



It is all about what we have: A discriminant analysis of organizations' decision to adopt open source software



Yan Li ^{a,1}, Chuan-Hoo Tan ^{b,2}, Xue Yang ^{c,*}

^a Information Systems, Decision Sciences and Statistics Department, ESSEC Business School, Avenue Bernard Hirsch B.P. 50105, 95021 Cergy-Pontoise Cedex, France

^b Department of Information Systems, City University of Hong Kong, Tat Chee Avenue, Kowloon Tong, Hong Kong

^c Department of Marketing and Electronic Business, School of Business (Management), Nanjing University, Hankou Road 22, Nanjing 210093, China

ARTICLE INFO

Article history:

Received 21 February 2012

Received in revised form 11 January 2013

Accepted 9 May 2013

Available online 25 May 2013

Keywords:

Open source software

Technology adoption

Human capital

Discriminant analysis

ABSTRACT

This research reasons that human capital, that is, knowledge, skills, experience, abilities, and capacities possessed by employees, plays a vital role in the adoption of open source software (OSS) by organizations. Based on the survey responses of 104 OSS-adopting organizations and 111 non-adopting organizations in China, a discriminant analysis of organizations' OSS adoption behaviors was conducted. The current findings support the argument that OSS-adopting organizations can be clearly distinguished from their non-adopting counterparts in terms of their availability of internal OSS human capital, accessibility to external OSS human capital, organizational size, IT department size, and criticality of IT operation. Theoretical and practical implications are discussed.

© 2013 Elsevier B.V. All rights reserved.

1. Introduction

Open source software (OSS) has become an essential substitute to proprietary software for organizations when they make software adoption decisions. OSS can benefit organizations, relative to proprietary software, in many ways, including enhanced autonomy in modifying and customizing software with the source code, lower or even zero software acquisition cost, lower risk of being dependent on a single proprietary software vendor, and potentially higher software reliability supported by a much wider pool of software developers globally [27,33]. The development of OSS products and community has offered the prospect of effective alternative business solutions and new business opportunities for many organizations [21].

In foreseeing the benefits and market potential brought about by OSS [6], many national governments have publicly announced various initiatives to support the growth of OSS [26]. For instance, several major European cities have shown their technological innovativeness by adopting and implementing OSS [8]. Large corporations, such as Hewlett-Packard, IBM, and Sun Microsystems, have also released OSS for free downloads (e.g., Java Platform, Enterprise Edition or Java EE) and offered value-added services based on such software [27].³ The adoption of OSS in higher education area has also been popular in the

US [40]. The increasing prominence of OSS in the software market has led to the growing belief that OSS will significantly challenge the market dominance of proprietary software.

Notwithstanding the market potentials and advantages of OSS, market observers caution that more work is necessary, such as promoting OSS usage in organizations, before OSS can overtake proprietary software as the dominant software choice [23]. To the extent that organizational purchase constitutes the largest share of software demand, and the proposed benefits and success of OSS can only be realized after adoption [17,34], understanding the propensity of organizations toward OSS adoption and the discriminating factors between OSS-adopting organizations and non-adopting organizations is imperative. This paper argues for the need to understand the unique properties of OSS and then identify the concerns that might create barriers for organizations to adopt OSS [9,30]. Despite the importance of this inquiry, insufficient discussions have been initiated, and most current studies focus on the innovation, governance, and competition of OSS projects [18,42]. Therefore, more effort needs to be exerted to enrich the present understanding of OSS adoption, especially by organizations [1].

Based on the literature review, a major hurdle to OSS adoption is the perceived uncertainty in service and support that could lead to an increase in the organization's cost to switch from extant software to OSS and using OSS on a continuous basis [46]. Thus, intellectual capital in the form of organizational OSS human capital might be a critical resource to overcome this barrier and influence the organization's decision to adopt OSS as a type of innovative initiative [37]. Drawing on human capital theory [4] and innovation adoption literature [39], this paper conducts a discriminant analysis of organizations' OSS adoption based on a survey in China. The results support

* Corresponding author. Tel.: +86 25 8362 1049; fax: +86 25 8362 1258.

E-mail addresses: liyan@essec.edu (Y. Li), ch.tan@cityu.edu.hk (C.-H. Tan), yangxue@nju.edu.cn (X. Yang).

¹ Tel.: +33 134 43 39 82; fax: +33 1 34 43 30 01.

² Tel.: +852 3442 9720; fax: +852 3442 0370.

³ <http://java.sun.com/javae/> (last visited on Feb 13, 2012).

the proposition that OSS-adopting and non-adopting organizations can be clearly distinguished in terms of availability of internal OSS human capital, accessibility to external OSS human capital, organizational size, IT department size, and IT criticality.

2. Theoretical foundation and hypotheses

The perceived uncertainty in OSS service and support, a major adoption barrier, is attributed to the nature of OSS development, which is often based on the informal networks of voluntary software developers. Hence, OSS service and support are not as guaranteed as those of proprietary software [10]. Such uncertainties are reflected in the form of various types of cost (e.g., OSS support costs) [46], which consequently lead many organizations to judge OSS to be inappropriate for adoption. For example, one of the major reasons that 500 managers of Australia's top firms rejected OSS is the perceived lack of reliable technical support [15].

This situation further lends credence to the use of human capital perspective as the theoretical lens to examine organizations' OSS adoption. Scholars debate whether OSS-adopting organizations should possess the necessary human capital, such as knowledge, skills, abilities, and capacities possessed by people [4], either internally (e.g., its IT staff) or externally (e.g., consultants), given that it can reduce the perceived uncertainty and risk associated with OSS service and support. The availability of internal and external knowledge could further affect the usage of OSS in a predominant way [41].

2.1. Human capital: intangible capital on top of intellectual capital pyramid

According to the resource-based view of an organization [28], resources, which are rare, valuable, inimitable, and non-substitutable, are more likely to produce sustainable competitive advantages for the organization. Differences in innovation adoption behaviors across organizations can be attributed to the variance in their resources and capabilities [37]. In this information era, compared with physical and financial capital, intellectual capital is more likely to produce a competitive advantage in innovation adoption because it is often rare and socially complex, thereby making it difficult to imitate and transfer [28]. Intellectual capital includes not only the legally enforceable intellectual property rights but also all the tangible and intangible aspects of intellectual assets that an organization develops and accumulated over time [45]. Among all types of intellectual capital, human capital, which refers to the knowledge, skills, experience, abilities, and capacities possessed by people [4,29], is at the apex of the intellectual capital pyramid [7].

An organization's human capital is accumulated through employee education, on-the-job training, and work experience. Although human capital theory was originally developed to examine the economic value of education [4], more recently, its application has been extended to organizational staff selection, training, compensation, human resource management, and innovation adoption practices in general [5,29,38].

At the organizational level, human capital is considered as a valuable and rare resource, which enables the owner organization to adopt innovations that its competitors cannot [43], thereby providing the basis for accruing competitive advantage [2]. An organization is unlikely to adopt an innovation successfully unless much of the required specialized expertise exists within the organization or such knowledge can be acquired easily or economically from the market [14]. For most OSS products where formal technical support may no longer be guaranteed, the internal availability or external accessibility of human capital will be the more important considerations than for products where service and support are provided by commercial enterprises (e.g., Windows and SAP).

As with other capital investments, the management of human capital can also be broken down into "make-or-buy" decisions [24].

On the one hand, organizations may internalize employment and build their human capital stock by initiating training and staff-development [5,19]. On the other hand, organizations may externalize employment by contracting or outsourcing certain functions to service agencies [32]. Therefore, in this study, OSS human capital is defined as the knowledge, skills, abilities, capacities, and experience with OSS possessed by people either *internal* or *external* to an organization. Conceptually, an organization's OSS human capital can be divided into two parts: (1) availability of internal OSS human capital, which refers to availability of the organization's staff members with the relevant skills and experience in OSS, and (2) accessibility to external OSS human capital, which refers to the extent an organization has access to external consultants, programmers on OSS forums, or an IT educational resource to support OSS adoption and use.

2.2. Human capital and organization's decision to adopt OSS

Based on the concept of technology-sensing capability, one of the two components of technological opportunism⁴ [36], OSS-adopting organizations should enjoy a higher availability of internal OSS human capital because such capability enables them to become more active in technological environmental scanning for OSS development, more sensitive to technological changes in OSS, and more receptive to the adoption of OSS. Leveraging on their internal OSS human capital, these organizations are likely to perceive less uncertainty and risk in the service and support of OSS when they adopt and deploy OSS innovations within their organizations. Based on the concept of technology-responding capability, the other component of technological opportunism [36], OSS-adopting organizations with higher availability of internal OSS human capital are also likely to be more capable to respond to technological trends in OSS development. Organizations that are sensitive to changes in their environment are likely to create enough momentum to change and innovate [12], whereas organizations with a great response capability tend to consider an innovation as an opportunity rather than a threat as they perceive greater control over the outcome [13]. In a survey conducted by the Chief Information Officer (CIO) magazine,⁵ of the ten essential questions that were raised for CIOs to ask themselves when deciding whether OSS is appropriate for their organizations' IT strategy, the top two are as follows: "Is there adequate in-house expertise to manage open source deployment, modification and maintenance?" and "How significant may limited support be for its implementation and maintenance?" These two questions suggest that the availability of internal OSS human capital is a significant discriminant factor between OSS-adopting and non-adopting organizations. We therefore propose:

H1. OSS-adopting organizations are likely to have higher availability of internal OSS human capital compared with their non-adopting counterparts.

Access to suppliers of IT-related services is one of the most efficient ways for an organization to accomplish a host of decision-making, adoption, and implementation tasks associated with new technologies [39]. Organizations with access to top-notch, low-cost suppliers of IT-related training and consulting have more choices and flexibility to carry out innovation-adoption strategies [39]. Most of the "suppliers" in the OSS product context are different from traditional software producers such as Microsoft. On the contrary, they are third-party IT consultants or developer groups on the OSS forum that are externally accessible to organizations.

⁴ Two components of technological opportunism are identified by Srinivasan, Lilien, and Rangaswamy [36]: *Technology-sensing capability* refers to an organization's ability to acquire knowledge of and understand technology developments in its business environment, and *Technology-response capability* refers to an organization's willingness and ability to respond to technological changes in its environment.

⁵ http://www.cio.com.au/article/168742/straight_open_source/ (last visited on Jan 11th, 2013).

Download English Version:

<https://daneshyari.com/en/article/6948582>

Download Persian Version:

<https://daneshyari.com/article/6948582>

[Daneshyari.com](https://daneshyari.com)