
OPEN ACCESS TO CONSTRUCTION IT RESEARCH ARTICLES – DEVELOPMENTS OVER THE PAST 25 YEARS

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Bo-Christer Björk, Professor Emeritus
Hanken School of Economics, Helsinki, Finland
Bo-christer.bjork@hanken.fi

SUMMARY: *The Journal of Information Technology in Construction (ITcon), was founded in 1996, using the new innovative open access business model enabled by the World wide web. A quarter century later Open Access (OA) journals have established themselves in all fields of science, in particular in biomedicine, so that around a fifth of all high quality peer reviewed articles are currently published in OA journals. In building and construction there are half a dozen active full OA journals, although ITcon remains the only one dedicated specifically to construction IT research.*

The development of OA has been slower than anticipated in the early years. An analysis using Michael Porter's five forces model of the competitive environment of scholarly publishing helps to highlight the reasons for this. Particularly important as a barrier to change is the strong emphasis in academic evaluations on impact factors, which favors old established journals. Despite such hurdles OA continuously grows in importance and pioneering journals like ITcon have helped to pave the way.

KEYWORDS: *Scholarly Journal, Open Access, Business Model.*

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1. INTRODUCTION

In the 1980s and 1990s the use of IT in construction was rapidly evolving and a research community of young researchers interested in topics like computer-aided design, product modelling (later renamed BIM), expert systems, etc. had emerged. This community regularly met and bonded at yearly conferences. Traditional paper format journals dedicated to this area were also founded, such as *ASCE Journal of Computing in Civil Engineering* (1987-), *Automation in Construction* (1992-) and the *International Journal for Computer Integrated Design and Construction* (1999-2000).

Email had already been around for a while when in 1993 the world wide web emerged and very rapidly started to revolutionize many business fields. The World Wide Web was in particular designed to help scientists like those working at CERN communicate easily (Berners-Lee and Cailliau, 1990) and its potential for the dissemination of scientific publications was also rapidly noticed (Harnad, 1999). The idea of an electronic only journal focusing on the use of IT in construction industry applications emerged in the spring of 1995. At that time scholarly journals were still distributed only in paper versions and bulky conference proceedings were distributed at the conference sites. The prize goes to the CIB world conference in Washington DC in 1986 where the twelve volume proceedings weighed around ten kilograms, causing major logistical problems for attendees facing luggage weight restrictions.

Not only was ITcon conceived as an electronic journal, hence the original title “Electronic” Journal of Information Technology in Construction, it was also from the start a full open access journal with no access barriers whatsoever. In contrast to many current OA journals from major publishers ITcon did not charge authors for the dissemination service but relied on the voluntary work of the central editorial team, and the implicit support of their institutions for resourcing the publishing. In addition, grants from the Swedish Building Research Council, the Slovenian Research Agency and the EU supported the development of the IT platform used for publishing and for managing the review process.

During its first five years ITcon struggled to get high quality submissions but after the millennium shift the journal gained acceptance and has to date published over 600 articles. During the last twenty years the number of yearly articles has steadily fluctuated in the range 20-50 articles, often depending on the publication dates of special issues. We can safely conclude that it has established itself as one of the leading journals in its niche field. The developments of the first ten years have been described in a previous article and will not be described in detail here (Björk, Turk and Holmström, 2005 or Björk and Turk, 2006). Key developments after those articles were written have been to utilise the open source Open Journals System as publishing platform and the labelling of all content with the Creative Commons license as well digital object descriptors (DOIs). This article in-stead focuses on changes in the general environment of scholarly publishing during the quarter century that ITcon has been published, and in particular the situation for construction IT research.

2. GENERAL DEVELOPMENT OF OA

Over the past two decades, there have been several empirical studies of how the uptake of open access has developed (Pivovarov et al 2018). The simplest measurement is to look at what proportion of journals are open access. Even that is complicated by the fact that it has been difficult to measure the number of scholarly journals in general, in particular when looking outside the English language ones. Some measurements have for instance looked at the proportion of Web of Science or Scopus indexed journals that are open access. Perhaps more meaningful is to look at the share of articles which are published in OA journals. It should be noted that while the number of yearly articles in OA journals is on average lower in OA journals than in subscription journals, there are a few open access mega-journals publishing thousands of articles each. Björk and Korkeamäki (2020) found in a recent study that the overall share in 2018 of 24,358 Scopus journals that were OA was 18.4 % and that the share of OA articles was 18.8 %. The distribution over scholarly fields was, however, strongly skewed with Biochemistry (23.0 %) and Medicine (22.0 %) having the highest uptake and business disciplines the lowest. Of fields close to construction IT, Engineering had 10.4 % and Computer Science had 13.9 %. In an earlier study of 9,500 articles published in 72 leading journals in building & construction only 5,6 % of the articles published in 2015-2017 were in full OA journals (Björk, 2018).

Unfortunately, there are also so-called predatory OA journals, journals which pretend being peer reviewed and where authors are guaranteed rapid publishing against the payment of author fees (Shen and Björk, 2015). Fortunately, the building and construction field has not been particularly badly affected by this phenomenon.



3. CURRENT CONSTRUCTION OA JOURNALS

Currently there are a handful of OA journals specialized in construction IT or construction more generally. The *Journal of Civil Engineering and Management* was originally published by the Vilnius Gediminas Technical University and has after a few years of being published by Taylor & Francis reverted to being published by the university and is now full OA. Authors have to pay a fee of 60 Euros per page, which in practice means on average around 1000 Euros for an article. *Buildings* is a journal launched in 2011 by the full OA publisher MDPI, and promises extremely fast publication, the first decision is promised to submitting authors after approximately 17.5 days. The median time from acceptance to publication is 3.8 days! The Article Processing Charge (APC) is approximately 1300 Euros. A newcomer is *Buildings & Cities*, which charges around 1100 Euros.

In addition to the above commercial ventures there are a handful of OA journals in construction which don't charge authors. These include *Construction Economics and Building*, *Journal of construction in developing countries* as well as some Spanish language journals (Björk, 2018). *ITcon* has for its full 25 year's history been the only OA journal specialized in research concerning the use of IT in construction,

4. AN EXPLANATION FOR THE SLOW GROWTH OF OA

All evidence thus points to a slowly growing acceptance as OA as a model for publishing scholarly journals also in the construction disciplines. But why has the growth over the past 25 years been much slower than we anticipated when we founded *ITcon* a quarter of a century ago and in particular linear rather than the exponential S-curve to be expected for disruptive innovations (Rogers, 2003). Why haven't existing journals converted to the OA model.

The key reasons for this can be found in a number of peculiarities in the business of scholarly journal publishing in general. A useful framework for discussing this is Michael Porter's famous model for describing the competitive situation of a given industry (Porter, 1980). This model has for four decades been part of the standard for teaching strategy at business schools. An adaption of the model for the scholarly publishing business is illustrated in Figure 1 below.

A more elaborate analysis is presented in Björk (2017). The essence is that the competitive situation in a given industry is determined by five central forces. For instance, the bargaining power of customers boils down to the position of university libraries to negotiate the multi-year contracts they make with a handful of major publishers to obtain digital access to their portfolio of journals (e. g. Science Direct, Springer Link). Since most universities require subscriptions to all leading journal packages, called bid deals, the bargaining power has been very weak, and publishers have more or less been able to dictate prices. In this respect scholarly publishing differs from fields like mobile phones or cars, where products from different vendors are substitutes. This has led to profit levels of 30-40 %, which companies in other industries can only dream of. Hence these big publishers have had very little incentive to a risky conversion of their journals to full OA paid by author charges. Instead, they have chosen a risk free hybrid strategy of opening up most of their journals to individually paid OA for selected articles (typically for 3000 USD), thus collecting revenue at both ends (Cressey, 2009).

A substitute for an original scholarly article is a manuscript copy stored in an open web repository. In the jargon of OA proponents such copies are called Green OA, in contrast to Gold OA, which consists of the original articles at the publisher's site (Suber, 2012). Green OA is mostly allowed by publishers, but often with a one-year delay. And not all authors bother about it, even when its legal and their university provides a web site for it. For this reason, only about 15-20 % of articles in closed subscription journals can be found as green copies.

A key factor slowing down innovation and the entry of new journals has also been the importance of having a Journal Citation Index impact factor and its level, for attracting academics to submit papers. Since the owner of the index Clarivate only accepts new journals very selectively this has been a major hurdle for newly founded OA journals. This dominance has been further cemented by the excessive use of this metric by many university administrations for evaluation purposes (Adler and Harzing, 2009). Where academics have published has been more important than the impact of the individual papers, which in today's world can be easily checked using more inclusive indexes such as Scopus and Google Scholar.

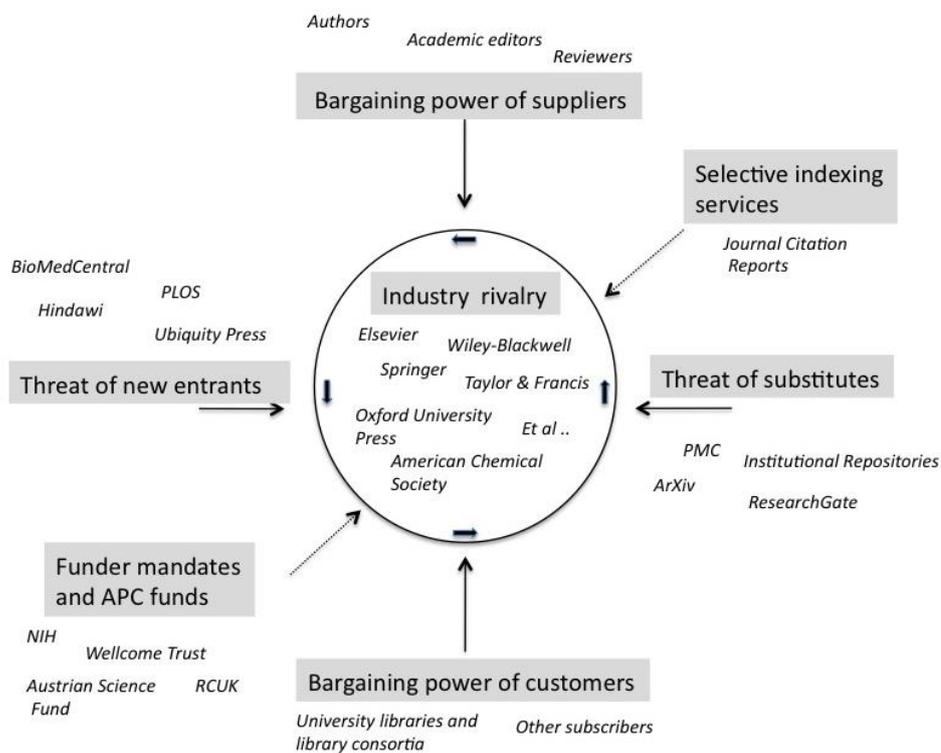


FIG. 1: Porter's competitive forces model adapted to the scholarly publishing business. Reproduced from Björk (2017) with permission from the publisher.

What Porter's model and an analysis using its concepts shows, is that the scholarly publishing industry (mainly the leading commercial and society publishers) is an industry where the leading incumbent players are extremely well protected from competition from new and innovative companies. With the high levels of profit that follows from this protected situation, they have little incentive to start experimenting with new innovation, such as open access, even if it would be funded by author charges.

5. CONCLUSIONS

When we started ITcon, we optimistically expected the Open Access business model to become the norm for publishing scholarly journals in a relatively short time frame of five to ten years. In this we have been disappointed. The reasons are mainly due to the general situation in academic journal publishing as outlined above. Although OA is rapidly getting a stronghold in biomedical publishing construction research is a laggard in the adoption of this model. The reasons follow the Porter's model and how it plays out in different fields.

What we have nevertheless been able to do is to run a high-quality peer reviewed journal using a collaborative open source like model. In this we are not alone, in fact a majority of all Open Access journals included in the DOAJ index follow this business model (Morrison, 2016). Using such a model based on voluntary work is doable for journals closely associated with active networks of researchers. Operating without monetary revenues (for instance charging authors) and expenses is also realistic for journals of the size of ITcon where the number of yearly submissions is reasonable. A decentralized structure with a number of collaborating co-authors is also helpful. Journals which are too dependent on only a single editor-in-chief are at a high risk of disappearing when that editor is no longer willing or able to continue.

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