
Preface: The Purpose, Contexts, and Structure of the Book

Purpose

The purpose of this book is to provide an overview of models that are of utility for library management, decision-making, and planning. Many of the models to be covered are quantitative in the sense that they consist of mathematical equations that embody variables that are measurable and produce results that are quantitative. Such models are similar to those that characterize the natural sciences and, in some respects at least, they can be used to test their own validity. That is, they can serve as the basis for hypotheses that can then be tested by experiment. Beyond that, just as the equations underlying models in the physical sciences can serve as means for engineers to design structures, the quantitative models for library management can be used as means to explore the effects of alternative values for variables, to determine the best choices for a management decision and to engineer the design of new library systems. Perhaps of most fundamental importance, they provide means for learning about the world of library management.

Most of the quantitative models presented in the text have been incorporated into a computer spreadsheet, the *Library Planning Model (LPM)*, that provides a structure within which the several models presented in the book can be interrelated and easily brought together for application to specific libraries and policy contexts.

However, the nature of libraries as institutions of society is that many of the issues of greatest importance in management cannot be well represented by quantitative models and may even be badly misrepresented by them. In fact,

the attempt to draw parallels with the natural sciences can lead to an unwarranted belief in the efficacy of quantitative models. The facts are that, unlike the phenomena of the natural sciences, those of the social sciences are governed primarily by the goals of the participants in them. Measurable variables may simply describe what has happened, not why it has happened. Of course, sometimes quantitative models can be designed to represent those goals, and some models will be presented in the book that do so. But for most decision problems in libraries, such goal-oriented quantitative modeling is still remote.

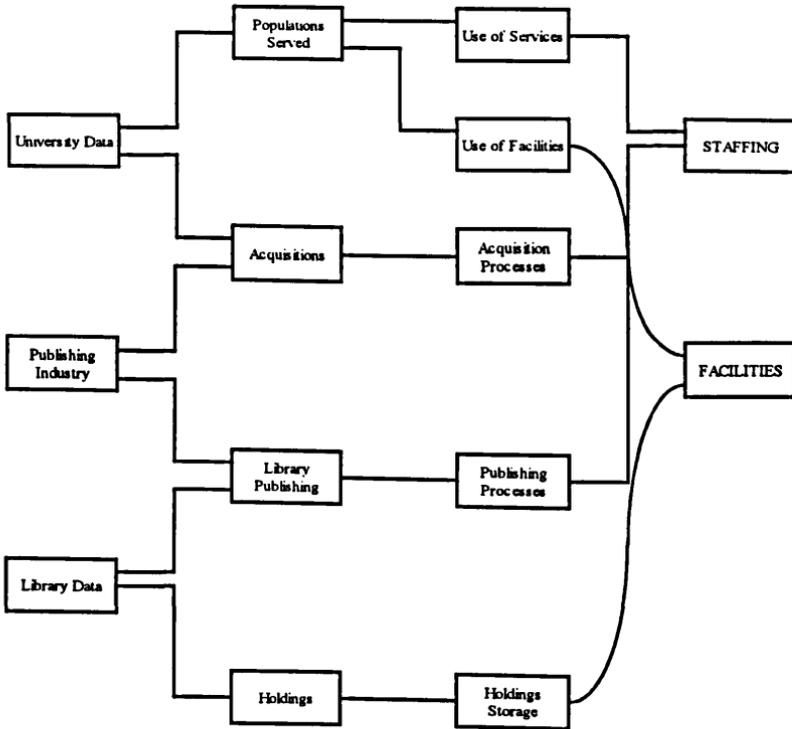
Therefore, among the models presented are some that are essentially qualitative and descriptive. That by no means diminishes their value and utility; it simply means that they must be dealt with in ways different from quantitative models. Some of these qualitative, descriptive models have also been incorporated into *LPM*, even though only in a preliminary form, so as to provide a framework within which quantitative aspects of such models might be developed and related to the entire set of models for library management.

Contexts

In the discussions of applications of models to libraries as well as their representation in *LPM*, three management contexts are considered. The first, operational management, focuses on the day-to-day operational tasks of the library. The second, tactical management, focuses on the allocation of resources, including money, staff, and facilities; it is the context in which decision-making is likely to be of most importance. The third, strategic management, focuses on things that are external to the library and over which the library manager usually has little if any control but that vitally affect the management in every respect; it is the context in which planning is most crucial.

As will be described below, Part 2 of the book presents models for operational and tactical contexts, and Part 3 presents models for strategic contexts. Specifically, the workloads that drive library operations and that determine the allocation of resources within the library are the focus of Part 2. But they are largely, if not totally, determined by forces external to the library, and those are the focus of Part 3.

Most directly, as covered in Part 3, the institution within which the library operates determines the nature of uses to be served and the magnitude of budget to fund the operations. Decisions made in the publishing community determine what information materials will be distributed and how they will be distributed. Schematically, the following flowchart shows the relationship of these two of the strategic contexts to the elements that are specific to the library:



The impact of the third strategic context included in Part 3, national information policies, is perhaps less direct but still it is of such fundamental importance that it needs to be recognized in library management, decision-making, and planning. Decisions made by governments, at every level, determine the economic, political, and legal environment within which the library must operate. Of special significance are interlibrary cooperative developments, many of which are made within the framework of such international, national, regional, state, and local policies. They have direct impact on decisions that might appear to be internally determined but that actually depend upon the larger strategic contexts.

Structure

The structure of the book reflects this set of contexts, and the nine chapters of the book conceptually should be considered as grouped in three parts.

Part 1. Scientific Management and the Library Planning Model

Part 1 consists of Chapters 1 through 3. Chapter 1 discusses the nature of scientific management and the use of models to support general management, decision-making, and planning. Chapter 2 then places special emphasis on their applications to libraries and information policy issues in a range of library management decision contexts and, in doing so, sets the stage for the detailed discussions in the ensuing two parts. Chapter 3 presents an overview of *LPM*, its conceptual structure and its operational structure, as the tool for bringing together several of the models for use on the kinds of decision problems discussed in Chapter 2.

The purpose of Part 1 is to provide a general introduction to the concepts and methods of modeling as they are relevant to library management. It concludes with the overview of *LPM* to provide knowledge about this tool so that easy reference can be made to it in subsequent sections.

Part 2. Library Operational and Tactical Management Contexts

Part 2 consists of Chapters 4 through 6 and deals with operational and tactical issues in library internal management. Chapter 4 presents a framework for estimating staff, materials, facilities, and associated costs needed to handle workloads for typical services and internal operations in a library. Within that framework, Chapter 5 presents models for representing the needs of users and related library services, for estimating the associated staffing, and for determining the needs for space and facilities to serve users and staff. Chapter 6 similarly presents models for representing the acquisition of materials and the related technical processing, for estimating the associated staffing, for determining requirements for storage of materials, and for making the related decisions concerning allocation of materials to alternative means for storage and access.

Part 3. Library Strategic Management Contexts

Part 3 consists of Chapters 7 through 9 and deals with strategic issues, those that are essentially external to the library but that must be considered in library management. Specifically, Chapter 7 presents models of institutional requirements, representing the needs to be served by the library, not as determined by library acquisitions, services, and internal processes but rather as they are determined by the institution's own objectives. Chapter 8 discusses models for representing the past, present, and future status of means for information production and distribution, representing the context of information resources

that are the basis for library acquisitions and services. Among the topics considered is the potential and, in some cases, actual role of libraries as publishers, and models are presented for assessing the impact of such a role on library operations. Special emphasis is given to the impact of digital libraries and of Internet access to them. Chapter 9 presents models of larger information structures, with special emphasis on the impact of information on national economics and on the role of libraries within them. It includes discussion of interlibrary cooperation as a critical example of larger information structures.

Summary

The following table summarizes the array of models presented in the book, identifying the chapters in which they are each discussed and the management issues to which they each apply.

| Model | Chapter | Applications |
|--|---------|------------------------------------|
| Cooperative Game Model | 1, 9 | Library Cooperation |
| Cobb-Douglas Econometric Model | 1, 5, 9 | Balance Between Investment & Staff |
| Leontief Matrix Model | 1, 9 | Structure of Information Economy |
| Systems Analysis Model | 1 | Planning & Design |
| Cost Accounting Model | 1-9 | All Applications |
| Workload Factor Model | 1-9 | All Applications |
| Organization Chart Model | 1 | Management Structure |
| Operations Matrix Model | 1 | Management Structure |
| Frequency of Use Model | 5 | Services to Users |
| Population Growth Model | 5 | Services to Users |
| Queuing Model | 5 | Services to Users |
| Ratio of Level of Use to Average Use Model | 5 | Services to Users |
| Facility Use Factors Model | 5 | Services to Users |
| Library Location Models | 5 | Services to Users |
| Collection Growth (1) | | |
| Exponential Model | 6 | Collection Management |
| Collection Growth (2) | | |
| Linear Model | 6 | Collection Management |
| Collection Growth (3) | | |
| Steady-State Model | 6 | Collection Management |
| Collection Growth (4) | | |
| Logistic Model | 6 | Collection Management |

(continues)

| Model | Chapter | Applications |
|---|---------|---------------------------------|
| Collection Use (1) | | |
| Zipf Law Model | 6 | Collection Management |
| Collection Use (2) | | |
| Mixture of Poisson Model | 6 | Collection Management |
| Collection Use (3) | | |
| Date Related Model | 6 | Collection Management |
| Allocation Decision Model | 6 | Storage Location Decision |
| Allocation Decision Model | 6 | Acquisition vs. Access Decision |
| Allocation Decision Model | 6 | Serial Deacquisition Decision |
| Inflation Distribution Model | 6 | Serial Deacquisition Decision |
| Collection Development (1) | | |
| Clapp-Jordan Model | 6 | Collection Management |
| Collection Development (2) | | |
| Voigt-Susskind Model | 6 | Collection Management |
| Collection Development (3) | | |
| Budget-based Model | 6 | Collection Management |
| Collection Development (4) | | |
| Peer Comparison Model | 6 | Collection Management |
| Governance Model | 7 | Information Management |
| Information Value (1) | | |
| Entropy Model | 8 | Information Distribution |
| Information Value (2) | | |
| Weighted Entropy Model | 8 | Information Retrieval |
| Information Value (3) | | |
| Information Structure Model | 8 | Information Production |
| Information Value (4) | | |
| Information Reduction Model | 8 | Information Production |
| Information Value (5) | | |
| Combinatorial Model | 8 | Information Production |
| Accounting Standards for Information | | |
| Investment Model | 8 | Information Production |
| Library Networks (1) | | |
| Structural Model | 9 | Library Networks |
| Technology Development (1) | | |
| Grosch's Law | 7 | Technology Management |
| Technology Development (2) | | |
| Moore's Law | 7 | Technology Management |
| Library Networks (2) | | |
| Communication Traffic Model | 9 | Library Networks |
| Library Networks (3) | | |
| Response Time Model | 9 | Library Networks |
| Library Networks (4) | | |
| User Response Model | 9 | Library Networks |
| Library Networks (5) Cost Trade-off Model | 9 | Library Networks |
| Information Economy Model | 9 | Libraries in the Economy |