Chapter 29
Open Growth:
The Impact of Open Source Software on Employment in the USA

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ABSTRACT

Open Source Software (OSS) is well established in sectors as diverse as aviation, health, telecommunications, finance, publishing, education, and government. As nations increasingly rely on knowledge assets to grow, the adoption of OSS will have profound economic consequences. This paper identifies the mechanisms inherent to OSS production that help fuel innovation in knowledge-based economies. As a collaborative and open production model, OSS is conceptualized as a prototype of open innovation. Drawing on US employment projections for 2008-2018, the authors' analysis predicts OSS will have a positive impact on employment growth in well-paid salary jobs across multiple sectors of the US economy. OSS-related software development jobs are widely diffuse throughout the economy, help build a skilled labour force and offer wages significantly above the national average. OSS is thus believed to be a strong contributor to growth in high-value employment in the US. The authors also posit that, as industries are exposed to the benefits of OSS as a result of the broad diffusion of OSS-related jobs, open innovation processes outside software development may be adopted through a process of learning and imitation.

INTRODUCTION

The emergence and evolution of Open Source Software (OSS) has had a dramatic impact on the software industry. While this impact is frequently discussed, its wider influence on innovation and employment growth in other economic sectors is poorly understood. To our knowledge, the impact of OSS on long-term employment in the USA has not yet been evaluated. Our paper is the first of its kind to quantify the impact of OSS on job creation and skill generation at the example of the United States. In doing so, we draw upon new growth theory and theories of learning as developed by scholars like Arora and Arrow.

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Knowledge plays a critical role in economic growth and innovation.[1] The accumulation of knowledge and the skills of the labour force are increasingly identified as stronger drivers of national growth than the possession of tangible assets (Solow 1957; Lucas 1988; Romer 1986). It is not news that a key variable in economic growth is the efficacy of technology utilization in the economy (Arora, 1995). Yet, the ability to utilize technology efficiently and generate new knowledge is conditioned by the innovation system in which actors are embedded. OSS represents an opportunity to utilize technology efficiently, build high-value skills in the labour force, ensure high software quality and promote innovation diffusion according to a new paradigm founded on openness rather than exclusion. This open system detects and assimilates existing knowledge resources more effectively than closed, proprietary innovation approaches. It also helps individuals to develop IT-related skills and signal technical excellence to employers in diverse industries.

The US lends itself well as a case example as it is the single largest software market in the world and controlled approximately 46% of the global software market in 2008 (OECD STAN Database for Structural Analysis, ed. 2008; cited in BSA 2009). Using official data on employment projections from 2008-2018 for the US, we estimate the impact of OSS on employment throughout the economy. Unlike manufacturing and agricultural industries, high technology industries are less prone to outsourcing concerns and globalization pressures. The US currently enjoys a strong global competitive advantage in high technology products and services. The software sector alone contributed $260 billion to the US economy in 2007, growing at an annual rate of 14% and outpacing growth in other US industries by 12% (OECD STAN Database for Structural Analysis, ed. 2008; cited in BSA 2009). As demand for complex software products increases with the growth of Internet services and the need for businesses to integrate the latest technologies in their production cycles, software development will become an increasingly important component of the economy.

This paper is structured as follows. First, the nature of the OSS phenomenon is briefly outlined. OSS is presented as an open innovation process that leverages the advantages of knowledge exchange and collaboration to fuel innovation in a knowledge economy more effectively than closed organizational structures. The concept of knowledge is then discussed in order to identify its role in employment creation. Understanding how knowledge is best generated, advanced and transferred helps uncover the link between OSS, skill development, innovation and employment growth and informs out quantitative analysis. We conclude by showing that an analysis of data on US employment projections from 2008 to 2018 suggests that OSS-related jobs have significantly above-average salary levels and will grow rapidly throughout multiple sectors of the US economy over this ten-year period. This process is not restricted to the software publishing industry.

A BRIEF INTRODUCTION TO OPEN SOURCE SOFTWARE

The Free/Libre/Open Source Software (FLOSS) movement is founded on the idea that the open development of software is more effective than its proprietary alternative. Put simply, it is about access to source code and freedom to modify and distribute it (Ajila & Wu, 2007). The distinctions between Free, Libre and Open Source Software models are based on the type of licenses applied to the source code as well as the cost and availability of the final product. Since we are primarily interested in FLOSS as an open production process and its impact on employment, the label Open Source Software (OSS) is applied to all of these activities.

By drawing on a vast pool of diverse expertise, this collaborative approach to software development is responsive to changes in the needs of its