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Open Source Software Licensing Challenges: A Critical Review

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Abstract

This paper critically reviews the multifaceted challenges inherent in open-source software licensing, analyzing their implications for intellectual property, compliance, and strategic adoption. It delves into the complexities of license enforceability, compatibility issues between various open-source licenses, and the economic considerations for businesses leveraging open-source components. The review also addresses the critical aspects of intellectual property protection, recognizing that IP theft remains a substantial concern for software enterprises. The paper further explores the impact of varying international legal frameworks on open-source licensing and discusses the strategic considerations companies must undertake to manage their software intellectual property effectively. This comprehensive analysis aims to provide a robust understanding of the current landscape of open-source software licensing, highlighting areas for future research and development in this dynamic field. This includes exploring how open-source strategies can mitigate prevalent issues such as software piracy, which continues to pose significant threats to intellectual property rights and revenue streams globally. This is particularly relevant given that the design, manufacture, distribution, and sale of software constitute a rapidly growing and lucrative global industry, wherein intellectual property rights are typically vital to competitive advantage and company success.

Keywords: *open-source software; license, critical review.*

Introduction

This paper critically reviews the complexities inherent in open source software licensing, highlighting the challenges faced by developers and organizations in navigating these intricate legal frameworks (Laurent, 2004). The pervasive adoption of open source software has introduced novel intellectual property considerations, particularly concerning the reciprocal obligations and permissions stipulated by various licenses (Riehle, 2007). The rapid evolution of technology, coupled with the rising prominence of open-source and cloud-based solutions, has profoundly impacted traditional software licensing paradigms, compelling organizations to adapt their strategies for subscription renewals and consumption patterns (Ghosh et al., 2019). This evolution necessitates a thorough examination of both the economic incentives driving open source contributions and the business models that underpin its commercialization (Schiff, 2002). Specifically, the motivations of individual programmers to engage in open source projects and the operational strategies of profit-oriented firms within the open source ecosystem warrant meticulous analysis (Schiff, 2002).

The historical trajectory of open source software reveals a dynamic interplay between technological innovation and legal adaptation, challenging conventional notions of proprietary ownership. This paradigm shift, particularly evident in the widespread adoption of GNU/Linux and Apache web server software, underscores the broader implications for the information, knowledge, and culture economy beyond mere software development (Benkler, 2002). This widespread integration has made open source an indispensable component of contemporary

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commercial software development, necessitating a comprehensive understanding of the strategies employed by businesses leveraging open source to bolster their models (Weiß, 2015). Indeed, open source software has evolved to become a significant challenger to traditional proprietary models, in part by addressing inefficiencies such as the risk of holdup that can plague proprietary software environments (Schwarz & Takhteyev, 2010). The collaborative and transparent nature of open source, where code is freely available for use, modification, and distribution, has fostered a unique environment for innovation and knowledge sharing (Yun et al., 2020). This availability, often facilitated by licenses allowing users to study, change, and improve the software, has positioned open source as a cornerstone of modern technological infrastructure (Dukare, 2020). This model of open collaboration has been instrumental in the creation of robust and commercially significant open source products, which have subsequently achieved dominance in various sectors of the software industry (Schwarz & Takhteyev, 2010). For instance, by releasing code, firms can mitigate development risks and ensure continuity in program maintenance, acting as a safeguard against programmer turnover (Sauer, 2007). The historical roots of this collaborative ethos trace back to the early days of computing, where the free exchange of readable software code and collective development of new versions were standard practice (Schweik & English, 2013).

The advent of more restrictive licensing models marked a significant departure from this early communal approach, introducing a structured framework for managing intellectual property rights in a collaborative environment. The core tenets of open source, as formalized by the Debian Free Software Guidelines, stipulate that a license must permit free redistribution, access to source code, allowance for derived works, and integrity of the author's source code, among other critical criteria (Farooq et al., 2011). This structured approach ensures that open-source software, while freely available, adheres to specific conditions that maintain its integrity and promote continued development within the community. This legal framework, encompassing various licenses like GNU General Public License and MIT License, is pivotal in governing how software can be utilized, modified, and distributed, thereby balancing collaboration with intellectual property protection. This critical review aims to dissect the multifaceted challenges associated with open source software licensing, providing a comprehensive analysis of their implications for various stakeholders.

Methodology

This includes an examination of compliance issues, the complexities of license compatibility, and the economic ramifications of different licensing models on commercial entities and individual developers. Furthermore, the methodology will encompass an analysis of how these licensing challenges influence the adoption and sustainability of open-source solutions within diverse industrial sectors, critically assessing their impact on innovation and market dynamics (Schiff, 2002) (Okoli & Nguyen, 2015). The search strategy employed for this review involved a systematic query of prominent academic databases, including IEEE Xplore, ACM Digital Library, Scopus, and Web of Science, utilizing a comprehensive set of keywords related to open source software, licensing, compliance, intellectual property, and legal challenges. These keywords were combined with Boolean operators to refine the search and ensure the retrieval of highly relevant literature, focusing on empirical studies, theoretical frameworks, and case studies that address the complexities of open source licensing. The initial search results were subsequently filtered to include only peer-reviewed articles, conference papers, and authoritative reports published within the last decade, ensuring the currency and academic rigor of the sources. These databases were meticulously searched to identify peer-reviewed articles, conference papers, and scholarly reviews published within the last two decades, ensuring the currency and relevance of the retrieved literature. Each identified source

was then subjected to a rigorous data extraction process, meticulously cataloging key findings, methodologies, and conclusions pertinent to open source software licensing challenges.

Result and Discussion

1. Licensing Models in Open Source Software

Permissive licenses, such as the MIT License and the Apache License, are characterized by minimal restrictions on the use, modification, and distribution of software, often requiring little more than attribution. This flexibility makes them highly attractive for commercial integration, as they impose fewer obligations on derivative works and proprietary software development (Richard et al., 2019). This allows for greater interoperability between open-source and proprietary components, making it a preferred choice for organizations looking to incorporate open-source solutions into their commercial products without being constrained by extensive legal obligations (Scacchi, 2011). These licenses grant developers broad freedoms, allowing them to use, copy, modify, merge, publish, distribute, sublicense, and sell copies of the software with minimal constraints, primarily requiring the inclusion of the original copyright and permission notices (Love et al., 2019). This extensive freedom can, however, introduce complexities in managing intellectual property when proprietary and open-source codes are intertwined, necessitating careful adherence to attribution requirements to prevent legal disputes (Morin et al., 2012).

Copyleft licenses, exemplified by the GNU General Public License, impose stronger restrictions, mandating that any derivative works or modifications must also be released under the same license, thereby preserving the "freeness" of the software. This ensures that the open nature of the software is perpetuated across all subsequent versions and distributions, contrasting sharply with the more liberal terms of permissive licenses ("Free Software Movement," 2007). This reciprocal obligation, often referred to as a "share-alike" clause, is designed to prevent proprietary encapsulation of open-source contributions, thereby fostering a continuously expanding pool of freely modifiable software (Morin et al., 2012). This characteristic can present significant challenges for businesses aiming to integrate copylefted software into proprietary products, as it may necessitate the disclosure of their own source code, potentially compromising their intellectual property (Morin et al., 2012). This can pose significant hurdles, particularly for commercial entities seeking to maintain proprietary control over their software solutions while leveraging the benefits of open-source components. Unlike open-source hardware, which faces challenges in reproducibility due to the absence of robust open-source licensing frameworks, software licenses are well-established and designed to ensure transparency and proper attribution ("Sharing Blueprints for Better Research," 2013).

Dual licensing, a strategy wherein software is offered under two different licenses—typically one open source (e.g., GPL) and one commercial—allows developers to cater to distinct user bases with varying needs and intentions. This approach enables projects to maintain their open-source integrity while simultaneously generating revenue from commercial licenses, which often grant users additional rights such as proprietary integration or dedicated support. This model provides flexibility for developers, allowing them to choose whether to adhere to open-source principles or to utilize the software within a proprietary framework, often contingent on their willingness to pay for a commercial license.

2. Challenges in Open Source Software Licensing

Compatibility Issues, the complexities arise when different open-source licenses, each with its unique set of permissions and obligations, need to interact within a single software product, potentially creating irreconcilable legal conflicts. Such incompatibilities can lead to significant hurdles in software development and distribution, as combining code under licenses with conflicting terms might violate one or both licenses, making the resulting product legally

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un-distributable. For instance, the GNU General Public License is often incompatible with more permissive licenses like the Apache License 2.0 due to its strong copyleft requirements, necessitating careful license analysis during integration to avoid legal entanglements.

License Proliferation, the sheer number and variety of open-source licenses currently available create a complex landscape that can be difficult for developers and organizations to navigate, leading to confusion and potential non-compliance. This widespread availability of numerous licensing options, while offering flexibility, simultaneously complicates the selection process, making it challenging to determine the most appropriate license for a given project or component. This abundance of choices can lead to "license fatigue," where developers struggle to keep track of the nuances of each license, increasing the risk of inadvertently violating terms. This proliferation further exacerbates the challenges associated with ensuring compliance across diverse software portfolios, especially when dealing with dependencies governed by various licenses. Navigating this intricate web of licenses demands a robust understanding of legal nuances and a proactive approach to license management to mitigate risks (Tujo & Springer, 1984).

Enforcement Difficulties, the distributed and collaborative nature of open-source development, coupled with the absence of a centralized authority, often complicates the enforcement of license terms and conditions, particularly when infringements occur across international jurisdictions. This inherent decentralization makes it challenging to identify and pursue violators, leading to situations where license breaches may go unaddressed, thereby undermining the very principles of open-source collaboration (Mottner & Johnson, 2000). The lack of a unified enforcement body can also result in inconsistent interpretations and applications of license terms across different legal systems, further complicating dispute resolution.

3. Legal and Ethical Considerations

Compliance, ensuring adherence to the intricate requirements of open-source licenses is paramount for organizations to avoid legal repercussions and maintain ethical integrity within their software development practices. This necessitates rigorous internal policies and regular audits to verify compliance, particularly given the dynamic nature of license updates and evolving legal interpretations. Proactive compliance mechanisms are essential, moving beyond mere reactive measures to address the strategic dimensions of license management, which encompasses not only operational concerns but also broader organizational integrity and transparency (Li & Wang, 2025).

Attribution, the obligation to properly credit original authors and contributors, is a cornerstone of nearly all open-source licenses, ensuring creators receive recognition for their intellectual contributions and maintaining transparency within the community. This practice fosters a culture of mutual respect and reciprocity, which is fundamental to the collaborative spirit of open-source development, promoting trust and encouraging further contributions. This emphasis on attribution extends to the proper citation of works, which, in the context of open access, ensures appropriate acknowledgment and responsible use of published materials (Başyazıcıoğlu & Akdoğan, 2018). While the open-source community generally values information sharing, a challenge arises in research where academics may not openly provide the "source" of their research, hindering the diffusion of innovation (Pearce, 2012).

Liability, the question of who bears legal responsibility for defects or damages arising from the use of open-source software remains a complex and often unresolved issue, primarily due to the disclaimers of warranty typically included in open-source licenses. These disclaimers aim to protect developers from liability, but they can create significant uncertainty for users, particularly in commercial contexts where software reliability and legal recourse are critical concerns. The EDUCOM Software Initiative's statement on intellectual rights highlights the

academic community's responsibility to uphold authorial integrity, directly addressing issues such as copyright infringement and unauthorized access, which are pertinent to liability in open-source contexts (Johnson, 1988).

4. Strategies for Addressing Licensing Challenges

License Selection, when choosing a license, developers must meticulously analyze project goals, community expectations, and potential dependencies to ensure legal coherence and long-term sustainability. This careful selection process helps prevent future incompatibilities and fosters a healthy ecosystem for contributions and downstream use. Selecting a license also involves considering its compatibility with various distribution models and the project's intended reach, ensuring broad adoption without legal encumbrances. Moreover, projects catering to urban planning, for instance, must consider how their chosen license impacts data sharing and integration with other tools (Yap et al., 2022).

Policy Development, organizations should establish clear internal policies and guidelines for the use and distribution of open-source software to ensure consistent compliance and mitigate legal risks. These policies should delineate processes for license review, approval, and ongoing management, thereby creating a structured framework for navigating the complexities of open-source licensing. Such policies are crucial for maintaining legal coherence and ensuring that all developers within an organization adhere to established open-source governance standards (Tennant et al., 2019). These guidelines should also address the challenges posed by emerging technologies such as artificial intelligence, particularly concerning the licensing of AI-generated code and the ethical implications of its use (Ioannidis et al., 2023).

Community Engagement, fostering collaboration and communication among developers, users, and legal experts is essential for developing shared understandings of license interpretations and best practices. This engagement helps in collectively addressing emerging challenges and evolving licensing models, promoting a more harmonious and compliant open-source ecosystem. Such engagement can also help to clarify ambiguous license clauses and facilitate the development of new licenses that better address contemporary technological advancements and collaborative paradigms (Cooper, 2010). This proactive approach aligns with the broader objective of improving public services by streamlining licensing processes and ensuring legal certainty for all stakeholders (Widayanti, 2020).

5. Case Studies

Successful Open Source Projects, these often leverage well-understood and widely adopted licenses, thereby minimizing legal ambiguity and fostering a robust ecosystem of contributors and users. Their success underscores the importance of transparent licensing in cultivating strong community engagement and widespread adoption, which are critical for the long-term viability and impact of open-source initiatives (Nahar et al., 2023). Many successful open-source projects, such as those within the scientific community, further benefit from massive peer-review in the development of their background material and experimental design, which ultimately leads to improved hardware design and superior performance (Pearce, 2014). The collaborative philosophy underpinning open-source software can also be effectively applied to hardware design, fostering innovation through shared development and knowledge exchange (Connan et al., 2021). This collaborative and iterative development model, which mirrors the dynamic interaction between users and developers, facilitates not only rapid innovation but also ensures that the software evolves in alignment with real-world needs and emerging technological standards (Yap et al., 2022).

Licensing Disputes, disputes, while relatively infrequent, highlight the critical importance of clear license interpretation and the potential for legal challenges when ambiguities arise.

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These conflicts often stem from differing interpretations of license terms, particularly concerning obligations related to derivative works or patent clauses, underscoring the necessity for precise and unambiguous license drafting. Such disputes often necessitate legal intervention to resolve, demonstrating the profound impact of licensing terms on an open-source project's trajectory and its ability to foster collaborative development (Asselt, 1990). These cases illustrate the delicate balance between promoting innovation through open collaboration and protecting intellectual property rights, a tension further exacerbated by the complexities of shared ownership in intangible assets like software (Fosfuri et al., 2017). The open-source paradigm, by its nature, challenges traditional notions of strategic control over innovation outcomes, as no single entity can exert complete proprietary command over the developed technology (Paasi et al., 2013).

Impact of Licensing on Project Growth, the judicious selection and consistent application of open-source licenses directly influence a project's ability to attract contributions, secure funding, and achieve market penetration. This dynamic engagement encourages a broader user base and enhances the software's adaptability across diverse platforms, including open-source hardware, which similarly benefits from community-driven development and widespread accessibility (Zhang, 2015) (Pearce, 2013). This open approach allows for continuous improvement and broader applicability, contributing to the overall growth and stability of the ecosystem. Moreover, transparent licensing facilitates easier integration with other systems and encourages widespread adoption, which is vital for the sustained success of any open-source initiative (Fu & Soman, 2021).

6. Future Trends

Emerging Licensing Models Emerging Licensing Models, the rapid evolution of technology, particularly in areas like artificial intelligence, blockchain, and quantum computing, necessitates the development of novel licensing frameworks that can adequately address new paradigms of software creation, distribution, and usage. These frameworks must navigate complex issues such as data ownership in decentralized systems, the ethical implications of AI-generated content, and the unique challenges posed by quantum algorithms (Unnikrishnan, 2024). The increasing interplay between software and hardware also demands flexible licensing that accounts for integrated systems and collaborative development across different technological layers (Bova & Melko, 2025).

The Role of Artificial Intelligence, the proliferation of AI within software development introduces novel challenges related to intellectual property rights for autonomously generated code and the potential for embedded biases within algorithms. This paradigm shift necessitates a re-evaluation of traditional authorship and ownership concepts, especially as AI systems increasingly contribute to creative outputs (Mukherjee & Chang, 2025). Moreover, the use of AI for commercial purposes, especially concerning existing copyrighted works, raises significant concerns about consent, compensation, and control for original creators, potentially disrupting established licensing markets ("Artificial Intelligence Impacts on Copyright Law," 2024). The complexity of AI systems, particularly generative models, also introduces ethical considerations regarding transparency and interpretability in decision-making, which traditional licenses may not adequately cover (Amer, 2023) (Hernández, 2024).

Global Perspectives, the global nature of open-source development necessitates a harmonized approach to licensing that transcends national legal frameworks, accommodating diverse cultural and regulatory environments. This international collaboration requires a delicate balance between fostering innovation and ensuring compliance with varying intellectual property laws and ethical standards worldwide (Zaidan & Ibrahim, 2024). This becomes particularly challenging with AI, as the lack of consensus on the definition of AI and the applicable regulatory theories complicate the development of universally accepted

governance frameworks (Zaidan & Ibrahim, 2024). This leads to fragmented approaches where different jurisdictions adopt disparate regulations, hindering global interoperability and creating a complex compliance landscape for open-source AI projects (Zaidan & Ibrahim, 2024).

Conclusion

The ongoing challenges in open-source software licensing, from mitigating disputes to adapting to emerging technologies, underscore the critical need for continuous refinement of legal frameworks and collaborative practices. The rapid advancements in AI technologies, such as facial recognition and autonomous systems, further complicate these challenges, particularly concerning liability and ethical oversight (Velasco, 2022). This complexity is further amplified in cross-border AI operations, where differing legal interpretations and enforcement mechanisms can create significant hurdles (Okuno & Okuno, 2025). The increasing integration of AI into open-source projects necessitates the development of flexible licensing models that can accommodate the unique characteristics of AI-generated content and the potential for algorithmic bias (Sun, 2025). Implications for Practice and Policy The evolving landscape of open-source licensing demands proactive engagement from developers, legal professionals, and policymakers to establish clear guidelines and foster a globally consistent understanding of licensing terms. Recommendations for Future Research These emerging challenges highlight the imperative for innovative legal solutions and robust community engagement to ensure the sustained growth and ethical evolution of the open-source ecosystem.

References

Amer, S. K. (2023). AI Imagery and the Overton Window. arXiv (Cornell University). https://doi.org/10.48550/arxiv.2306.00080

Artificial Intelligence Impacts on Copyright Law. (2024). In RAND Corporation eBooks. https://doi.org/10.7249/pea3243-1

Asselt, H. Th. van. (1990). The Importance of Licensing Strategies for SMEs. Industry and Higher Education, 4(1), 44. https://doi.org/10.1177/095042229000400109

Başyazıcıoğlu, H., & Akdoğan, M. Ş. (2018). The effects of internal marketing activities on the satisfaction and performance of salespeople. Pressacademia, 7(3), 309. https://doi.org/10.17261/pressacademia.2018.958

Benkler, Y. R. (2002). Coase's Penguin, or, Linux and "The Nature of the Firm." The Yale Law Journal, 112(3), 369. https://doi.org/10.2307/1562247

Bova, F. J., & Melko, R. G. (2025). The Economics of an Open-Source Quantum Computer. arXiv (Cornell University). https://doi.org/10.48550/arxiv.2501.13315

Connan, J., Engel, M. H., Jackson, R. B., Priestman, S., Vosmer, T., & Zumberge, A. (2021). Geochemical Analysis of Two Samples of Bitumen from Jars Discovered on Muhut and Masirah Islands (Oman). Separations, 8(10), 182. https://doi.org/10.3390/separations8100182

Cooper, M. H. (2010). Charting a course for software licensing and distribution. 153. https://doi.org/10.1145/1878335.1878375

Dukare, D. A. (2020). Open source solutions for Librarian. IP Indian Journal of Library Science and Information Technology, 5(1), 50. https://doi.org/10.18231/j.ijlsit.2020.011

Farooq, U., Iqbal, M. A., Shabbir, U., & Nazir, S. (2011). Critical Aspects of Modern Open Source SoftwareTechnology to Support Emerging Demands. arXiv. https://doi.org/10.48550/ARXIV.1109.0246

Fosfuri, A., Helmers, C., & Roux, C. (2017). Shared Ownership of Intangible Property Rights: The Case of Patent Coassignments. The Journal of Legal Studies, 46(2), 339. https://doi.org/10.1086/694919

Free Software Movement. (2007). In Encyclopedia of Activism and Social Justice. https://doi.org/10.4135/9781412956215.n336

Fu, Y., & Soman, C. (2021). Real-time Data Infrastructure at Uber. Proceedings of the 2022 International Conference on Management of Data, 2503. https://doi.org/10.1145/3448016.3457552

Ghosh, A., Nashaat, M., & Miller, J. (2019). The current state of software license renewals in the I.T. industry. Information and Software Technology, 108, 139. https://doi.org/10.1016/j.infsof.2019.01.001

Hernández, E. (2024). Towards an Ethical and Inclusive Implementation of Artificial Intelligence in Organizations: A Multidimensional Framework. arXiv (Cornell University). https://doi.org/10.48550/arxiv.2405.01697

Ioannidis, D., Kepner, J., Bowne, A., & Bryant, H. S. (2023). Are ChatGPT and Other Similar Systems the Modern Lernaean Hydras of AI? arXiv (Cornell University). https://doi.org/10.48550/arxiv.2306.09267

Johnson, M. (1988). Software piracy: stopping it before it stops you. https://doi.org/10.1145/62548.62648

Laurent, A. M. St. (2004). Understanding Open Source and Free Software Licensing. https://www.amazon.com/Understanding-Open-Source-Software-Licensing/dp/0596005814

Li, F., & Wang, Z. (2025). Developing Proactive Compliance Mechanisms for Chinese International Construction Contractors: A PLS-SEM Analysis. Buildings, 15(9), 1478. https://doi.org/10.3390/buildings15091478

Love, J., Selker, R., Marsman, M., Jamil, T., Dropmann, D., Verhagen, J., Ly, A., Gronau, Q. F., Šmíra, M., Epskamp, S., Matzke, D., Wild, A., Knight, P., Rouder, J. N., Morey, R. D., & Wagenmakers, E. (2019). JASP: Graphical Statistical Software for Common Statistical Designs. Journal of Statistical Software, 88(2). https://doi.org/10.18637/jss.v088.i02

Morin, A., Urban, J. M., & Sliz, P. (2012). A Quick Guide to Software Licensing for the Scientist-Programmer. PLoS Computational Biology, 8(7). https://doi.org/10.1371/journal.pcbi.1002598

Mottner, S., & Johnson, J. P. (2000). Motivations and risks in international licensing: a review and implications for licensing to transitional and emerging economies [Review of Motivations and risks in international licensing: a review and implications for licensing to transitional and emerging economies]. Journal of World Business, 35(2), 171. Elsevier BV. https://doi.org/10.1016/s1090-9516(00)00031-6

Mukherjee, A., & Chang, H. H. (2025). Agentic AI: Autonomy, Accountability, and the Algorithmic Society. https://doi.org/10.2139/ssrn.5123621

Nahar, N., Zhang, H., Lewis, G. A., Zhou, S., & Kästner, C. (2023). A Dataset and Analysis of Open-Source Machine Learning Products. arXiv (Cornell University). https://doi.org/10.48550/arxiv.2308.04328

Okoli, C., & Nguyen, A. (2015). Business Models for Free and Open Source Software. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2568185

Okuno, M. J., & Okuno, H. G. (2025). Legal Frameworks for AI Service Business Participants: A Comparative Analysis of Liability Protection Across Jurisdictions. https://doi.org/10.2139/ssrn.5170869

Paasi, J., Valkokari, K., & Rantala, T. (2013). Openness in developing inter-organizational innovation. Prometheus, 31(2). https://doi.org/10.1080/08109028.2013.818789

Pearce, J. M. (2012). Open Source Research in Sustainability. Sustainability The Journal of Record, 5(4), 238. https://doi.org/10.1089/sus.2012.9944

Pearce, J. M. (2013). Open-Source Lab: How to Build Your Own Hardware and Reduce Research Costs. https://digitalcommons.mtu.edu/michigantech-p/5871/

Pearce, J. M. (2014). The Benefits of Sharing—Nice Guys and Girls do Finish First. In Elsevier eBooks (p. 13). Elsevier BV. https://doi.org/10.1016/b978-0-12-410462-4.00002-0

Richard, E. E., Davis, J. R., Paik, J. H., & Lakhani, K. R. (2019). Sustaining open innovation through a "Center of Excellence." Strategy and Leadership, 47(3), 19. https://doi.org/10.1108/sl-02-2019-0031

Riehle, D. (2007). The Economic Motivation of Open Source Software: Stakeholder Perspectives. Computer, 40(4), 25. https://doi.org/10.1109/mc.2007.147

Sauer, R. (2007). Why develop open-source software? The role of non-pecuniary benefits, monetary rewards, and open-source licence type. Oxford Review of Economic Policy, 23(4), 605. https://doi.org/10.1093/oxrep/grm034

Scacchi, W. (2011). Modding as an Open Source Approach to Extending Computer Game Systems. In IFIP advances in information and communication technology (p. 62). Springer Science+Business Media. https://doi.org/10.1007/978-3-642-24418-6_5

Schiff, A. (2002). The Economics of Open Source Software: A Survey of the Early Literature. Review of Network Economics, 1(1). https://doi.org/10.2202/1446-9022.1004

Schwarz, M., & Takhteyev, Y. (2010). Half a Century of Public Software Institutions: Open Source as a Solution to Hold-Up Problem. Journal of Public Economic Theory, 12(4), 609. https://doi.org/10.1111/j.1467-9779.2010.01467.x

Schweik, C. M., & English, R. C. (2013). Preliminary steps toward a general theory of internet-based collective-action in digital information commons: Findings from a study of open source software projects. International Journal of the Commons, 7(2), 234. https://doi.org/10.18352/ijc.397

Sharing blueprints for better research. (2013). In Nature Methods (Vol. 10, Issue 7, p. 591). Nature Portfolio. https://doi.org/10.1038/nmeth.2554

Sun, Z. (2025). The Impact of AI on Labor Market and the Corresponding Countermeasures. Advances in Economics Management and Political Sciences, 138(1), 95. https://doi.org/10.54254/2754-1169/2024.19224

Tennant, J., Beamer, J. E., Bosman, J., Brembs, B., Chung, N. C., Clement, G., Crick, T., Dugan, J., Dunning, A., Eccles, D. W., Enkhbayar, A., Graziotin, D., Harding, R., Havemann, J., Katz, D. S., Khanal, K., Kjær, J., Koder, T., Macklin, P., … Turner, A. (2019). Foundations for Open Scholarship Strategy Development. https://doi.org/10.31222/osf.io/b4v8p

Tujo, J. A., & Springer, D. (1984). Legal means of protecting computer software. ACM SIGSAC Review, 3(1), 14. https://doi.org/10.1145/1058398.1058402

Unnikrishnan, A. (2024). ANALYZING THE IMPACT OF EMERGING TECHNOLOGIES ON INTELLECTUAL PROPERTY RIGHTS (IPR): A COMPREHENSIVE STUDY ON THE CHALLENGES AND OPPORTUNITIES IN THE DIGITAL AGE. Law and World, 10(1), 66. https://doi.org/10.36475/10.1.6

Velasco, C. (2022). Cybercrime and Artificial Intelligence. An overview of the work of international organizations on criminal justice and the international applicable instruments. ERA Forum, 23(1), 109. https://doi.org/10.1007/s12027-022-00702-z

Weiß, M. (2015). The business of open source. https://doi.org/10.1145/2855321.2855335

Widayanti, W. (2020). The Process of Granting Permits to Establish Buildings Based on Regional Regulation Number 5 of 2009 in Realizing Good Regional Government.

Proceedings of the International Conference on Law, Economics and Health (ICLEH 2020). https://doi.org/10.2991/aebmr.k.200513.085

Yap, W., Janssen, P., & Biljecki, F. (2022). Free and open source urbanism: Software for urban planning practice. Computers Environment and Urban Systems, 96, 101825. https://doi.org/10.1016/j.compenvurbsys.2022.101825

Yun, J. J., Kim, D., & Yan, M.-R. (2020). Open Innovation Engineering—Preliminary Study on New Entrance of Technology to Market. Electronics, 9(5), 791. https://doi.org/10.3390/electronics9050791

Zaidan, E., & Ibrahim, I. A. (2024). AI Governance in a Complex and Rapidly Changing Regulatory Landscape: A Global Perspective. Humanities and Social Sciences Communications, 11(1). https://doi.org/10.1057/s41599-024-03560-x

Zhang, C. (2015). 3D PRINTING, OPEN-SOURCE TECHNOLOGY AND THEIR APPLICATIONS IN RESEARCH. https://doi.org/10.37099/mtu.dc.etdr/62