# Investigating recognition-based performance in an open content community: A social capital perspective

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## Abstract

As the open source movement grows, it becomes important to understand the dynamics that affect the motivation of participants who contribute their time freely to such projects. One important motivation that has been identified is the desire for formal recognition in the open source community. We investigated the impact of social capital in participants' social networks on their recognition-based performance; i.e., the formal status they are accorded in the community. We used a sample of 465 active participants in the Wikipedia open content encyclopedia community to investigate the effects of two types of social capital and found that *network closure*, measured by direct and indirect ties, had a significant positive effect on increasing participants' recognition-based performance. *Structural holes* had mixed effects on participants' status, but were generally a source of social capital.

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## 1. Introduction

The open source movement is a puzzle to those who are more comfortable with the traditional economic model of software development, where a large fixed cost of development is offset by mass distribution under strictly controlled intellectual property licenses. Obviously, participants in open source projects are not economically motivated [52]. As the movement continues to grow, it becomes important to examine the social fabric of the communities to better understand how and why they "work".

A number of studies have considered what incentives motivate participants in open source projects [23,24,32]. One notable motivation is the participants' desire to be recognized in their virtual community of open source participants. This occurs when a participant receives informal praise and acknowledgment from their fellows, and also by tangible tokens such as recognition in the open source communities by the granting of administrative, or "insider", rights that permit high-quality contributors to add their changes directly with minimal prior review, and to have an important role in deciding the direction of the project. Thus the action is equivalent to promoting an employee to manager status in a traditional organization and thus is a recognition of achievements.

Our study therefore investigated how *social capital* [8,15,21,35] in the community influenced an OSS

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participant's recognition-based performance. Because open source communities operate under *social structures* [12], social capital theory provided a valuable perspective for understanding how participants leveraged social resources to achieve their performance objectives. More specifically, we asked: Do the virtual connections through which open content participants operate influence their performance?

We addressed this question by examining the activities of Wikipedia (http://en.wikipedia.org, a general encyclopedia), currently the largest open source content community, because its members span every aspect of the human demography and anyone with Internet access may access and contribute to it [13,34,53].

## 2. Open source software and social capital

Though open source activities have been practiced since the mid-1980s, when the Free Software Foundation was founded, little research has been attempted to try to maximize its benefits.

### 2.1. Open source software (OSS)

The emergence of open source software has changed the technological landscape of the computing industry, affecting the strategic dynamics of some commercial enterprises, including interactions among proprietary software developers, hardware manufacturers, and makers of network products [51]. OSS has been defined as "software that is made freely available to all"; it is often developed and maintained by many contributors scattered around the world, but they interact through a virtual community. The majority of these public-good producers contribute freely to the project in return for only intrinsic rewards.

However, "freedom" has a particular meaning in open source contexts: "Free [open source] software is a matter of the users' freedom to run, copy, distribute, study, change and improve the software" [48], as opposed to *freeware*, which is software provided at no price. An OSS license often permits sale of the product or a system developed from or with it, with the caveat that the buyer be informed of his or her right to full access to the source code at no charge, instead of, or in addition to, paying for compiled executable programs.

### 2.1.1. Motivations for participating in OSS projects

Research on OSS has mainly focused on dimensions such as the economic and sociological foundations, motivational issues of participants, and its managerial and legal aspects. Von Hippel and von Krogh consider

OSS developed a "private-collective" innovative model, and illustrated how it deviated from private investment and collective action models. They believed that the "private-collective" model offered "the best of both worlds" by resolving problems such as revelation of innovations developed by private funds and the free-riding phenomenon. From the perspectives of labor economics and industrial organization, Lerner and Tirole examined OSS economics and argued that signaling incentives (career concern incentives, future job opportunities and ego gratification) were the main drivers of the volunteers' participation. These authors also discussed the importance of leadership due to the unique management structure of open source organizations and the competitive dynamics betweens open and commercial software development.

Drawing from the extended Klandermans model of voluntary action [28], Hertel et al. explored the factors that motivated the participation of volunteers. Some of these factors, based on a Web-survey of 141 participants, included *pragmatic* (e.g., improving the Linux kernel for personal advantages), *social* (i.e., supporting the work with other volunteers), and *hedonic* motives (i.e., intrinsic motivations). Bonaccorsi and Rossi [5] discussed several economic issues, such as motivation, coordination and diffusion from the perspectives of collective action, governance structure, and network externalities, respectively.

In open source projects, it is necessary to consider the performance of the participating developers, since most are volunteers with individual motivations for participation. Aligning performance measures with motivations would be helpful to organizers and evaluators of OSS projects [19]. According to the resource-based model of social structure sustainability, online social structures should provide members with positive benefits, such as the opportunity to be influential [55], to affiliate or champion [37], and the ability to disseminate ideas rapidly [27]. While not absolutely necessary for participation, it is very important for open source participants to be recognized for their contributions [48]; thus they gain status and respect in the community. To better encourage participation in open source projects, research is needed to understand the dynamics of recognition as an incentive, and how the attainment of this motivation serves as an indication of a participant's performance, in the sense that they have achieved a desired individual goal.

### 2.1.2. OSS and open content encyclopedias

An important feature of OSS communities is that there is limited opportunity for participation for those