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DESIGNING SCIENTIFIC JOURNALS: ISSUES AND SURVEY RESULTS*

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The design parameters of scientific journals are important policy choices for journal editors as well as for the professional areas which they represent. The editorial structure of a journal presents a set of choices which importantly affect the variety of papers which are published, those that are submitted, and to some degree, the nature of future research in an area. These elements, in turn, affect reader satisfaction, journal subscriptions, and the future viability of sponsoring professional societies. This paper presents a conceptual structure for the journal-design problem and a set of survey results which should aid in addressing journal design issues and policy questions. The purpose of the paper is to define the issues and to present data in a manner that will stimulate discussion and further analyses.

Professional journals represent an important source of scientific information. Along with monographs, dissertations, proceedings, reports, preprints and patents, they form the primary category of formal scientific communication.[1]

Aggregate statistics show that scientific and technical journals are a relatively healthy segment of the overall scientific and technical communications system. Unlike book publishing and other segments of the system, there has been no proliferation of journals, and thus little associated negative economic consequences. The number of scientific and technical journals has not increased dramatically since 1960–a 2% annual increase reflecting almost perfectly the steady growth in the number of scientists. The number of journal subscriptions has increased dramatically over the same period, although individual journals have experienced substantial subscription declines. This has occurred in the face of slight (real) increases in journal subscription prices.[2]

Despite this relative economic prosperity of scientific and technical journals, there is evidence to suggest that journals may not be in such a strong position in the future.[3] One important basis for this negative forecast is data which suggest that journals are not now well integrated into the process whereby researchers obtain and use scientific information. Usage studies suggest that only a small number of journals are actually used by most researchers, that formal information acquisition systems are not used as heavily as are informal ones (unless the formal systems have the desirable characteristics of the informal ones), and that users in private firms rely more heavily on informal communications channels than on formal ones (while university researchers have the opposite preference).[4]

These findings are potentially important to the future of scientific journals since they suggest that the past growth in the number of journals may not continue, and that only those possessing "desirable properties" which facilitate use may prosper in the future. They are particularly important to a journal such as *Management Science* because of the high proportion of its subscribers who are employed by private firms[5] (since their tendency is to rely more heavily on informal channels than on formal ones).

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1 See Ackoff et al. [1].

2 All data from National Scientific Foundation [7].

3 For instance, see Clasquin and Cohen [3].

4 See Ackoff et al. [1, pp. 7–49].

5 See Schaffir [8] as well as results of this study.

If a journal such as *MS*, representing a broad and ill-structured field, is to serve as a primary communications medium for a professional organization that seeks " . . . to identify, extend and unify scientific knowledge pertaining to management,"[6] it seems reasonable to conjecture that it must satisfy several basic criteria:

(a) it must represent diverse areas of management interest and research,
(b) it must be designed so that it is perceived to be useful by subscribers,
(c) it must appeal to both academics and practitioners.

These are no easy tasks because the field of management science is so imprecisely defined and because the professional society is made up of clientele with diverse interests and objectives. If such a journal comes to predominantly reflect a small number of points of view, such as those of mathematical programmers or cost-effectiveness analysts, it will no longer be a journal that is representative of the field for which it is named. Correspondingly, if it comes to serve primarily as a vehicle whereby academic authors "talk to each other" and "earn their promotions," without regard to the practical utility of their ideas, or if it conversely comes to serve only those practitioners who want "cook-book" solutions to problems, it is not likely to achieve its potential.

The "Journal Design" Problem

There are a variety of related processes through which a journal and its constituents seek to identify, extend and unify knowledge. Among these processes are:

(1) the scientific processes which are used to generate new knowledge;
(2) the accepted mode and style of expression and communication which is used convey information;[7]
(3) the editorial review process which selects those papers to be published in the journal, guides and adjusts the content of the published manuscripts, influences overall submission patterns to various journals, and perhaps even affects subsequent research project selection;
(4) the explicit or implicit editorial decision concerning which areas of management science research are most relevant and important;
(5) the variety of "managerial" choices which are made concerning such things as the structure of the editorial departments, editorial personnel, and the topics to be covered in "special issues."

Viewed in this way any journal can be thought of as a goal-oriented system involving many inter-related processes. This system serves importantly as a basis for defining, for both the present and the future, the field which it represents.

The historical content of a journal as well as any topical editorial structure (such as the departmental structure of *Management Science*) operationally determines the degree to which it is perceived to be useful to its various constituents and defines the varieties of papers which valued. Thus, a reader interested in "automated design" or a researcher with results to report in the same area, would probably not seek out *Management Science* because it carries few, if any, papers in the area and because its departmental structure does not suggest a natural place for such submissions.

Thus, in establishing editorial structures, editorial policy, and publication criteria, a scientific journal is defining its own role and importantly affecting the future of the field which it represents. The critical issues of journal design are *how* and *by whom* these choices should be made. It is to those issues to which this preliminary paper is addressed.

[6] The official description of TIMS which appears in most society publications, including on the front cover of each issue of *Management Science*.

[7] See Medawar [6] for a critique of accepted styles of writing scientific papers.

A Journal Design Model

A scientific journal may be thought of in information process terms as in Figure 1. That figure shows a flow of information emanating from authors (A) and being "delivered" to readers (R) using the journal as a vehicle. Editors (E) represent the administrators of the process. The figure shows feedback loops between readers and editors (x), editors and authors (y), and readers and authors (z).

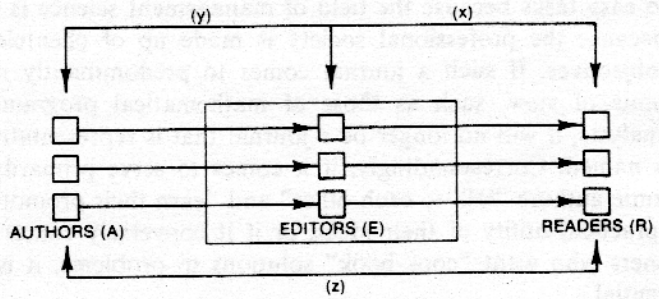

FIGURE 1. Journal Design Model.

The rectangles in Figure 1 represent groups of authors, editors and readers. These groups represent areas of common interest within which research is performed and/or papers are selected for reading and use. For instance, one simple dichotomy which is often alluded to is that of academics versus practitioners. Another common taxonomy is in terms of areas of research interest–e.g., math programming, stochastic processes, etc. More complex grouping schemes which combine both topical interest and usage patterns, are also readily defined. The authors and reader groups in Figure 1 are intended to describe "naturally formed" and ill-defined entities such as "informal colleges" of individuals having common interests and often sharing many informal media for communications.[8]

The editorial groups in the figure are one explicit element of journal design. For instance, the editorial departments of *Management Science* are meant to represent research areas which are presumed to be well defined and cohesive.

Journal Design Issues

There are a variety of empirical and normative journal-design issues which are suggested by the model in Figure 1:

(1) To what degree do (should) reader (R) and author (A) groups correspond?
(2) To what degree do (should) editorial groups correspond to either reader or author groups?
(3) Is a "matching" process for reader and authors groups feasible (desirable)?
(4) Can (should) editorial groups be structured to enhance the communications linkages between similar author and reader groups or to encourage inter-group communications?
(5) Can (should) author groups be affected through journal design (such as with the encouragement of research in new areas through paper competitions in specific areas, special journal issues etc.)?
(6) Can (should) reader groups be affected through journal design (such as through the soliciting of new kinds of subscribers—perhaps those that can better utilize the information being generated and published)?
(7) What overall journal design strategy would be best to serve the interest of the journal and its clientele?

[8] See Ackoff, et al. [1].

A Preliminary Study

There are no clear answers to any of these issues. However, since they can only be solved in the context of empirical data describing the interests of the various actors in the scientific communications process, the authors have undertaken a study which has the objective of addressing the empirical aspects of the issues. Hopefully, through such a study, the normative issues will be more clearly defined.

The study was initiated at the request of Martin K. Starr, Editor-in-Chief of *Management Science* and then, President of TIMS. While it is beyond the scope of the paper to detail all aspects and results of the study to date, we present here significant preliminary results which may be revealing, and which may be of value to those who have ideas concerning the journal and its publication policies and procedures.

The empirical data presented here may be useful in assessing the degree of congruence of interests among the various constituents of the *Management Science* journal (e.g., authors, editors, and readers) and how potential differences in interests among these constituents may be used to guide journal design decisions.

It is well recognized by all concerned that a simplistic journal design strategy involving the "matching" of reader and author interests may well not be in the best interests of anyone. However, the only way that the impact of such a strategy may be assessed is in the light of empirical evidence about the status and plans of the various journal constituents.

Study Procedure

The first step in the study was to develop a questionnaire to be used in surveying the various constituents of *Management Science*. Each of the departmental editors of the journal was asked to develop a list of topic area "descriptors" indicating the types of research topics which he felt best captured the content of journal papers which his department has been receiving and publishing. In many cases, as expected, these descriptors represented the "key areas" which the editor used as guides for assigning papers to associate editors for refereeing.

The departmental editors were also asked to identify "futurists" in the management science field who they felt could best suggest descriptors which would highlight new and emerging areas of management science interest. These futurists were subsequently asked to provide a set of descriptors for these "future areas."[9]

After all of these descriptors—generated by editors and futurists—were collected, a panel of University of Pittsburgh business school faculty members was convened. This panel was composed of active and knowledgeable representatives from various areas of management science (e.g., marketing, operations research, behavioral science, economics). The panel was asked to carefully review the entire list of descriptors with the objective of eliminating redundancies, ambiguities, and discipline-specific jargon. In essence, the aim of this panel was to arrive at a "final" list of items which would be reasonably concise and comprehensible to individuals from the diverse management science areas. This final list was expected to be a reasonably exhaustive representation of the present and future areas of the management sciences.

The panel reduced the initial collection of almost 400 descriptor items to a list of 87 items. These items were randomly distributed on a questionnaire. Next to each item appeared a seven-point Likert scale from 1 (not at all interested) to 7 (extremely interested) with 4 as "average." Different instructions for the 87 item questionnaire

[9] As might be expected from the less-well-defined nature of their charge, some of the futurists found it easier to describe their "images of the future" in extended form rather than in simple descriptive phrases. In such cases, the authors and the panel (whose activities are to be described) performed the task of reducing their content to the form of descriptors—thereby undoubtedly doing dis-service to the far-reaching ideas of these distinguished people.

were developed for the major constituents of *Management Sciemce*: authors (producers of knowledge), readers (consumers of knowledge) and editors (the filters. translators, selectors, and transmitters of knowledge). Specifically, for *authors* the instructions read: "Please indicate to what extent each of the following items defines a research area or theme which you are currently investigating or might investigate in the future–for which you might submit articles to *Management Science* for publication review," For *readers*: the instructions were, "Please indicate the extent to which each of the following defines an area or theme that you would like to read about in *Management Science*." And for the *editors* (departmental editors and associate editors of *MS*) the instructions were: Please indicate the extent to which each of the following topics describes a research area or theme in which you have the interest and expertise to review articles submitted for publication in *Management Science*.

The survey questionnaire with the appropriate instructions was then sent to: (1) a random sample of 1198 TIMS members (who are presumed to be readers), (2) a sample of 171 authors who had written articles for *Management Science* during the previous three years, (3) the 17 departmental editors including the Editor-in-Chief and the 83 associate editors listed in the journal, and (4) the 39 associate editors of *Operations Research*. The latter group was surveyed to allow broader definition of the management science field as well as to reflect the overlapping readership reported by Gupta & Simon [4].[10]

The questionnaire as well as scaling for items and the instructions for different constituents was developed on the basis of the MAPS Design Technology. The MAPS (*M*ultivariate *A*nalysis *P*articipation and *S*tructure) procedure is intended to maximize the face validity and meaningfulness of the terms appearing on the questionnaire, while collecting data in a form that can suggest implications for the effectiveness and design of the organization or social system in question [5].

Survey Results

The survey data are presented here to facilitate analysis by others who have interests in the journal-design problem and/or interest in *Management Science* itself.

TABLE 1

Breakdown of Readers and Authors by Professional Affiliation

	This Study		1968 Study[11]	
Readers	Number	%	Number	%
Academics (full time)	170	31	NA	27
Practitioners (full time)	249	46	NA	73
Mixed (part time)	125	23	NA	NA
Total Sample	544	100	NA	100
	This Study		1968 Study[11]	
Authors	Number	%	Number	%
Academics (full time)	59	78	88	71
Practitioners (full time)	11	14	36	29
Mixed (part time)	6	8	NA	NA
Total Sample	76	100	124	100

[10] Instructions provided with the instrument sent to editorial personnel of *Operations Research* were the same as those used for editorial personnel of *Management Science*, except that they were asked to evaluate each area in relevance to their own journal. The *Harvard Business Review* was also identified as having significant overlapping readership, but that journal does not have an editorial structure which would permit meaningful comparisons to be made with those of *MS* and *OR*.

[11] See Boisseau [2] and Gupta and Simon [4].

TABLE 2

Item Response Means and Standard Deviations for Management Science Survey

Survey Questionnaire Items	Readers			Authors	Editors
	Practitioners ($N = 299$)	Academics ($N = 170$)	Total ($N = 545$)	($N = 76$)	($N = 45$)
1. Information systems	4.9 (1.7)	4.2 (1.9)	4.6 (1.8)	3.5 (1.8)	3.5 (2.1)
2. Network Analysis	3.3 (1.6)	3.5 (1.6)	3.4 (1.6)	3.3 (2.0)	3.1 (1.9)
3. Organizational Design	4.0 (1.8)	3.6 (2.0)	3.8 (1.9)	2.5 (2.0)	3.3 (2.1)
4. Integer programming	3.0 (1.6)	3.3 (1.8)	3.2 (1.7)	3.0 (1.9)	2.7 (1.8)
5. Obtaining & using subjective judgmental assesments	4.7 (1.7)	4.4 (1.8)	4.5 (1.7)	3.3 (1.9)	3.5 (1.8)
6. Measurement of productivity & performance	4.9 (1.6)	4.2 (1.8)	4.6 (1.7)	2.9 (1.7)	2.9 (2.0)
7. Integration of management science	4.8 (1.5)	4.8 (1.8)	4.8 (1.6)	4.2 (1.8)	3.9 (1.9)
8. Artificial intelligence	2.7 (1.5)	2.9 (1.7)	2.8 (1.6)	1.9 (1.3)	2.7 (1.8)
9. Fixed-point & complementary-point algorithms	2.0 (1.3)	2.3 (1.4)	2.1 (1.3)	1.9 (1.4)	2.2 (1.9)
10. Quality of life and work	3.7 (1.7)	3.5 (1.8)	3.6 (1.8)	2.3 (1.7)	3.0 (1.9)
11. "Action" research	3.6 (1.7)	3.4 (1.9)	3.5 (1.8)	2.6 (1.9)	3.1 (2.2)
12. The role of the management scientist	4.0 (1.7)	3.7 (1.8)	3.9 (1.7)	3.0 (1.8)	3.5 (1.8)
13. Design and analysis of computer systems	3.9 (1.9)	3.4 (1.9)	3.7 (1.9)	2.7 (1.7)	3.0 (1.9)
14. Agricultural & food resource allocation	2.8 (1.6)	3.3 (1.8)	3.0 (1.7)	2.4 (1.6)	2.5 (1.7)
15. Future studies	4.0 (1.7)	3.8 (1.8)	3.9 (1.8)	2.6 (1.8)	3.1 (1.7)
16. Goal programming	3.7 (1.7)	3.8 (1.8)	3.7 (1.7)	2.7 (1.8)	2.8 (1.6)
17. Simulation	5.0 (1.4)	4.8 (1.6)	4.9 (1.4)	4.0 (2.0)	4.1 (1.7)
18. Group decision theory	4.2 (1.6)	4.2 (1.8)	4.1 (1.7)	3.2 (2.0)	3.5 (2.0)
19. Sequencing theory	3.1 (1.5)	3.3 (1.6)	3.2 (1.5)	3.5 (2.0)	2.5 (1.6)
20. Search algorithms	3.3 (1.5)	3.6 (1.7)	3.4 (1.6)	3.2 (1.8)	3.0 (1.7)
21. International business	3.6 (1.8)	3.1 (1.7)	3.4 (1.8)	2.1 (1.5)	2.9 (1.7)
22. Banking, financial & investment systems	4.2 (1.9)	3.4 (1.9)	3.9 (1.9)	2.9 (1.9)	2.9 (1.8)
23. Policy analysis	4.3 (1.6)	3.9 (1.8)	4.1 (1.7)	3.0 (1.9)	3.8 (2.2)
24. Operations management	4.4 (1.5)	4.1 (1.9)	4.3 (1.7)	4.0 (2.1)	3.2 (1.9)
25. Scheduling and sequencing theory	3.7 (1.6)	3.6 (1.8)	3.7 (1.7)	3.7 (2.1)	2.7 (1.7)
26. Innovation & organizational development	4.2 (1.7)	3.6 (1.8)	3.9 (1.8)	2.5 (1.8)	3.0 (2.0)
27. Project management	4.6 (1.6)	3.6 (1.7)	4.3 (1.7)	3.3 (2.0)	3.2 (1.9)
28. Methodologies for implementing mgmt. science	5.0 (1.6)	4.7 (1.8)	4.9 (1.6)	3.8 (1.9)	4.0 (1.9)
29. Health care analysis	2.9 (1.8)	3.6 (1.8)	3.2 (1.8)	3.3 (2.1)	3.0 (1.9)
30. Inventory theory	3.7 (1.8)	3.6 (1.8)	3.7 (1.8)	3.7 (2.2)	3.7 (2.0)
31. Technological forecasting	4.5 (1.7)	3.9 (1.6)	4.2 (1.7)	2.9 (1.9)	3.3 (1.9)
32. Reliability, replacement, & maintenance	3.3 (1.7)	3.3 (1.6)	3.4 (1.7)	2.7 (1.8)	2.7 (1.7)
33. Strategic planning	5.0 (1.7)	4.2 (1.9)	4.7 (1.8)	2.9 (1.9)	4.0 (2.0)
34. Game theory	3.3 (1.6)	3.5 (1.7)	3.3 (1.6)	2.2 (1.7)	3.2 (2.1)
35. Conflict management	3.7 (1.6)	3.4 (1.8)	3.6 (1.7)	2.3 (1.8)	2.8 (1.7)
36. Portfolio selection	3.7 (1.8)	3.2 (1.8)	3.5 (1.8)	3.0 (2.0)	2.7 (1.6)
37. Personnel management	3.3 (1.6)	2.6 (1.6)	3.1 (1.6)	2.1 (1.6)	2.6 (1.7)
38. Management control systems	4.4 (1.5)	3.9 (1.8)	4.3 (1.6)	3.0 (2.0)	3.3 (2.1)
39. Chance-constrained programming	3.0 (1.7)	3.3 (1.7)	3.1 (1.7)	2.6 (1.8)	2.5 (1.5)
40. Interactive computer algorithms	3.6 (1.8)	3.6 (1.9)	3.6 (1.9)	3.2 (2.1)	2.8 (2.0)
41. Transportation analysis	3.6 (1.7)	3.6 (1.7)	3.6 (1.7)	3.2 (2.1)	2.7 (1.8)
42. Capital investment decisions*	4.9 (1.7)	4.0 (1.9)	4.5 (1.8)	3.5 (2.0)	3.2 (2.0)
43. Implementation of public policy	3.3 (1.7)	4.1 (1.8)	3.7 (1.8)	2.8 (2.0)	4.0 (2.3)
44. Research methodology	3.4 (1.6)	4.2 (1.7)	3.7 (1.7)	3.1 (1.9)	3.8 (1.8)
45. Goal setting	4.0 (1.7)	3.8 (1.8)	3.9 (1.7)	2.6 (1.6)	3.4 (2.0)
46. Ethics of management science	3.7 (1.7)	3.6 (1.8)	3.7 (1.7)	2.7 (1.9)	3.3 (1.7)
47. Management of developing economies	3.0 (1.7)	3.1 (1.8)	3.1 (1.7)	2.0 (1.4)	2.7 (1.6)
48. Inter-systems analysis	3.4 (1.6)	3.2 (1.7)	3.3 (1.7)	2.3 (1.5)	2.7 (1.7)
49. Graph theory	2.8 (1.6)	2.8 (1.7)	2.8 (1.6)	2.5 (1.9)	2.8 (1.7)
50. National needs analysis	3.2 (1.7)	3.5 (1.8)	3.3 (1.7)	2.5 (1.7)	2.9 (1.8)
51. Governmental regulation	3.3 (1.6)	3.3 (1.7)	3.4 (1.7)	2.4 (1.8)	3.3 (1.9)
52. Methodology of model building	4.5 (1.5)	4.7 (1.7)	4.7 (1.6)	4.1 (1.8)	4.3 (1.9)
53. Educational systems analysis	2.9 (1.6)	3.9 (1.7)	3.4 (1.7)	3.1 (1.8)	3.3 (1.9)
54. Stochastic processes and models	3.7 (1.7)	4.1 (1.6)	3.9 (1.7)	3.7 (2.2)	4.5 (2.0)

TABLE 2 (*continued*)

Survey Questionnaire Items	Readers			Authors	Editors
	Practitioners ($N = 299$)	Academics ($N = 170$)	Total ($N = 545$)	($N = 76$)	($N = 45$)
55. Capital investment decisions*	4.7 (1.8)	3.7 (1.9)	4.3 (1.9)	3.3 (1.9)	3.0 (1.9)
56. Dynamic programming	3.5 (1.6)	3.7 (1.8)	3.6 (1.7)	3.2 (2.0)	3.5 (2.0)
57. Fuzzy systems theory	3.2 (1.6)	3.0 (1.7)	3.1 (1.7)	2.2 (1.6)	2.5 (1.7)
58. Non-linear programming	3.3 (1.6)	3.6 (1.8)	3.4 (1.7)	2.9 (1.9)	2.9 (2.1)
59. Multiple criteria decision making	4.6 (1.6)	4.9 (1.6)	4.7 (1.6)	3.9 (2.1)	4.0 (1.9)
60. Management systems	4.6 (1.5)	4.1 (1.7)	4.4 (1.6)	3.0 (1.8)	3.4 (1.9)
61. Problem finding and formulation	4.8 (1.5)	4.5 (1.8)	4.7 (1.6)	3.7 (1.9)	4.3 (2.1)
62. Distribution systems analysis	3.7 (1.7)	3.4 (1.6)	3.6 (1.7)	3.2 (2.0)	3.0 (1.9)
63. Uniting of mgmt. sci. models & behav. sci.	4.1 (1.7)	4.0 (2.0)	4.1 (1.8)	3.2 (2.1)	3.8 (2.1)
64. Large-scale systems analysis	4.2 (1.7)	4.2 (1.8)	4.2 (1.7)	3.5 (2.1)	3.8 (2.1)
65. Theory of teams	3.1 (1.5)	3.1 (1.7)	3.1 (1.5)	2.2 (1.7)	2.8 (1.8)
66. Manpower planning	3.8 (1.7)	3.1 (1.6)	3.6 (1.7)	2.5 (1.7)	2.8 (1.8)
67. Assessing organizational effectiveness	4.3 (1.6)	3.7 (1.9)	4.1 (1.7)	2.6 (1.8)	3.2 (2.1)
68. Market research	4.0 (1.8)	3.3 (1.9)	3.6 (1.8)	2.5 (1.8)	3.2 (2.2)
69. "Crisis" management	3.8 (1.5)	3.0 (1.6)	3.5 (1.6)	2.0 (1.5)	2.7 (1.9)
70. Automated design	2.9 (1.5)	2.6 (1.6)	2.8 (1.5)	2.1 (1.5)	2.5 (1.8)
71. Criminal justice analysis	2.6 (1.7)	3.0 (1.6)	2.8 (1.6)	2.5 (1.6)	2.9 (1.8)
72. Energy research utilization	3.9 (1.8)	4.0 (1.7)	4.0 (1.7)	3.2 (1.9)	3.4 (1.8)
73. Computational complexity & computability	2.8 (1.7)	2.8 (1.7)	2.8 (1.7)	2.7 (1.7)	2.8 (1.8)
74. Gaming	3.1 (1.7)	3.4 (1.7)	3.1 (1.6)	2.0 (1.4)	2.5 (1.5)
75. Cost-benefit analysis	4.9 (1.4)	4.2 (1.6)	4.6 (1.5)	3.1 (1.8)	3.5 (2.0)
76. Optimal control theory	3.3 (1.5)	3.5 (1.7)	3.3 (1.6)	2.4 (1.7)	3.2 (1.6)
77. Human information processing	3.8 (1.6)	3.8 (1.8)	3.8 (1.7)	2.4 (1.7)	3.3 (2.1)
78. Statistical analysis	4.5 (1.6)	4.3 (1.7)	4.4 (1.6)	3.5 (2.1)	4.1 (1.8)
79. Theory of modeling	4.3 (1.7)	4.6 (1.7)	4.4 (1.7)	3.4 (1.8)	3.7 (1.9)
80. Consumer behavior	3.7 (1.7)	3.2 (1.8)	3.5 (1.8)	2.5 (1.8)	3.2 (2.2)
81. Marketing analysis	3.9 (1.8)	3.2 (1.8)	3.6 (1.9)	2.5 (1.8)	3.2 (2.3)
82. Analysis of research & development	3.5 (1.6)	3.4 (1.6)	3.5 (1.6)	2.7 (2.0)	2.8 (1.7)
83. Decision and value theory	4.2 (1.7)	4.3 (1.8)	4.2 (1.7)	3.5 (2.0)	3.8 (1.9)
84. Queuing systems	3.4 (1.6)	3.4 (1.8)	3.5 (1.7)	3.0 (2.0)	2.9 (2.0)
85. Optimization methodology	3.8 (1.7)	4.2 (1.9)	4.0 (1.8)	3.7 (2.1)	3.6 (2.0)
86. Information economics	4.1 (1.6)	3.9 (1.8)	4.0 (1.7)	2.7 (1.7)	3.4 (1.9)
87. Corporate modeling	5.1 (1.6)	4.2 (1.8)	4.7 (1.8)	3.2 (1.9)	3.7 (1.9)

* These items (No. 42 and No. 55) were unintentionally duplicated on the survey instrument. The similar results of this duplication served to enhance our degree of confidence in the data.

No attempt is made to conclusively interpret the data; rather, it is the objective of this paper to speculate on some reasonable interpretations of the results. The response rate for the survey questionnaire was approximately 50 percent. Table 1 shows a breakdown of the responding readers and authors by professional affiliation for this survey as well as comparative data from two prior surveys [2], [4]. This breakdown does confirm the tendency for academic authors to publish research for practitioner readers in *Management Science*.

Table 2 shows the means and standard deviations of the 87 items in order of their appearance on the survey questionnaire by constituent groups, including a breakdown of readers into academic and practitioner readers. The latter was done since the interests of academic readers may be closer to those of the predominantly academic authors than to practitioners. Scanning Table 2 suggests that readers (total) on the average convey broader overall interest in management science topics than the authors, with the editors between the two. Specifically, the overall response means are 3.8, 2.9, and 3.2 for readers, authors, and editors, respectively. While these differences may result from different response styles among the three constituents (e.g., authors

being more conservative and cautious in indicating research plans), the mean differences may also stem from the tendency of authors to be more narrow in research plans (a few topics of great interest), while readers are broader in wishing to read about more management science topics, with the editors being in between.

Of course, these differences may simply reflect the fact that the three groups were, in fact, asked different questions (authors were asked what they are or are planning to research, readers were asked what they would like to read about, and editors were asked to describe their areas of reviewing expertise). If, as might reasonably be speculated, individuals typically perceive themselves as having narrower research interests than editorial expertise, and narrower editorial expertise than reading interest, one would not necessarily interpret the data of Table 2 to reflect dissonance among the groups.

However, it is interesting to analyze the relative congruence of interest between, (1) authors and readers, and (2) academic readers and practitioner readers, as shown in Table 2. The first comparison may be interpreted to suggest the topics in management science which are desired by readers but not "produced" by authors, or may be researched and written about by authors but not found to be of much interest by readers. Either of these "mis-matches" carries with it a variety of strategic questions as to their meaning, the desirability of increasing the degree of congruence, and method for doing so if it is deemed to be desirable.

The second comparison which is facilitated by Table 2 may help to suggest the desirability of market segmentation. For example, if there are considerable differences among academic and practitioner readers it may be misguided to expect *one* journal to appropriately address both segments. On the other hand, if the reader sample is fairly homogeneous, the desirability for developing a segmentation strategy is less apparent.

Table 3 shows a rank ordering of *t*-values for reader-author mean differences on the 18 items which were the most significant ones (all below the 0.001 significance level). This level of significance and number of items were chosen to highlight author-reader differences with a manageable set of items (since most of the 87 items had mean

TABLE 3

T-values for Mean Differences Between Authors and Readers

Item No.	Title	*t*-value*
69	"Crisis" management	7.75
6	Measurement of productivity & performance	7.72
33	Strategic planning	7.54
75	Cost-benefit analysis	6.74
21	International business	6.66
67	Assessing organizational effectiveness	6.61
60	Management systems	6.54
77	Human information processing	6.51
45	Goal setting	6.43
86	Information economics	6.43
74	Gaming	6.42
87	Corporate modeling	6.28
10	Quality of life and work	6.20
26	Innovation & organizational development	5.98
35	Conflict management	5.86
15	Future studies	5.82
47	Management of developing economies	5.79
31	Technological forecasting	5.48

* All 18 means for readers are greater than means for authors.

differences between authors and readers which were significant at the 0.001 level) and to facilitate comparison with the 18 items which were the only items that achieved significance at the 0.001 level between practitioner readers and academic readers (to be presented shortly).

As can be seen from Table 3, readers generally want to read articles concerning some of the more strategic, qualitative, future-oriented, and effectiveness-based topics than authors (mostly academics) plan to research and publish in *Management Science*. Thus, topics such as strategic planning, assessing organizational effectiveness, future studies, and innovation and organizational development are in sharp contrast to some of the more quantitative topics such as integer programming, fixed-point and complementary-point algorithms, computational complexity and computability, and queueing systems which showed minimum differences between authors and readers (see Table 2).

Table 4 shows a rank ordering of t-values for mean-difference between practitioner readers and academic readers on the 18 items which were significant below the 0.001 level. In contrast to Table 3, some of the differences reflect stronger endorsement by the practitioner readers than by the academic readers, as evidenced by negative t-values. Topics showing such significant differences included project management, corporate modeling, personnel management, strategic planning and cost-benefit analysis, which suggests that the more strategic, qualitative, futuristic, effectiveness-based interests of the readers are mostly influenced by the practitioner readers. The academic readers, on the other hand, are more interested than practitioner readers (positive t-values) in topics such as educational systems analysis, research methodology, implementation of public policy, and health care analysis. Interestingly, all of the items but one are application oriented. However, not only may these application interests be more research-oriented than action-oriented (i.e., interests in them may be correlated with the concern for research methodology), but the application areas are primarily in the public sector. It may be that more practitioner readers are involved with the private sector, and consequently, are not that interested in management

TABLE 4

T-values for Mean Differences Between Academic Readers and Practitioner Readers

Item	Title	t-value
27	Project management	− 5.74
53	Educational systems analysis	5.62
87	Corporate modeling	− 5.19
55	Capital investment decisions	− 5.03
44	Research methodology	4.92
42	Capital investment decisions	− 4.76
69	"Crisis" management	− 4.60
43	Implementation of public policy	4.52
22	Banking, financial & investment statements	− 4.42
37	Personnel management	− 4.38
33	Strategic planning	− 4.36
66	Manpower planning	− 4.23
29	Health care analysis	4.19
75	Cost—benefit analysis	− 4.06
81	Marketing analysis	− 3.99
6	Measurement of productivity & performance	− 3.93
1	Information systems	− 3.73
68	Market research	− 3.73

* A positive t-value denotes that the mean for academic readers is greater than the mean for practitioner readers, and vice versa for negative t-values.

science in educational, governmental, and health care settings. Another possibility is that the academic readers are anticipating that the public-sector is, and will be, a growing client for the application of management science knowledge, and are interested in reading about these new developments.

Another set of survey results permits a comparison between the *Management Science* editors and editors of *Operations Research*. This comparison may help to suggest a point of reference for a study that is primarily focused on only one journal in the management science field. The means on all 87 items for the 45 responding editors of *Management Science* (taken as a group) were compared to the means for 21 responding editors of *Operations Research*. Only five of the items had a statistically significant difference at the 0.05 level. This suggests that the two editorial groups are quite homogeneous.

Implications and Conclusions

These survey results may be interpreted at a variety of levels. The fact that fixed point theory is seen as a relatively low interest item, while practitioners rate corporate planning models to be of high interest might be directly interpreted to suggest that the management of the journal should try to achieve more "parity" of interest by stimulating papers in the latter area, but not in the former. Such stimulation might take a variety of forms such as the identification of potential authors' invitations for submissions, paper competitions, the dedication of an issue to a high interest topic, etc.

However, a basic journal design policy issue which must be faced before such actions can be evaluated is whether it is appropriate for journal managers to interpret these data in this fashion and to take such actions. The issue is both an empirical one of interpreting the data and a normative one of determining the *proper* role and policies of the journal.

Other of the previously-noted journal design issues may also be addressed using the survey data. Analysis of these data provides one way of empirically defining the groups which are described in Figure 1. Such an approach views the journal design process as one of developing an editorial structure which best facilitates a matching of readers and authors.

However, this issue also entails normative aspects of how to interpret and to evaluate the apparent difference in interests between readers and authors, and between practitioner readers and academic readers. In particular, readers (especially practitioner readers) seem to have greater interest in reading about strategic, qualitative, furturistic, and effectiveness-oriented topics than in those topics about which authors plan to research and publish. (Of course, it should be noted that the author sample is of *past* authors, while possible future authors may be quite different in their interests.) These reader-oriented topics are quite different than some of the more traditional quantitative *Management Science* topics.

Other issues and interpretations of the survey results are readily identified. Since there appear to be greater differences between readers and authors than between practitioner readers and academic readers, it may be that the impact of the journal would be enhanced if more attention were focused on the author-reader interface. This idea is consistent with the shift away from a "Theory-Applications" dichotomy in the journal. Of course, this conclusion assumes that these interfaces are amenable to alteration with the same effort and resource expediture. Such an assumption needs further exploration and analysis.

There are a wide variety of issues and interpretations of the survey data which are of importance to the future of *Management Science*. Because of this, and because

management scientists have not often addressed their skills to important problems of their own profession such as journal design, we have taken the opportunity to help to define the relevant issues and to provide a data base for study and analysis.[12]

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