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WHAT MOTIVATES PEOPLE TO CONTRIBUTE: A STUDY ON THE GAMIFICATION OF GITHUB

TREO Paper

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Abstract

In this study we investigate how the gamification elements (in the context of GitHub) affects knowledge workers' contribution volume and quality over a timespan of 15 years. Analyzing the contribution history of over 23,000 users, this study reveals that social features (groups and social networking features) and personalization features would positively influence knowledge contribution in the long term, while the initial positive effect of achievement features (performance progress, ranking and trophy) would diminish over time, exhibiting negative effects in the long term. The sponsorship features show no significant effect on knowledge sharing.

Keywords: Knowledge Sharing, Knowledge Economy, Gamification, Panel Data Regression.

1 Introduction

The internet revolution has catapulted the global information economy into a new era of exponential growth. This transformation has been characterized by the rise of online platforms and repositories, facilitating the seamless exchange of knowledge and information across borders. Ranging from simple question-and-answer forums to sophisticated software development environments, these platforms have enabled individuals to contribute and share knowledge with minimal economic, physical, and temporal constraints. However, regardless of whether the generation and sharing of information is driven by vocational pursuits or inspired by the 'hacker ethic', the fundamental question remains: What motivates individuals to share information and knowledge, and actively participate in collaborative global projects?

Gamification has been widely adopted in knowledge-sharing platforms due to its motivational and persuasive nature. By implementing gamification features such as social networks and personalization in the design of the interfaces, users are expected to become motivated to participate and contribute to activities relevant to the given platform (Xi and Hamari, 2019). In the literature of knowledge management, online communities and platform economy, research has shown the significant role of gamification and motivational approaches in driving users' behaviors (Silic and Back, 2017; Suh and Wagner, 2017; Friedrich et al., 2020; Qian et al., 2022).

However, the majority of these studies often investigated either a whole gamified systems based on survey methods, or experimentally examined a limited amount of specific game elements such as badges (Hamari, 2017), points (Koppitsch and Meyer, 2022) and Levels (Chen et al., 2022). There is a lack of a holistic picture of how these different motivational affordances and features might differently motivate users. More importantly, due to the lack of empirical evidence on the long-term effects of gamification, it is still unclear whether these design features would continuously engage users to generate and contribute a considerable volume of valuable knowledge. To address this research gap, we identify and examine the effects of seven important gamification factors on knowledge-sharing behaviors utilized in GitHub, by conducting a longitudinal investigation.

2 Methodology

GitHub is a leading platform for open-source collaboration and software development, making it an ideal environment for studying knowledge-sharing behaviors. Accordingly, GitHub was selected as the primary data source for this study. To investigate the impact of gamified elements on knowledge-sharing behaviors, this study primarily concentrates on gamified elements introduced after the establishment of the platform.

Independent Variables: Seven Gamification Features. We selected seven gamification elements as key independent variables. The introduction dates and timeline of these elements are shown in Figure 1. Each independent variable represents one of seven gamification elements, followed by a binary variable indicating its presence (1) or absence (0), e.g., $Organization_{it}$ is an indicator that equals to 1 if user i can experience Organization at time t .



Figure 1. Timeline of the implementation of gamification features.

Dependent Variables: Quantity and Quality of Knowledge Sharing. Our main dependent variables are the quantity and quality of knowledge sharing. These variables help us to assess the extent and effectiveness of users' contributions to the platform. Quantity refers to the volume of contributions made by users, while quality pertains to the value or relevance of those contributions. Specifically, knowledge sharing quality is measured by the average forks (which means creating a personal copy of someone else's project) received per project, and quantity is measured by the number of shared projects in GitHub. Utilizing a longitudinal dataset of 23,443 GitHub users over 15 years (from January 2008 to September 2023), we conducted a panel regression analysis to examine the relationship between gamification elements and user contribution behaviors. Inspired by difference in difference (Donald and Lang, 2007), we introduce a function of the interaction terms between gamification elements and users' tenure. This modified panel regression model helps us identify critical turning points, rising/falling trends, or steady-state conditions in the relationship between gamification elements and knowledge sharing.

3 Findings

The study's findings illuminate the complex interplay between gamification features and user contribution behaviors.

Social features (organization and team discussion) have a significant positive effect on knowledge sharing quality and quantity in the long term, but the positive impacts of organization and team discussion diminish with users' increasing tenure.

Personalization features (status) have a significant positive effect on quantity of knowledge sharing, but the positive effect on quality of knowledge sharing is not initially significant, while both effects increase over users' tenure.

Achievement features (contribution graph, ranking and trophy) have a significant negative influence on both quantity and quality of knowledge sharing in the long term, and these effects are positive at first but diminish with users' increasing tenure.

Sponsorship features show no significant impact on either quantity or quality of user knowledge sharing behaviors.

4 Conclusions

The results of our study demonstrate some departures from prior research and add new dimensions to the understanding of gamification and knowledge sharing behaviors. Our results underscore the significance of considering the combined impact of gamification elements. In addition, the observed long-term effects of gamification elements on knowledge sharing are less explored in the existing literature. Understanding how these effects evolve over time provides valuable insights for the sustainable design of gamification strategies.

In conclusion, our study contributes to the existing body of knowledge on gamification and knowledge sharing by highlighting the dynamic effects of many different gamification elements. The outcomes of our research emphasize the need for a nuanced approach to gamification design, considering not only individual elements, but also their combinations and temporal dynamics. These findings offer practical guidance for platform administrators, and the understanding of how gamification elements impact knowledge sharing can be beneficial to organizations and educational institutions seeking to enhance their knowledge-sharing environments.

Acknowledgments

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References

- Chen, L., Baird, A., and Straub, D. (2022). "The impact of hierarchical privilege levels and non-hierarchical incentives on continued contribution in online Q&A communities: A motivational model of gamification goals," *Decision Support Systems* 153, 113667.
- Donald, S. G. and Lang, K. (2007). "Inference with difference-in-differences and other panel data," *The review of Economics and Statistics* 89(2), 221-233.
- Friedrich, J., Becker, M., Kramer, F., Wirth, M. and Schneider, M. (2020). "Incentive design and gamification for knowledge management," *Journal of Business Research* 106, 341-352.
- Hamari, J. (2017). "Do badges increase user activity? A field experiment on the effects of gamification," *Computers in human behavior* 71, 469-478.
- Koppitsch, S. E. and Meyer, J. (2022). "Do points matter? The effects of gamification activities with and without points on student learning and engagement," *Marketing Education Review* 32(1), 45-53.
- Qian, T. Y., Matz, R., Luo, L. and Xu, C. (2022). "Gamification for value creation and viewer engagement in gamified livestreaming services: The moderating role of gender in esports," *Journal of Business Research* 145, 482-494.
- Silic, M. and Back, A. (2017). "Impact of gamification on user's knowledge-sharing practices: relationships between work motivation, performance expectancy and work engagement," In *Proceedings of the 50th Hawaii International Conference on System Sciences*, 1-11.
- Suh, A. and Wagner, C. (2017). "How gamification of an enterprise collaboration system increases knowledge contribution: A feature approach," *Journal of Knowledge Management* 21(2), 416-431.
- Xi, N. and Hamari, J. (2019). "Does gamification satisfy needs? A study on the relationship between gamification features and intrinsic need satisfaction," *International Journal of Information Management* 46, 210-221.