

## **A CRITICAL LITERATURE REVIEW**

### **AN OPEN SOURCE SOFTWARE DEVELOPMENT**

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## **Biography**

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## **An Open Source Software Development – Way to Freedom or Benefit**

### **Libertarian View Vs. Corporate View**

#### **Abstract**

This is a critical literature review of the open source software landscape and what purpose it aims to serve by accelerating a debate in the field of IS about what open source means and how it has transformed the social and economic landscape of software industry. As the general population has developed an increased dependence on information technology, the necessity for quality software offerings has also increased. The paper attempts to present, interpret and compare the two contrasting theories of the open source landscape – the libertarian view vs. the corporate view. Subsequently, it aims to delve into the battle of these two conflicting theories and what their interpretations present from the perspective of socially embedded lens – freedom or benefit (profit). The paper will examine the differing opinions and dichotomy of the scholars from multiple angles and if the juxtaposition of these two theories creates the holistic view of the landscape.

## **Introduction**

Software development had humble originations as a means to provide collaboration between scientists and engineers, but as information technology has established a pervasive presence throughout the world, the development of software has emerged as a major industry. Software serves the purpose of providing the instructions for the computer and subsequent programs to work correctly and many corporations, such as Microsoft and Apple, have established a firm grasp over the software market. As a result, the emergence of open source software has presented a challenge to the traditional offerings by providing free alternatives. This has resulted in debates over the open source software that has been going on for long and scholars have pondered over the validity and quality of the open source software and what motivates the coders to engage in such a practice. Before we delve into dichotomy of what open software is, we have to get into etymology of the term “open source” and what it means to different scholars.

## **Literature Review & Discussion**

### Origin of Open Source Software

The origin of the word came into being in 2001 when Eric Raymond published his work titled “The cathedral and the Bazaar”. The use of these metaphors in the nomenclature associated with the distribution of software allows one to develop a comprehension of the premises presented while models provide representations that may be partial or incomplete. However, as the concepts identified through the use of metaphors prove to be productive, they then become models. Two primary metaphors applied in this area consist of cathedrals and bazaars to serve as a method of identifying proprietary software and open source software. Here, “cathedral” represents “proprietary” software and indicates a single point focus where one entity prepares a completed package whereas “bazaar” represents “open source software” as there are many separate individuals who collaborate freely to produce an item.

### Societal Good

Weber (2005) explains how “alumni effect” lowers the cost of collaboration while working in open source landscape as opposed to working in proprietary landscape. This explains why software developers, engineers and programmers reignited the collaborative measures from the early days of computer technology to present open source software as a method to combat the

increasing costs associated with the total cost of computing, as proprietary software became more prevalent. Consequently, Bretthauer (2002) defined open source software as a type of programming codes available to public, in this case software coder(s) irrespective of their geography or demography, who can further create or modify codes freely as per their respective requirements, thereby giving the name “open source”. Elaborating further, Benkler (2006) states that open source is based on non-proprietary model and on shared contributions for a common project without having any right for anybody to be excluded from part of the project or the whole of it. According to Fitzgerald (2006), open source software does not mean “free” in terms of money or in terms of making the payment but it means “freedom” or “free speech”. Hippel et al. (2003) further states that open source software is a “social” and “economic” phenomenon and comprises of software developers who collaborate to develop or exchange software codes without expecting any monetary gain which they can, both individually or/and collectively, freely builds on each other’s or modify and distribute freely for use or for further modification. Chesbrough (2003) elaborates open source as a collaborative community which does not exclude anybody from enhancing, modifying and re-modifying the codes nor does it allow anybody to exert proprietary claims to any part of the codes he/she/they have developed. It is basically a community of software developers created on internet. Hence we can see that scholars have used the term “open” and “free” quite frequently and interchangeably. Hence, looking at the arguments above, open source software may be perceived as a roadmap to further innovation, which is constrained-free and open to all who want to collaborate thus creating a new business model.

### Business Model

On the business model, Ibarra et al. (2015) states that open innovation may be perceived as having “inflows” and “outflows” of knowledge to innovate and to design a better and purposeful product. Chesbrough (2003) further clarifies about open innovation to be a repository of abundant knowledge that must be used readily to create value and the knowledge must flow from one individual or the company to another individual(s) or company(s) or/and vice-versa. He further elaborates how open innovation leverages external sources to save cost and time and hence produces better product at lower costs. Thus it can be seen that open source software is an open innovation that brings disparate sources together to contribute, modify and further

distribute to re-modify at a faster rate and at lower cost. Furthermore, open source software can also be used and integrated with other products such as selling the support service with software, free basic versions vs. value added advanced versions, integrating the free open software with other IT's infrastructure of the consumers etc. For example, IBM is a good example of how it leveraged the open source software landscape to boost its business model that lowered the costs of the operating system that IBM sells along with its own offerings that connected IBM's other hardware and software together (Chesbrough, 2003).

Weber (2005) further elaborates that open source software should not only be seen as a source code that can mutate whichever way the society wants but should also be seen as a business from the legal and economic perspective. According to him, open source software must be seen as free, that is public and non-proprietary and requires modification, distribution with any binary attached and re-distribution. Hence it becomes important to see its impact on the society as a whole and if it has any legal and economic implications. Using Social Construction of Technology Theory, Flanigan et al. (2010) posits that open source software product emanates as a result of constant pull and push between the society and the technology. Raymond (2001) further elaborates the curiosity of the open source community and the way they code together as best as possible hence enjoying the freedom. Hence it becomes evident that it is the society, which shapes the product as per their needs and requirements. Weber (2005, pp. 180) characterizes open source software as:

- *“A methodology for research and development*
- *A new business model (requiring new mechanisms for compensation and profit*
- *The ‘defining nexus’ of a community geared towards the development of common goods*
- *A new ‘production structure’ unique to ‘knowledge economies’*
- *Even a political philosophy”*

Hence open source may be seen as having brought transformational changes as a result of the “pull” and “push” of social and economic landscape evolving through the lenses of “extraordinarily diverse hopes and fears” arising out of the “information revolution”.

### Libertarian View vs. Corporate View

As a proponent of Libertarian view, Raymond (2001) perceives the development of open source software for societal good and a key to social progress based on “the culture of social gifts” embedded in the domain of social and psychological perspectives, a collective model as envisaged by Hippel et al. (2003), and not for profit and arising out of curiosity emanating as a result of collaboration among skilled parties located anywhere in the world. Furthermore, through the examination of Social Movement Theories, the use of free and open source software has the ability to reduce the amount of profits obtained by commercial software to effect change to address social justice concerns in the attempt to develop a society that embraces the premises of fairness and impartiality for all (Sullivan, 2011). This forms a strong solidarity among the open source developers based on sharing and coordination thereby, eliminating or reducing proprietary restrictions and increasing curiosity among the open source coders that gives rise to the best software product in the market (Hippel & Krogh, 2003). Hippel et al. (2003) further elaborates that open source community is not constrained by IP protection or monetary gain. Their motivation comes from self-improvement, learning, collaboration, and acknowledgement of their names and from the liberty to develop the software whichever way the community wants. Hence, we see that there is congruence between Raymond and Hippen et al. about how curiosity has given rise to some of the best software in the world. Stallman (2009) further clarifies that open source landscape represents a cultural and social solidarity among all the coders who are the users leading to strong bonding and cooperation. According to Weber (2005), “Libertarians see in open source a tool to emancipate individuals from governmental and corporate tyranny” (pp. 180). On the contrary, Benkler (2006) in “The Wealth of Networks” argues that not-for-profit research is more viable and economically efficient than for-profit research showing the role that non-proprietary production plays in shaping the system of information production, which leads the economists to advocate the possibility of government funding. On the contrary, the enthusiasts of free market see open source software as a product that is of high quality and innovative but it also creates low barrier to entry in the market (Weber, 2005).

As the use of open source software increased in popularity, efforts were made to normalize the process by associating the practice with freedom through the identification of “free as in free speech, not free beer” according to Stallman (2009) as the term “open source software” was

adopted to remove the associated political connotations. As participation in the creation and use of open source software increased, the quality of the software improved as flaws, or bugs, within the code were quickly identified and corrected. As open source software relies on the involvement of numerous individuals to act as programmers, testers, and users, this participation for many became viewed as a method that allowed many software developers to learn and hone their craft (Benkler, 2006). From the managerial perspective, it was not just the learning but also “recognition” and “reputation among one’s peers” that contributors needed which helped them get further work (Li et al., 2012; Rooij, 2009). Seeing one’s name on the open source project was a big motivation for the contributors (Li et al., 2012). Hence, firms innovate and gain from “learning networks” of sharing and collaborating in the open source landscape which clearly shows the way Benkler tends to agree with Weber.

Corporate view perceives open source software landscape as a business model that creates value (Fitzgerald, 2006) and hence competitive advantage. Fitzgerald (2006) further clarifies that open source software, which is a free software, when combined with other services or product can bring profitability, a private investment model as envisaged by Hippel et al. (2003), and enhance market share. Benkler (2006) also seems to be linking his view with this private investment model and states that some of the coders who participate in open source software landscape may have long-term financial motivation, such as service contracts or consulting etc. and this, on the institutional level, can be explained by how IBM combined demand-side and supply side strategies in open source landscape and used Linux kernels to remarkably enhance its customer base for other products. This helped IBM generate US\$ 2 billion in revenue. Krishnamurthy (2005 in Ross, 2013), while seeming to be in agreement with Benkler (2006), further clarifies that open source software, which is a free software, is a business model for value creation when we combine such open source software with other complimentary services and products which may be termed as “indirect commercialization”. Hence we see that the term “free” and “open” can not be used interchangeably and have different connotations as the open software matures.

According to Li et al. (2012), based on the libertarians’ view, the motivation of open source community comes from idealism, that is openness, and from freedom to use it and to distribute it whereas corporate view proposes their motivation comes from “reputation” (Weber, 2005) and

“kinship amity” and “symbolic capital” (Raymond, 2001) which in the long run helps them get financial gains. Benkler (2006) further states that coders do not rely on firm based, market based, or hybrid based signals suggesting that it is the networked environments that generates the modality of organizational production creating “common based peer production” where “common” denotes the “institutional structure” permitting access to use, access and control of resources. It is this freedom that motivates coders to interact and collaborates among them without having any intervention from anybody without any fear, thus creating “commons” based efficiency for peer production. It is very important for efficient peer-production projects to be structured, both culturally and technically. This motivates different users or individuals to code the program that is proportionate with the level of their motivation, ability and availability. Alternatively, Benkler’s arguments may also be seen in congruence with the corporate view about how IBM and Red Hat leveraged peer production in order to complement the business activities and hence attain competitive advantage in it which clearly demarcates an interface between market and non-market actors which may be seen as reinforcing each other (Benkler, 2006). This allows contributors to show their talent and debate on their ability to code resulting in their ego-satisfaction and self-expression which eventually brings them “recognition” and “reputation” (Barron, 2013) that in the long term helps them get monetary benefits in the form of better job prospects. Elaborating more on this, Castells (2004) identified this phenomenon as part of the new emerging economy incubating within the old one; thus leading to the development of “network economy” which is distributed and decentralized, integrating all across the globe and capable of bringing every human effort to full productivity that we can later address as consistent growth with a learning curve growing constantly, having better living standards and having lower level of unemployment (Castells, 2001). Hence, it can be seen how open source software landscape can be leveraged in generating new economic structure and profitability.

From the perspective of organization, libertarians perceive the open source landscape as having a flat structure as opposed to hierarchical organization structure in the “proprietary” landscape (Benkler, 2006). It is assumed that such a flat structure is more beneficial and efficient in producing the quality of coding and has a positive effect on motivation (Hippel & Krogh, 2003). By contributing more to open source, such coders can take control of the source repository (Stallman, 2009). However, corporate view perceives free and open landscape as a platform for

horizontal decision-making based on “charisma” – the ability to control and motivate contributors without formally having control over them (Barron, 2013). This helps coders to contribute as much as they want without having to be controlled by anybody.

Barron (2013) views the emergence of open software landscape deeply embedded in anti-capitalism but yet perceives the open source software landscape as a new route to generating monetary value rooted in contemporary capitalism. Weber (2005) postulates that the coders do not just work on open source software projects just because they want to do good to society but, based on the corporate view, they invest their time and effort in expectation of new form of capital “reputation” which will help them get their job prospects in future and hence financial gain eventually. The coders do not expect such gain immediately. There is an abundance to code in an open source landscape and the coders are judged by how much they contribute in such landscape (Zeytlin, 2003; Weber, 2005) which clearly shows how open source movement originated in the ethos of anti-capitalism and anti-authoritarianism having the elements of socialism or “socialized process” embedded in the continued development of “socio-technological base” (Krishnamurthy, 2005 in Ross, 2013) in the form of “solidarity”, “sharing” and “collaboration” for the societal good and then transformed itself into “collaborative capitalism” (Barron, 2013) bringing monetary value to all the members of the society who contribute to open source landscape.

Libertarians justify and view free riders as important contributors in an open source landscape, although they may not be qualified enough to code with quality. From the economics, managerial and technical perspective, free riders are of almost no value but they are likely to find errors in the software for advanced coders (Raymond, 2001), thus giving a specific direction to the open source project. This helps them gain learning for further contribution. However, corporate view perceives free-riders as non-entities and do not pay any attention to them since many successful companies are getting inclined to use open source software for their business critical solutions (Finnegan et al., 2014).

Finally, when we juxtapose the libertarian and corporate view, the model, according to Hippel et al. (2003), becomes private collective model, which proposes that open source software is not

just for “public good” but it also has the elements of “private” or financial gain and offers “best of both worlds”. On the one hand, it becomes a source of innovation and brings solidarity and learning curves as a societal good. On the other hand, it provides opportunities and “selective incentives” to its contributors.

## **Conclusion**

Open Source Software has become a very vibrant and competitive methodology and a business model for further research and development. For example, certain offerings, such as Linux and Mozilla, challenged the monopoly on personal computing by offering options to the operating systems and web browsers presented by Microsoft and Apple. Even though the major corporations have the financial backing to provide programmers and software engineers with compensation for their efforts and contributions, open source enthusiasts known as hackers, continue to challenge these accepted practices by developing software without expectation of compensation.

Further research may be conducted about how and, to what extent, social media network can be used and can contribute to the development of open source software community and hence enhance the reliability and monetary profitability of the open source software.

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