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Do less active participants make active participants more active? An examination of Chinese Wikipedia

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ABSTRACT

Knowledge collaboration in online communities often involves a significant proportion of less active participants who make only scant contributions to their communities. This has become a pervasive characteristic of collaborative work organized through this new form. However, there is ambiguity regarding the role of less active participants in knowledge collaboration in online communities. In this study, we probe the indirect influence of less active participants' contributing behaviors on the quality of knowledge collaboration. We propose the following two-step causal path: 1) less active participants' participation causes active participants to increase contributions and 2) the additional contributions of active participants that result from less active participants' participation substantively improves the quality of knowledge collaboration. Using the edit data of featured articles in the Chinese Wikipedia, we examine the proposed causal path. The main findings of this study are as follows: the productivity of active participants of a Wikipedia article increases when they are triggered by less active participants' editing activities; the additional edits of active participants triggered by less active participants can improve the quality of an article; and less active participants play a major role in reviving the editing work of dormant articles. These findings reveal that less active participants play a substantial role in knowledge collaboration in online communities, as their contributing behaviors sustain collaborative work and eventually improve the quality of outputs.

1. Introduction

With the widespread popularity of internet technologies, such as web 2.0, web 3.0, social media, and the wiki, there has been an increase in knowledge collaboration in online communities. Knowledge collaboration in online communities involves "*individual acts of offering knowledge to others as well as adding to, recombining, modifying, and integrating knowledge that others have contributed*" and then "*benefit them personally, while contributing to the community's greater worth*" (pp. 1224) [14]. Examples of knowledge collaborations in online communities include online editors' collaboration for revising articles on Wikipedia, volunteer developers' collaboration for developing software projects on SourceForge, and users' collaboration for remixing music on ccMixter.

The main purpose of these types of online applications is to produce high-quality knowledge-based products [7,25]. For example, Wikipedia co-founder Jimmy Wales has described Wikipedia as "*an effort to create and distribute a free encyclopedia of* the highest possible quality *to every single person on the planet.*"[1] An online community is a phenomenal platform for quickly gathering a large number of participants with highly diverse cognitive profiles and interests [7,19,38]. Thus, knowledge collaboration in online communities can lead to high-quality outputs. For example, open source software products have fewer bugs than competing closed-source software,[2] and the scientific contents of Wikipedia are almost as accurate as that of Britannica [17].

Knowledge collaboration in online communities has organized itself in a new form that is very different from the traditional ways [6,36]. This new organizing form lacks a centralized organizational structure [31], stable membership [14], and traditional mechanisms to divide task and assign subtasks to knowledge workers [3]. Individuals constantly participate in the collaborative work without formally predefined roles and decide when and how to work [41].

Therefore, the following phenomenon is often observed in online communities: a small group of participants are very active and contribute most contents in the collaborative work, whereas several others that are less active contribute only an insignificant amount [7,11,15]. This phenomenon is prevalent for activities concerning Wikipedia

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[1] Available at https://lists.wikimedia.org/pipermail/wikipedia-l/2005-March/020469.html.

[2] Available at http://news.cnet.com/Study-lauds-open-source-code-quality/2100-1001_3-985221.html.

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article editing [7,26,47], open source software development projects [13,43], and online music remixing [21,42].

The existence of many less active participants has been a non-negligible characteristic of knowledge collaboration in online communities, but this phenomenon rarely occurs in knowledge work in traditional contexts. The question that arises regarding knowledge collaboration in online communities is what is the role of less active participants in the production of high-quality knowledge? We argue that the research on this question is important for two reasons.

On the one hand, an inquiry into this question will deepen our understanding of the new organizing form wherein knowledge collaboration can occur. Faraj and his colleagues analyzed the characteristics of knowledge collaboration in online communities and stated that "*failure to examine the critical role of … inactive participants in the functioning of the community is to ignore that passive (and invisible) participation may be a step toward greater participation*" (pp. 1226) [14]. Aaltonen and Kallinikos argued that in order to capture the essential logic of knowledge creation under the new form of organizing, scholars should realize "*what is inactive [but] is not useless*" and make clear the process that "*what is immediately inactive may well shape both what becomes active and its quality*" (pp. 187) [1]. These viewpoints emphasize that the less active participants' contributing behaviors may play a key role in the new form of organizing. Studies focusing on less active participants' contributing behaviors shed light on the intrinsic characteristics of the new organizing form.

On the other hand, there is ambiguity regarding less active participants' role in knowledge collaboration in online communities. In this context, it can be stated that some individuals believe in the creed of the *wisdom of crowds* that "nobody is smarter or faster than everybody" [12]. These individuals think that one of the essential merits of online communities is their capability to gather a large number of participants for knowledge collaboration quickly and easily [24,25,28]. Gathering many participants, regardless of whether they are active or less active, increases the group size, and thereby benefits the knowledge collaboration. An increase in the number of participants increases the diversity of experiences and interests and broadens the range of knowledge sources, thereby achieving neutral viewpoints [19] and improving the quality of output [10,38]. Arazy and Nov noted that an appropriate degree of contribution inequality (that is, the existence of many less active participants) in Wikipedia article editing work exerted a significant positive effect on article quality [5]. Nevertheless, the role of less active participants has been persistently questioned. The openness of online communities may attract some less active participants with incompetence or malice who provide misleading materials and cause conflicts [45]. A recent paper showed that the overall tone of a Wikipedia article is mostly decided by a dominant few (active participants) rather than by a trivial many (less active participants) [27]. In other words, less active participants although they account for a major part of the overall population in knowledge collaboration, have a negligible DIRECT effect on the output. There are opposing opinions on the role of less active participants' behaviors in knowledge collaboration in online communities, and hence it is essential to conduct carefully designed examinations.

In this study, we probe the INDIRECT influence of less active participants' contributing behaviors on the quality of knowledge collaboration. We propose the following two-step causal path: 1) less active participants' participation causes active participants to increase contributions and 2) active participants' additional contributions, which are the result of less active participants' participation, substantively improve the quality of knowledge collaboration.

From the literature on individuals' motivations to participate in collaborative work in online communities, we obtain some clues to the first causality proposed. Factors that motivate individuals to contribute to online communities include gaining reputation [9,22,23] and social identity [16,39,40] and displaying altruism [35,44]. Individuals who are keen to build and enhance their reputations or identities in the community or are willing to benefit others tend to contribute frequently to collaborative work, that is, act as active participants. When the work to which an active participant has devoted efforts attracts more participants, the former gets an opportunity to enhance own reputation and identity. Likewise, when the work contribution of the participant benefits more people, the participant experiences an increased enthusiasm to increase own contributions. Zhang and Zhu's work provides circumstantial evidence to our prospection. They used the Chinese Wikipedia's data and found that each editor showed a tendency to increase contribution with an increase in the group's size. They also found that editors who were likely to care more about social benefits reacted more strongly to changes in the group's size [46]. Therefore, when many less active participants contribute to a certain work, active participants of this work may be triggered to make additional contributions.

The verification of the causal relationship between less active participants' participation and active participants' additional contributions leads to the following interesting question: do these additional contributions effectively improve the quality of work? If active participants' reaction is confined only to eliminating or correcting some contents provided by less active participants, then the impact of the former's additional contributions to quality will be negligible. Conversely, if active participants contribute substantial content in response to less active participants' participation, then active participants' additional contributions will significantly influence the quality.

In summary, the following two research questions on knowledge collaboration in online communities are investigated in this study: 1) do less active participants' contributing activities trigger active participants to contribute more and 2)do active participants' additional contributions improve the quality significantly? By employing the editing data of featured articles in the Chinese Wikipedia, we verify that the answer to both questions is "yes." The results reveal the following indirect impact of participation by less active participants on quality: less active participants' contributions will cause active participants to be more active, and thereby contribute to an increase in quality.

This work responds to the call of Faraj et al. for studies examining the role of less active participants in the functioning of the online community [14]. The new form of organizing in online communities lacks the traditional mechanisms that can control the process of knowledge collaboration. This study exposes the unique way in which less active participants maintain the activeness and fruitfulness of knowledge production. This work offers empirical evidence to support Aaltonen and Kallinikos's arguments: "*what is inactive is not useless*" and "*what is immediately inactive may well shape both what becomes active and its quality*" (pp. 187) [1]. Therefore, this study contributes to the research on knowledge collaboration in this new organizational form.

This study determines the way less active participants influence the quality of collaborative work in online communities. As Lee and Seo show, the overall tone of knowledge collaboration in online communities is determined by active participants (who are called a "dominant few") [27]; however, we indicate that less active participants cannot be named as the "trivial many" because they are indispensable in the generation of high-quality knowledge. We reveal that even if less active participants do not directly determine the overall tone of the output, their participation makes active participants more productive, which leads to high quality. To the best of our knowledge, the current study is the first study to expose the indirect impact of participation by less active participants on the quality of knowledge collaboration.

2. Data and research design

2.1. Data collection

We collect data from featured articles in the Chinese Wikipedia. The Wikipedia uses a wiki platform to host an open-source encyclopedia, which is a typical online community for knowledge collaboration [32]. The editing process of a Wikipedia article is a typical example of

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