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A System Dynamics Model of Academic Journal Publishing

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The advent of the World Wide Web has changed the potential ways that academic researchers can both disseminate and seek information. While paper was traditionally (and some would argue is still) the preferred method of disseminating the findings of scholarly research, electronic journals are gaining popularity as vehicles for dissemination and acquisition of the products of research. Advocates of digital information argue that the ease of transmission, decreased costs, and greater publishing latitude allows publishers to produce electronic journal volumes unconstrained by page counts and printing schedules. Those who still question electronic scholarly publications worry about quality of scholarship, copyright, and the permanence of electronic media (Andersen, 1998; Kiernan, 2000). Underlying both sets of concerns is the use of peer-reviewed publication in the tenure and review process for academics. Scholarly journal articles are a mainstay of the tenure process and as such must be of high quality and available for study by tenure review committees (Brodman,2000; Kitchens, 2000).

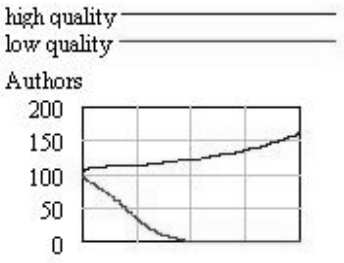
Issues relating to journal pricing, and, in particular, individual versus institutional pricing, also affect the dynamics of moving from paper to electronic media. Purchase of a journal by libraries makes a paper journal accessible to far more people than almost any number of individual subscriptions. The dynamics of e-journal dissemination, ostensibly available to anyone with access to a computer and the web, and, notably, without necessary access to a library, are far different. Furthermore, the role of traditional publishing houses is necessarily changing as individual organizations can launch web-based journals that are no longer affiliated with publishing firms.

This paper presents a system dynamics simulation of an academic journal. The paper explores the feedback processes that control the review process, journal quality, size of readership, size of author pool, and the size and quality of the journal itself.

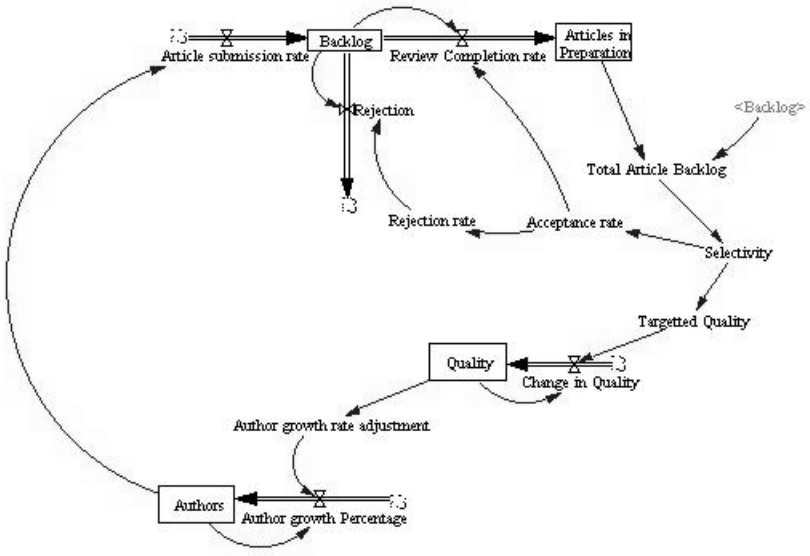
THE MODEL

In an effort to understand the dynamics of traditional and electronic professional journals we have developed a conceptual model from which to begin our investigations. The Professional Journal base model includes six sectors: Authors, Publishing, Subscriptions, Finances, Quality and Reviewers. These sectors are outlined in the sector diagram below.

The base line model indicates particularly strong positive feedback related to the connection between quality, journal selectivity, author submissions, and journal growth. This is indicated in the following graphs, which contrast the growth of numbers of authors and articles under conditions in which journal quality is above and below a professional norm.

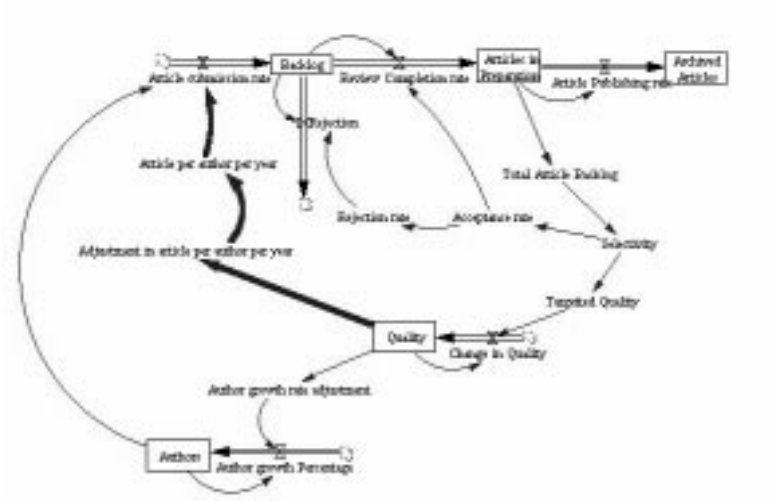


Model behavior is generated by positive feedback loops indicated in the following diagram.



As indicated in the diagram, improved quality leads to more authors, who in turn write more articles. This leads to a backlog of articles from which to choose, leading to greater selectivity and greater quality. Conversely, lower than average quality leads to a fall off in authors, articles, and selectivity, further depressing quality.

It is interesting to note that the growth in authors under positive quality circumstances is not as dramatic as author falloff under negative circumstances. This is explained by another positive feedback loop, indicated in the following diagram.



In this diagram, increases in quality lead to an increased number of article submissions by authors, but not to as dramatic a degree as in the cases of quality diminution, where authors stop submissions more rapidly. This enhances the strength of the quality-author-article-selectivity loop, causing more dramatic negative behavior in the case of poor quality.

FUTURE RESEARCH

The current model is a base from which to study the basic dynamics of journal publishing. Future iterations will include more dynamic behavior in the areas of reviewer recruitment, journal costs, price and revenues, as well as the dynamics of subscription and audience growth. We will also explore differences in publishing dynamics due to changes in the process of review and publication consistent with alternative web-based publishing processes.

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