User Interaction Within Online Innovation Communities:
A Social Network Analysis

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ABSTRACT

In the digital era, enterprises have established online innovation communities to attract customers to participate. Presented in this study is user interactions within these communities using social network analysis. By identifying distinct subgroups within the network and comparing the user interactions among these subgroups, this research aims to identify the group diversity of online interactions. The findings indicate that dialogists are more willing to interact and hold a favorable network position, followed by questioners, while answerers have the lowest level of interaction. User subgroups are identified using k-core analysis. The higher the value of the core k, the more interactions between users in the k-core subgroup and the better the network position. By combining both ego-centered and group dimensions of online interaction characteristics, this paper also outlines an investigation into an empirical study on the influence of user interactions on community recognition. The results confirm heterogeneous effects among different subgroups.

KEYWORDS:

Online Interaction, User Community, Social Network, Subgroup, Community Recognition

INTRODUCTION

Recently, there has been a shift toward deriving product ideas from users rather than relying solely on the research and development (R&D) personnel of an enterprise. This pattern has been termed as open innovation by Professor Henry Chesbrough of the University of California (Chesbrough, 2003). Ideas generated by users are often of higher quality in terms of novelty and customer benefits compared to those generated by professionals (Costa et al., 2023). Consumers prefer to purchase products that are developed by other users due to the feeling of being involved vicariously in the

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design process (Dahl et al., 2015). As a result, many enterprises have established online innovation communities to attract a wider customer base to participate in enterprise innovation. Examples of such communities include Microsoft's Power BI Community, LEGO Ideas innovation community, and Xiaomi's MIUI community of China.

User interaction is a critical feature of online innovation communities (Hwang et al., 2019). Users in these online innovation communities share their experiences and ideas on production through proposing, commenting, voting, question and answer (Q&A), and other means. Enterprises achieve the product innovation by listening to users' and adopting their valuable ideas. The social interactions in these communities facilitate social relationships among users. For example, users can follow each other and provide support and comment on interesting ideas. This results in the formation of a complex social network with online users as the nodes (Chen et al., 2021).

The literature suggests that the implementation of interaction tools is a significant driver of online community performance (Chen et al., 2021). Online interaction enables members to communicate ideas with one another and promotes the sharing and production of knowledge (Liang et al., 2020; Masson & Parmentier, 2022). Studies have also shown that online interactions help build trust among users and community reciprocity norms (Pai & Tsai, 2016), and online identification (Panteli & Sivunen, 2019).

Recent studies have used social network analysis to characterize online relations from multiple dimensions and explore their impacts on user innovation (Pyo et al., 2023; Qi et al., 2021; Rishika & Ramaprasad, 2019). As a quantitative method for studying relational data, social network analysis provides methodological support for depicting the whole picture of user online interaction and deconstructing the characteristics of user online interaction. Previous research commonly initiates the ego-centered network to characterizing user interactions such as their direction and frequency (Chen et al., 2021; Wang et al., 2022) or the redundancy measured by the connectivity of neighboring users (Li et al., 2021; Stephen et al., 2016). Few studies have addressed the subgroups of the user network and explored the characteristics among the subgroups formed by certain users with similar interactive patterns.

Our objective is to analyze users' online interactions by establishing a social network, identifying distinct subgroups within the network, and comparing the user interactions among these subgroups. To achieve this, we have selected one typical online user innovation community, Microsoft's Power BI Community, as our sample. We also investigated the impact of user interaction on community recognition, considering interaction characteristics from both the ego-centered and subgroup dimensions. The regression results confirm heterogeneous effects among different subgroups, even though the users have the same number and strength of online interactions, which implies the social contagion effect within the groups.

The primary contribution we present in this paper is the characterization of user interactions for various user groups and the identification of heterogeneous effects on community recognition among these groups. This study inspires future research to focus on the group diversity in user interactions and its impact on user behaviors. Additionally, the findings can guide the development of user interaction guidelines in online communities and enhance user innovation.

LITERATURE REVIEW

Online User Interaction

In the context of online innovation communities, scholars attend more to the effect of online interactions on user innovation. Online user interaction facilitates the tacit knowledge embedded in the individuals to be transformed into explicit knowledge and spread to other users, which inspires users with new ideas (Stephen et al., 2016). An abundance of empirical studies confirm that online interactions between users promote innovation through social influence and learning (Riedl & Seidelc,

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