

The Black Market for Scholarly Articles: You Can't Have Elsevier without Sci-Hub

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Introduction

There has been considerable hand-wringing over Sci-Hub. It clearly violates copyright laws and undoubtedly uses nefarious means to acquire copies of scholarly articles. Elsevier sued Sci-Hub and in June of 2017 was awarded \$15 million in damages. The same month American Chemical Society (ACS) sued Sci-Hub, asking for \$4.8 million. That November a default judgement was issued in the ACS case along with a permanent injunction requiring all parties – internet search engines, web hosting sites, internet service providers (ISPs), domain name registrars, and domain name registries – to cease facilitating access to, use, reproduction, and distribution of ACS content from Sci-Hub. As a result, Sci-Hub access has been blocked in several countries.¹ Despite this Sci-Hub continues to operate presumably from either Russia or Kazakhstan and there are duplicate sites operating out of other countries. Neither Elsevier or ACS has collected any money.

Opinions on Sci-Hub vary greatly. John Bohannon sums it up nicely when he says Sci-Hub is, "an awe-inspiring act of altruism or a massive criminal enterprise, depending on whom you ask."²

In the article will argue that Sci-Hub is the inevitable result of for-profit scholarly journal publishing when articles are digital objects on the network. Sci-Hub is the black market that is the predictable result of the economics of scholarly publishing. To explore this proposition, we will begin with a brief history of Sci-Hub and then review the economics. Finally, we will explore the black market success of Sci-Hub.

Sci-Hub

In 2011 Alexandra Elbakyan, who Bohannon describes as, “a typical science graduate student: idealistic, hard-working, and relatively poor” returned to her native Kazakhstan after studying in Russia, Germany, and the United States.³ She was 22. In Kazakhstan, Elbakyan found that she had only minimal access to the scientific literature she needed to continue her research. Most of what she need was locked behind paywalls. She could use #IcanhazPDF, a means of broadcasted a request for an article over Twitter, with the hope that a researcher somewhere with access to the article would provide it. #IcanhazPDF worked for Elbakyan, but not very well. As Bohannon, explains. “What was needed, she decided, was a system that allowed that papers to be shared – with absolutely everyone. She had the computer skills – and contacts with other pirate websites – to make that happen, and so Sci-Hub was born.”⁴ Elbakyn had a job that needed doing to advance herself – she needed read scientific papers. While she was studying aboard she could use licensed journals provided by universities, but when she returned to Kazakhstan, this option was closed to her. The alternative ways to get the job done was to pay for individual articles, which she could not afford, or to use #IcanhazPDF which was cumbersome and hit-or-miss. She decided she needed to find something better to do to her job. She was struggling and in her circumstances; there were no good options. It turned out that Sci-Hub, the system she built to do her job, was useful to many others who had the same job and were in similar circumstances.

Sci-Hub is an easy to use database of a large portion of the world’s scholarly journal articles. In July of 2019 Sci-Hub claimed it contains 74 million articles. Daniel S. Himmelstein and his colleagues estimate that as of March 2017 Sc-Hub contained 77.8% of journal articles in the Crossref database, including 96.9% of all Elsevier articles, 89.7% of Springer-Nature, 94.7% of Wiley-Blackwell, and 98.8% of ACS. In March 2016, Sci-Hub claimed 200,000 downloads.⁵ By one estimate, the downloads from Sci-Hub in 2016 accounted for 3% of downloads from all science publishers.⁶ Sci-Hub is used across the world including, it seems, by many who have legitimate access to the articles they download from it. Bohannon’s analysis of Sci-Hub log files shows heavy use in a number of U.S. college towns and he interviewed a number of people who cite ease of use as the reason for downloading articles from Sci-Hub.⁷ Work by Bianca Kramer and David Nicholas and his colleagues confirm this finding.⁸ James Heather, in his article, “Why Sci-Hub Will Win” describes what it takes to get an article from Sci-Hub versus what it takes to let the same article through his university

library – five clicks for Sci-Hub, ten for the library. Heathers conclude, “when you throw away licencing, copyright, and digital rights issues, it’s very easy to build a *superior* service.”⁹ Sci-Hub clearly infringes the copyrights of publishers, but for Sci-Hub users the using an illegal service is the only way, or in some cases the easiest way, they can get done a job that is important for them to make progress in their lives. Given this, they are prepared to set aside any qualms they might have about Sci-Hubs methods. It is a price they are willing to pay.

In 2016 Elbakyan was one of *Nature’s* 10 a list of the ten people who mattered in science. They titled her the “paper pirate”.¹⁰

The Economics of Digital Scholarly Publishing

We need to begin our analysis of the current economics of scholarly publishing by considering the nature of digital network based documents. Network based digital content have the following three characteristics:

1. A copy can be instantaneously delivered anywhere in the world.
2. A copy is the same as the original.
3. A copy can be made at zero marginal cost.

As Andrew McAfee and Erik Brynjolfsson put it in their book, *Machine, Platform, Crowd*, digital content is, “Free, perfect and instant.” As they go on to explain:

Free, perfect, and instant make a powerful combination, worth more than each of these characteristics separately. Thus, it is very difficult to compete with...

For most of history, few, if any, goods and services have been free, perfect, and instant. But with digital, networked goods these three properties are automatic.¹¹

While digital documents can have these characteristics, there is a problem. From an economic perspective the cost of a good that maximizes societal benefit is the marginal cost of the good. But if the marginal cost is zero, there is no way for a profit making company to produce the good unless it creates an artificial scarcity that can then be used to demand a price above margin cost. This is what the subscription model of journal publishing does. By acquiring copyright and implementing paywalls publishers restrict use of the journal articles they publish to those who have paid for access to them. In economic terms this is called monopoly rent taking.

This dynamic has two important results. First, society receives less benefit from the publication than it should. Second there are individuals who wish to use the

publication, but do not have the means to purchase it. The higher the price charged for the publication, the larger this group of people will be.

The music industry found itself in similar circumstances when MP3 music files began to be distributed through Napster. The solution the music industry finally came to after a largely fruitless round of legal challenges, was first cheap digital sales through Apple's iTunes and then streaming services. In understanding why these strategies were successful in greatly reducing piracy, we need to recognize that there are two types of costs involved in acquiring digital music (or digital journal articles). One is the monetary outlay. The second is the time and effort the individual is required to invest in order to acquire the digital object. These two costs combine to create the true marginal cost. Thus, if the cost of time and effort is reduced enough many customers will be willing to pay a modest amount to purchase the item.

Commercial and large scholarly society publishers have a problem with this strategy because of their high profit margins – 25% to 35% – they will have difficulty adopting these strategies because it would disrupt the established business models.* In the case of the music industry it was new players – Apple, Pandora, and Spotify – who changed the model, not the established recording companies. It is likely that it will take new players to change the model for scholarly publishing. The more likely outcome will be the replacement of the subscription model with the Gold Open Access with funder or institutional support for either APCs or direct journal operating subsidies.

Until the business model for scholarly journal publishing flips and the monetary cost to users is reduced to zero, there will be a significant number of people who have a need for articles, but not the means to acquire them. In these conditions black markets inevitably arise.

Black Markets

Black markets arise when people need something that in their circumstances is not available to them through legitimate means. For people needing scholarly articles

* Scholarly societies technically don't have profit margins, but most use surplus from their publishing operations to support other society programs, so their business models have constraints that are similar to commercial publishers. Given this, it is not a surprise that ACS, like Elsevier, sued Sci-Hub.

this occurs when they do not have access to a well-resourced library and cannot afford the \$25 to \$40 per article costs. A clear example of the dilemma is a doctor without legitimate access to the current medical literature who needs that information to treat a patient. This is far from a hypothetical situation.¹² Black markets provide illegally what people need, but cannot acquire legitimately in ways or at prices they can afford. Most people who acquire items in the black market recognize the illegality of the transact, but do so none-the-less because they have no other good options. Black markets will be used to a greater degree if they are convenient; if the harm done by committing the illegal act is view as being small, and if the odds of being caught are minimal.

This accounts for the success of Sci-Hub as a black market. First there are a large number of people who have a need, in many cases a pressing need, but cannot afford the legitimate means to acquire scholarly articles. Second, Sci-Hub is more convenient to use than legitimate means of accessing paywalled journals. Given the nature of digital documents attempts to create artificial scarcity require the creation of inconvenient interfaces. When digital documents are allowed to be free, perfect, and instant the systems that manage them become simple and easy. Third, many people view the harm done by acquiring an article form Sci-Hub to be minimal. In fact, many view the commercial publishes as the bad actors because of the excessive profits the make on what many view as a public good. Sci-Hub in the minds of many plays the role of Robin Hood. Finally, the chances of being caught and sanctioned for using Sci-Hub to acquire articles for an individual's research needs is vanishingly small.

Conclusion

The problem for established scholarly publishers is that, because they need to operate with large profit margins, it is necessary to artificially create scarcity by erecting barriers and restricting access to a good – digital documents – that by their nature wants to be abundant. The need to create scarcity in turn denies legitimate access to scholarly articles to many who could benefit from them. Being denied access to this resources limits what these individuals can achieve in their lives. These people will do what they can to get what they need, especially if doing so is easy and the perceived harm is small.

Imposing the subscription model on digital content will inevitably lead to a black market that takes advantage of the characteristics of digital documents and is simple and easy.

You can't have Elsevier without Sci-Hub.

Notes

¹ "Sci-Hub," Wikipedia, <https://en.wikipedia.org/wiki/Sci-Hub> (retrieved June 20, 2019); Quirin Schiermeier, "US Court Grants Elsevier Millions in Damages from Sci-Hub," *Nature*, June 22, 2017, <https://www.nature.com/news/us-court-grants-elsevier-millions-in-damages-from-sci-hub-1.22196>, and Dalmeet Singh Chawla, "Court Demands That Search Engines and Internet Service Providers Block Sci-Hub," *Science*, November 6, 2017, <https://www.sciencemag.org/news/2017/11/court-demands-search-engines-and-internet-service-providers-block-sci-hub>

² John Bohannon, "The Frustrated Science Student Behind Sci-Hub," *Science*, April 28, 2016, <https://www.sciencemag.org/news/2016/04/frustrated-science-student-behind-sci-hub?IntCmp=sci-hub-1-11>

³ Bohannon, "The Frustrated Science Student Behind Sc-Hub"

⁴ Bohannon, "The Frustrated Science Student Behind Sc-Hub"

⁵ Daniel S. Himmelstein, et. al., "Research: Sci-Hub Provides Access to Nearly All Scholarly Literature," *eLife* February 9, 2018, DOI: [10.7554/eLife.32822](https://doi.org/10.7554/eLife.32822)

⁶ Richard Van Noorden, "Alexandra Elbakyan: Paper Pirate," in "Nature's 10: Ten People Who Mattered This Year," *Nature* December 19, 2016, <https://www.nature.com/news/nature-s-10-1.21157>

⁷ John Bohannon, "Who's Downloading Pirated Papers? Everyone," *Science* April 28, 2018, <https://www.sciencemag.org/news/2016/04/whos-downloading-pirated-papers-everyone>

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- ⁸ Bianca Kramer, "Sci-Hub: Access or Convenience?" A Utrecht Case Study (Part 1)." *I&M / I&O 2.0*, June 20, 2016, <https://im2punt0.wordpress.com/2016/06/20/sci-hub-utrecht-case-study-part-1/>; Bianca, Kramer, "Sci-Hub: Access or Convenience?" A Utrecht Case Study (Part 2)." *I&M / I&O 2.0*, June 20, 2016, <https://im2punt0.wordpress.com/2016/06/20/sci-hub-access-or-convenience-a-utrecht-case-study-part-2/>, and David Nicholas, et. al., "Sci-Hub: The New and Ultimate Disruptor? View from the Front," *Learned Publishing* 32(2): 147-153 April 2019, <https://doi.org/10.1002/leap.1206>
- ⁹ James Heathers, "Why Sci-Hub Will Win," *Medium*, May 2, 2016, <https://medium.com/@jamesheathers/why-sci-hub-will-win-595b53aae9fa>
- ¹⁰ Van Noorden, "Alexandra Elbakyan: Paper Pirate"
- ¹¹ Andrew McAfee and Erik Brynjolfsson, *Machine, Platform, Crowd: Harnessing our Digital Future* (New York, NY: W. W. Norton & Company, 2017), 135-137.
- ¹² See: Ibraín Enrique Corrales-Reyes, "Sci-Hub and Evidence-Based Dentistry: An Ethical Dilemma in Cuba," *Journal of Oral Research* 6(7): 175 July 2017, DOI: <http://doi.org/10.17126/joralres.2017.054> and Guido Bendezú-Quispe, Wendy Nieto-Gutiérrez, Josmel Pacheco-Mendoza, and Alvaro Taype-Rondan, "Sci-Hub and Medical Practice: An ethical Dilemma in Peru," *Lancet: Global Health* 4(9): PE608 September 1, 2016, DOI: [https://doi.org/10.1016/S2214-109X\(16\)30188-7](https://doi.org/10.1016/S2214-109X(16)30188-7)