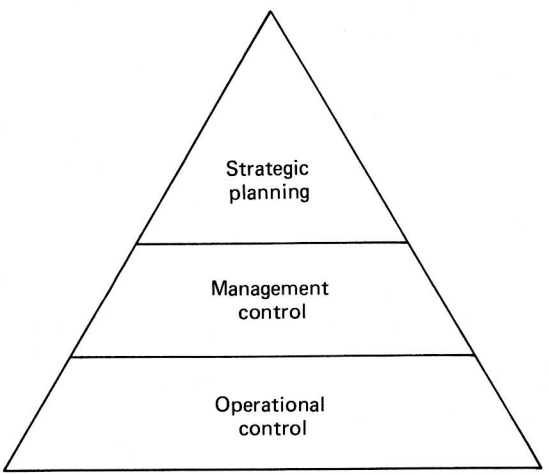

Fig. 1.1 Levels of business activity

bank, operational control includes the physical sorting, recording, and posting of checks.

The next level, *management control*, includes processes or functions that facilitate the management of those processes delegated to the operational control level. An example of a management control process is production scheduling, where a system is established to schedule products through the various fabrication and assembly points within a factory. The feedback from the production scheduling process enables management to control the operation.

The top level of the triangle represents strategic planning processes, the processes that determine what products to produce in the first place or, even more broadly, what markets or businesses the company should be in currently or plan to be in the future. These are brief examples or definitions of these three levels; later sections will build on this basic Anthony triangle. It represents a very useful classification schematic for establishing the proper perspective and providing a foundation for beginning the exploration of MIS.

LEVELS OF MANAGEMENT

The first term to define is management. Figure 1.2 presents the organizational chart of a manufacturing company. Company organization charts generally have considerably more detail than this one; however, it has enough to illustrate the distinction between the different levels of management.

There are several ways to describe the various management levels. Although lines of demarcation are not absolute, one can distinguish certain layers within the organization. For the most part, top management will perform the strategic planning processes, middle management the management control processes, and operating management the operational control functions.

In attempting to distinguish the layers of management, we may find it difficult to stick to only three levels when most companies have an organizational hierarchy consisting of eight or more levels; that is, some managers are eight levels or more removed from the company president. One of the purported operational advantages enjoyed by Japanese companies is an organizational structure having as few as five levels separating the factory worker from the president.

Figure 1.3 summarizes the interaction of the three levels. Top management establishes the policies, plans, and objectives of the company, as well as a general budget framework under which the various departments will operate. These factors are promulgated and passed down to middle management, where they are translated into specific revenue, cost, and profit goals, particularly if each department works under a cost or profit center concept. These are reviewed, analyzed, and modified in accordance with the overall plans and policies until agreement is reached. Middle management then issues the specific schedules and measurement yardsticks to operating management. The latter level has the job of producing the goods and services required to meet the revenue and profit goals, which in turn will enable the company to reach its overall plans and objectives.

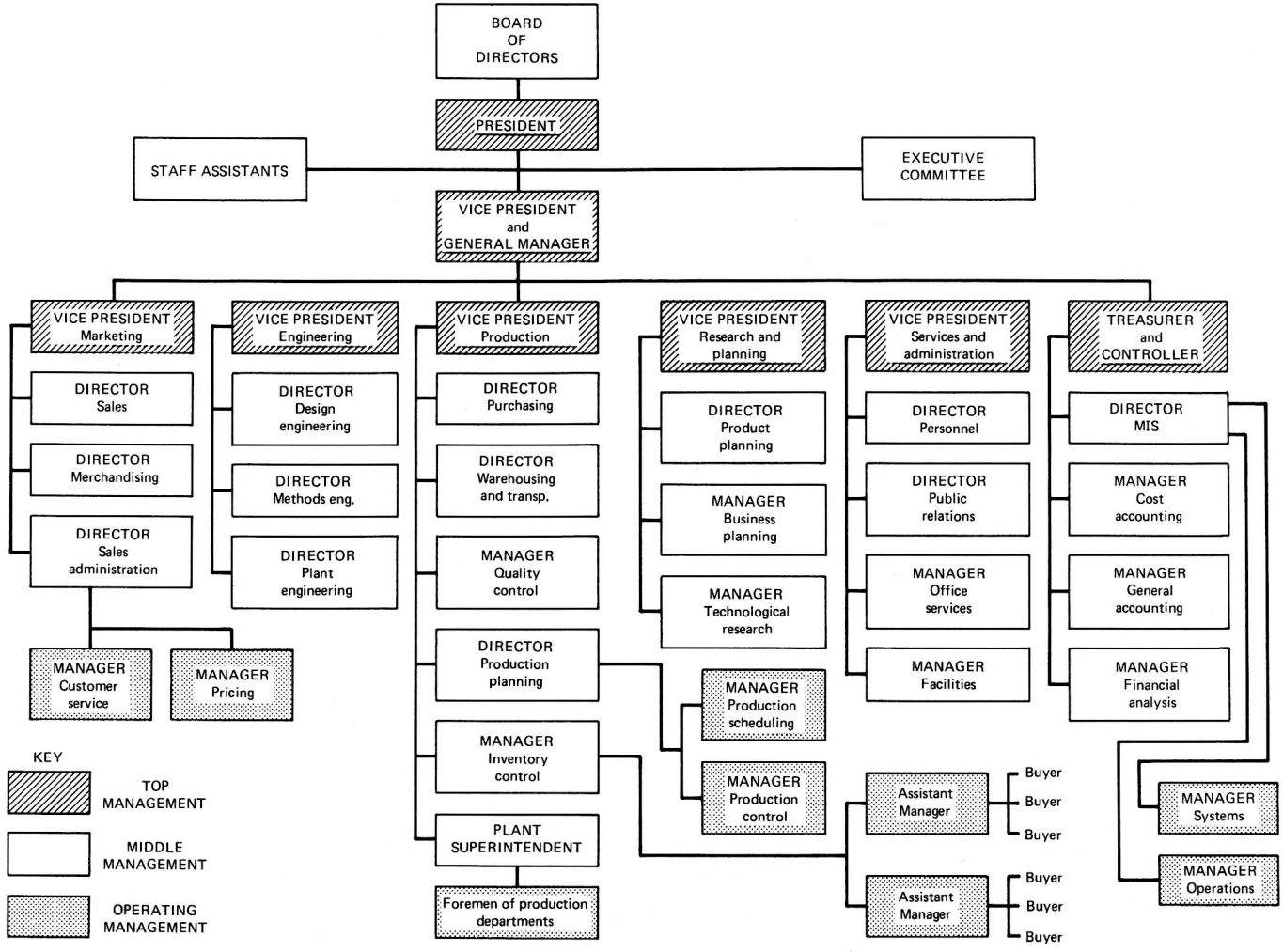

Fig. 1.2 Company organizational chart

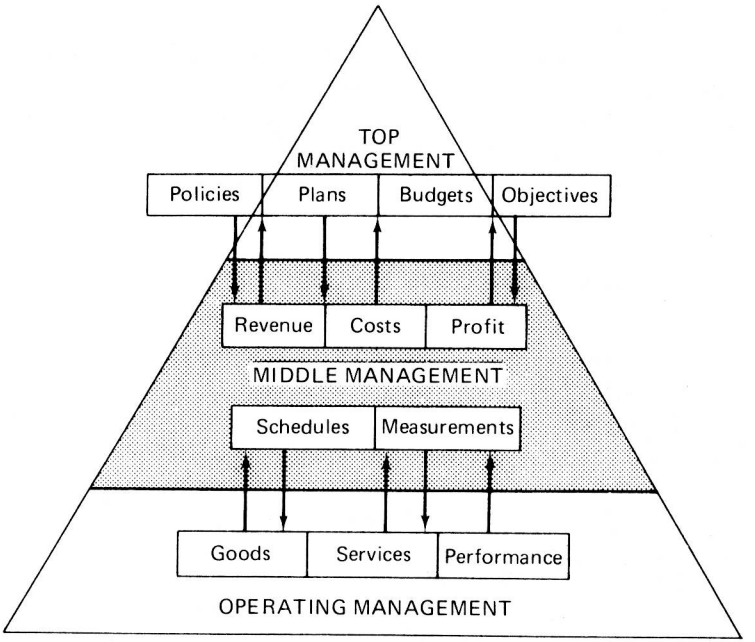

Fig. 1.3 Interaction of management levels

THE PLANNING PROCESS

Most companies have some form of a long-range plan, typically five years, which acts as the master strategy and road map tying together the processes just mentioned. The plan promulgates the major business, market, and product strategies of the company for the next five years or longer, indicating the resources in the form of facilities, people, technology, and money necessary to accomplish the strategies. In addition to the strategies, the overall company goals are stated for the long-range plan period including performance indicators such as revenue, profit, return on investment, return on assets, market share, and the like. The goals are broken down by product line or operating division or both. The yearly operating plan of the company comes directly from the long-range plan, usually being identical for the first year or the first two years.

The long-range plan and the yearly operating plan are the basis for the formulation of individual objectives and goals, both of the numeric type and of the event type. An example of a numeric goal is a specified sales or shipment volume, while an event goal might be the delivery of a new product on a specific date or the completion of a new facility. The degree to which these objectives and goals cascade through an organization is a function of the planning process and the operating style of the company; however, the trend is to continually link more lower-level management goals to the company long-range plan and operating plan. This obviously provides a more