The Economics of Open Source: How Open Source Software Can Be Successful in the Market

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Open source software (OSS) has allowed several key technologies to thrive, benefitting modern technology companies such as Facebook and Google. It is impossible to talk about the success of OSS without looking at the revolutionary collaborative community of innovative, skillful, and dedicated programmers that allowed this movement to challenge corporations such as Microsoft. In fact, the success of this community has drawn significant capital to allow open source projects to compete with corporations in the market. Hewlett Packard, IBM, and Sun have given significant capital investments to such projects, while others received significant venture capital financing[1] Companies such as Red Hat completed its Initial Public Offering (IPO), which meant that they could seek capital for economic growth now that their stock was offered to the public. Meanwhile, several other open source companies have. Yet, there is a running debate on whether or not OSS can actually compete with proprietary software in terms of their revenue streams. And it is important to acknowledge the fact that the future of open source development remains difficult to predict with "off-the-shelf" economic models. However, by analyzing the business and economics of open source through the lens of case studies on past open source companies, the potential success of OSS can be understood. With the right business model and conditions, OSS can rise to compete with proprietary software in the market.

First, open source development is inherently appealing to individual programmers, attracting the best talent in the labor market. In simple economic terms, a programmer participates in a project if there is a net benefit, which is equal to the sum of immediate payoff and delayed payoff.[2] Meanwhile, payoff is calculated by benefits minus costs. Although open source development pales in comparison to working on proprietary software in immediate benefits—since proprietary code

[1] Josh Lerner and Jean Triole, "The Simple Economics of Open Source," National Bureau of Economic Research, last modified March 2000, accessed January 18, 2018, http://www.nber.org/papers/w7600.
[2] Lerner and Triole, "The Simple," National Bureau of Economic Research.

generates income that can be distributed to programmers as monetary compensation in the short run—joining an open source project has less immediate costs. Open source developers can work on their own schedule, saving more invaluable time than working at a proprietary company where efficiency is often compromised to a more rigid schedule. Furthermore, OSS has several key delayed rewards, including ego gratification, peer recognition, and future job offers. Ego gratification comes in the form of a feeling of accomplishment of being in a project that can be of major benefit to the world, embracing a humane cause to give back without economic incentive. Peer recognition and reputation are often sought after in the developed world, exemplified by Linus Torvalds, who was widely recognized from his Linux open source work. Perhaps more concretely, a developer can enhance his or her reputation or resume. Substantial evidence shows that this enhancement can be a good "stepping stone" for securing better access to VC money and future job offers, providing a strong economic incentive.[3] For example, an Apache developer is likely to be hired by IBM or other companies that value related contributions.

Open source software provides not only an economic advantage to the individual programmer talent market, but also a competitive advantage to the company itself. There are ways open source companies can challenge the obvious revenue benefits of commercial projects. First, the labor market is more fluid in an open source environment, since knowledge can be transferred easily to a new environment. This means that companies can cut costs when hiring workers, allowing one worker's skills and strengths to be moved to suitable projects. Similarly, open source companies can leverage the benefits of crowdsourcing, which can overcome organizational limitations in human resources and employee capabilities. Crowdsourcing offers open source

[3] US Army, A Business Case Study of Open Source Software, by Carolyn A. Kenwood, 6, July 2001, https://www.doc.ic.ac.uk/~susan/475/opensource.pdf.

companies a wider pool a collective knowledge, reduced labor costs from shifting the costs (development testing, localization, etc.) to the external workforce, more rapid development of software, and even innovation in various sectors—a 2008 survey of 100 top marketing executives revealed that crowdsourcing was effective as internal R&D for developing new ideas.[4] Second, open source companies have a natural channel for branding, marketing, and public relations (PR), allowing them to spread their open source product more easily. For example, Bootstrap raised Twitter brand awareness due to a large number of customers in the open source marketing channel that were developing products with Twitter Bootstrap, which could also indirectly allow them to attract even more skilled developers. Third, open source companies have flexible revenue streams. This benefit can be easily understood by examining the unique success of Red Hat, an open source company specializing in commercializing Linux.[5] The company was able to charge a support fee to customers who relied on Red Hat for maintenance, support, and installation, giving the company a market cap of $10 billion in 2014, placing it on the same charts as large proprietary systems such as VMware.[6] The fact that Red Hat was open source allowed it to quickly innovate a new revenue stream, which prompted various other open source and proprietary companies to follow suit, but with diminishing returns now that this "support" model was widely known.

Despite Red Hat's successful business model, its revenue still did not enable adequate funding, with only around $1 billion in revenue in 2013 compared to the $75 billion of Microsoft

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[4] Robert C. Ford, Brendan Richard, and Michael P. Cluchta, "Crowdsourcing: A New Way of Employing Non-employees?," Business Horizons 58, no. 4 (July 2015): 379, accessed January 19, 2018, doi:10.1016/j.bushor.2015.03.003.

[5] Peter Levine, "Why There Will Never Be Another RedHat: The Economics of Open Source," TechCrunch, last modified February 13, 2014, accessed January 19, 2018, https://techcrunch.com/2014/02/13/please-dont-tell-me-you-want-to-be-the-next-red-hat/.

[6] Levine, "Why There," TechCrunch.

and Amazon.[7] However, this quandary can be further improved with different business models. With the Software as a Service (SaaS) model, meaning that open source projects can partner with companies like Amazon with their own servers and software instead of purchasing and running them in-house, open source companies can reap economic benefits.[8] They can obtain a lower cost structure from economies-of-scale since customers are aggregated via the Web onto a single, vertically integrated infrastructure. Not only does the company have to spend money on servers, but it also directly reduces the cost of the customer. Open source companies can now focus on product differentiation and innovating on current businesses to ultimately produce a more competitive product in the market.

Open source companies can also profit economically in another way: being acquired strategically and aiming to get merged or join a larger corporation. Although this decision may be seen as abandoning the open source ideologies, in the case of Firebase joining Google, both parties understood the virtues of open source development. Firebase gained the technical infrastructure needed at a large company, gaining access to the cloud infrastructure suite of the Google Cloud Platform.[9] Meanwhile, Google obtained the rapid and fast development capabilities of the Firebase team, allowing them to build much more and much faster. This rapid development was a characteristic unique to the open source community, which was recognized as the key to success for both Firebase and Google. This case example demonstrates that perhaps a symbiotic relationship between OSS and proprietary software is the key to business success.

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[7] Levine, "Why There," TechCrunch.
[8] Wikimedia Foundation, "Business Models for Open-source Software," Wikipedia, accessed January 19, 2018, https://en.wikipedia.org/wiki/Business_models_for_open-source_software#Selling_software_as_a_service.
[9] James Tamplin, "Firebase is Joining Google!," The Firebase Blog, entry posted October 21, 2014, accessed January 19, 2018, https://firebase.googleblog.com/2014/10/firebase-is-joining-google.html.

On the topic of rapid development, Eric Raymond coined the "bazaar" model to describe this crucial characteristic of OSS.[10] In the "bazaar" model, software is released early and often rather than a simple group of individuals quietly developing software in isolation without a beta-trial for the cathedral model—applying to proprietary of commercial off-the-shelf (COTS) models. The obvious economic benefits of this "bazaar" model include saving time and efficiency with code reuse as fixes and patches come in quicker, infinite lifetime for upgrades, and high interoperability—many vendors compete to provide the best quality of support, and as long as there is demand for the open source product, it can always create support even if one vendor goes out of business.[11] As always, there are a couple of arguments against this bazaar characteristic of OSS, including the fact that it is geared towards the sophisticated user rather than ignorant customers; although users in less developed countries benefit the most from OSS, most beneficiaries are well-off individuals or Fortune 500 companies.[12] And version control, integration, and a consistent code base is a nightmare, leading to a fragmented development team. However, Mozilla Firefox was an example of how these barriers could be overcome and how even OSS can be geared towards the end user.

Currently, Mozilla Firefox is a widely used web browser commanding 13% of browser market share, second only to Chrome.[13] But its success is largely attributed to its early stage decision. In 1998, Netscape—one of the earliest successful commercial web browser that was slowly losing ground to Microsoft's Internet Explorer at the time—open sourced a portion of its browser code

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[10] Wikimedia Foundation, "The Cathedral and the Bazaar," Wikipedia, accessed January 19, 2018, https://en.wikipedia.org/wiki/The_Cathedral_and_the_Bazaar.
[11] US Army, A Business, xiv.
[12] Lerner and Triole, "The Simple," National Bureau of Economic Research.
[13] NetApplications.com, "Browser Market Share," Net Market Share, https://www.netmarketshare.com/browser-market-share.

under the Mozilla project with the hope that the community would develop a viable code base that could compete in the market.[14] Indeed, this act garnered support and built a strong open source community. However, this pursuit for a solid code base, a more useful product, and a great browser did not directly result in the generation of income, which the other proprietary browsers focused on by focusing on revenue-driving technology. For example, Mozilla advocated for a pop-up blocker to socially benefit the end-user while Netscape intentionally removed this feature to drive advertisement profits.[15] Mozilla countered this problem with several key strategies. After receiving $2 million from AOL for its not-for-profit foundation, primarily funneled towards the Firefox project, Firefox focused on branding, community marketing through spreadfirefox.com, New York Times advertisements, and localized communities through internalization. In addition to leveraging its strong community, these strategies allowed Mozilla Firefox to economically self-sustain the project when the initial seed money was nowhere enough to compete with Internet Explorer.[16]

Now that revenue was not a problem, Firefox could address the problem of open source software generally being avoided by non-technical users, since the voices of technical users tend to be more active in many open source communities. Firefox found a solution in connecting the talented developers of the open source community to the individual end user. The basis of its four basic "rules" guiding the development of the project aimed to cut down the overly technical features of Mozilla, keep the development team small, assign different priorities to patches submitted by community members, and listen to the vote of the end-user. These four guiding principles allowed Firefox to compete with proprietary software as a consumer product, adding non-technical

[14] Jin, Leigh and Robertson, Bruce, "Lessons Learned from the Development and Marketing of Mozilla Firefox Browser" (2008). AMCIS 2008 Proceedings. Paper 279. http://aisel.aisnet.org/amcis2008/279.
[15] Jin and Robertson, "Lessons Learned," AMCIS 2008 Proceedings. Paper 279.
[16] Jin and Robertson, "Lessons Learned," AMCIS 2008 Proceedings. Paper 279.

end-users to its large base of customers. With 25 million downloads in less than hundred days following its 1.0 launch and reaching its goal of 10% market share as of April 2005, one can argue that Mozilla Firefox had a successful launch as an Open Source browser.

Open source software certainly has economic drawbacks, but analyzing several open source company cases has shown that these challenges can be overcome by various economic and business strategies. Mozilla Firefox maintained the positive benefits of a "bazaar" style open source model while making the browser more accessible to customers in the market. For Red Hat's conditions, open source development was perhaps the more profitable choice. Meanwhile, companies like Google Firebase mixed OSS and proprietary software to drive their acquisition business model to success. In the future, more open source companies will be developed to solve a need and promote a spirit of collaboration. But these companies will need to think economically to continue providing their useful services. The key for these companies is to keep core parts of products that are critical for business proprietary. By changing parts of the infrastructure to an open source style, reaping its positive benefits, these companies can be successful in the market.

References

Ford, Robert C., Brendan Richard, and Michael P. Cluchta. "Crowdsourcing: A New Way of Employing Non-employees?" *Business Horizons* 58, no. 4 (July 2015): 377-88. Accessed January 19, 2018. doi:10.1016/j.bushor.2015.03.003.

Jin, Leigh and Robertson, Bruce, "Lessons Learned from the Development and Marketing of Mozilla Firefox Browser" (2008). AMCIS 2008 Proceedings. Paper 279. http://aisel.aisnet.org/amcis2008/279

Lerner, Josh, and Jean Triole. "The Simple Economics of Open Source." National Bureau of Economic Research. Last modified March 2000. Accessed January 18, 2018. http://www.nber.org/papers/w7600.

Levine, Peter. "Why There Will Never Be Another RedHat: The Economics of Open Source." TechCrunch. Last modified February 13, 2014. Accessed January 19, 2018. https://techcrunch.com/2014/02/13/please-dont-tell-me-you-want-to-be-the-next-red-hat/.

NetApplications.com. "Browser Market Share." Net Market Share. https://www.netmarketshare.com/browser-market-share.

Tamplin, James. "Firebase is Joining Google!" *The Firebase Blog*. Entry posted October 21, 2014. Accessed January 19, 2018. https://firebase.googleblog.com/2014/10/firebase-is-joining-google.html.

US Army. *A Business Case Study of Open Source Software*. By Carolyn A. Kenwood. July 2001. https://www.doc.ic.ac.uk/~susan/475/opensource.pdf.

Wikimedia Foundation. "Business Models for Open-source Software." Wikipedia. Accessed January 19, 2018. https://en.wikipedia.org/wiki/Business_models_for_open-source_software#Selling_software_as_a_service.

———. "The Cathedral and the Bazaar." Wikipedia. Accessed January 19, 2018. https://en.wikipedia.org/wiki/The_Cathedral_and_the_Bazaar.