Proceedings of ICMRED 2025 Symposium: Effective Communication as a Powerful Management Tool
DOI: 10.54254/2754-1169/2025.BL24125

Long-Tail Crowdsourcing for Game Accessibility: A Study of Player Co-Creation in Hearthstone's Accessibility Mods

Yuan Tao[1*], Xin Xu[1]

[1]*School of Management, Nanjing Normal University of Special Education, Nanjing, China*
**Corresponding Author. Email: taoyuan@stu.njts.edu.cn*

Abstract: As the global gaming population grows, disabled players are increasingly voicing their needs for accessible game design. However, official accessibility features in many games often fail to address the diverse requirements of disabled players, particularly for niche groups. In response, player communities have taken initiative to develop accessibility tools, including mods. This paper uses Blizzard's Hearthstone as a case study, focusing on the community-driven "Hearthstone Access" visual accessibility mod. It explores how player communities, through co-creation mechanisms, achieve the development and optimization of inclusive features outside the platform. By integrating Long-Tail Theory, Crowdsourcing Theory, and Participatory Design Theory, the paper introduces the concept of "Long-Tail Crowdsourcing," revealing how players respond to the needs of niche groups through distributed, low-cost collaboration. This study not only demonstrates the feasibility of user-driven innovation in digital products but also provides new perspectives for platform companies' inclusive strategies, user participation mechanisms, and external innovation models.

Keywords: User-Generated Content, Player Co-Creation, Accessibility Design, Long Tail Crowdsourcing, Crowdsourcing Model

1. Introduction

The global gaming population continues its significant growth, reaching 3.42 billion in 2024 [1]. Notably, over one-fifth (20.5%) of these gamers live with disabilities [2], a proportion considerably higher than the global disability prevalence. This highlights the critical importance of accessible game design, as gaming offers a vital avenue for social interaction and achievement for disabled players facing real-world barriers. However, despite some progress, many mainstream games still fall short in accommodating diverse accessibility needs [3].

In response, player communities have developed grassroots solutions, such as *Hearthstone Access*—a mod enabling blind and visually impaired users to play *Hearthstone* via screen readers [4]. Similar community-led tools, like *WeakAuras* for *World of Warcraft* and accessibility mods for *Minecraft*, showcase the creative and technical potential of co-creation [5]. However, these initiatives often lack institutional backing and long-term sustainability [6].

Drawing on Long Tail Theory, Crowdsourcing Theory, and Participatory Design, this paper proposes the conceptual framework of **Long-Tail Crowdsourcing**. Using *Hearthstone*'s accessibility mod as a case study, it explores how community co-creation drives game accessibility development and offers theoretical and practical insights for inclusive design strategies.

© 2025 The Authors. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).

DOI: 10.54254/2754-1169/2025.BL24125

2. The challenges of game accessibility design

2.1. Structural barriers in the game industry's accessibility design

The game industry continues to face structural challenges in implementing accessibility design. During the development phase, many games lack standardized accessibility guidelines, resulting in significant limitations for players with disabilities in key areas such as input methods, interface navigation, and information acquisition [3]. Most accessibility features are only available in a small number of games, while independent or smaller development teams often lack the resources to support such design efforts [7]. This imbalance in resource allocation has led to many small and mid-sized games failing to provide even basic usability for disabled players, further exacerbating inequality in gaming experiences.

In addition, feedback mechanisms are often inadequate. For example, games may lack alternative visual cues or provide insufficient options for haptic feedback [6]. These issues highlight a systemic neglect of accessibility in the development process, rather than merely a lack of technical capability.

2.2. Tensions between market logic and accessibility design

Game companies' limited investment in accessibility design stems mainly from return-on-investment concerns. They often believe that developing dedicated features is too costly with limited benefits, perceiving disabled players as a relatively small segment [7]. However, this narrow market view overlooks two key factors.

First, the actual size of the disabled player community is likely underestimated. Current statistics often fail to capture its true scale due to non-disclosure for privacy or other reasons [3, 8]. Second, accessibility design generates a long tail effect—when aggregated, these small, diverse needs can form a market segment comparable in size to the mainstream audience [9].

Moreover, accessibility features hold potential value beyond direct profits: they can enhance brand image, expand user bases, and even create new business models. Unfortunately, the industry still lacks an effective framework to evaluate the comprehensive benefits of accessibility, leading decision-makers to overly rely on simplified cost-benefit analyses and further discouraging long-term strategic investment in inclusive design.

2.3. Perceptual challenges in accessibility acceptance

Overall, awareness and acceptance of accessibility design within gaming communities remain limited. While some communities actively support the development and use of accessibility mods, others express resistance to such modifications, with some players even viewing them as a threat to the fairness of the game [8]. This resistance reflects a broader misconception within gaming culture—an obsession with "purity" of experience and a lack of understanding regarding the importance of diversity and inclusion.

More critically, some members of the community misinterpret accessibility features as "special treatment" for players with disabilities, rather than recognizing them as essential measures to ensure equal participation. As a result, disabled players often face not only technical barriers but also social pressure and stigma. This problem is particularly pronounced among hardcore gamer groups, who tend to resist any changes to game mechanics and are more likely to oppose modifications intended to support accessibility.

DOI: 10.54254/2754-1169/2025.BL24125

2.4. Strategic uncertainty and the risks of player co-creation

Although player co-creation has played a vital role in advancing game accessibility, its outcomes remain vulnerable to significant uncertainty. Under the Digital Millennium Copyright Act (DMCA), many companies retain the right to restrict the use of game mods on the grounds of copyright protection, even when such mods are developed to enhance accessibility for players with disabilities.

Player-created modifications may still be deemed illegal by game developers or publishers, regardless of their good intentions or accessibility purposes [10]. This intersection of legal ambiguity and commercial strategy places community-based co-creation efforts under systemic risk. Mod developers may lose motivation when years of effort can be invalidated overnight, while players with disabilities who rely on these tools may suddenly find themselves without essential support. This fragmented policy environment not only undermines the sustainability of accessibility-driven innovation, but also increases the fragility of inclusive practices within gaming communities.

3. The value mechanism of player community co-creation

3.1. The long tail theory

Chris Anderson's Long Tail Theory highlights how niche demands in digital platforms, though individually small, can collectively rival mainstream markets [9]. It challenges the dominance of "mass demand," instead recognizing marginalized users as a significant force.

Players with disabilities exemplify a long-tail group in gaming. Their needs, often neglected, are nonetheless meaningful. For example, *Hearthstone*'s heavy reliance on visual interfaces creates barriers for visually impaired users. In response, community developer GuideDev created *Hearthstone Acces*s, a mod that adds voice prompts and keyboard shortcuts [11]. Despite its small user base, the mod gained traction through community sharing, sparking wider discussions on inclusive design.

Long Tail Theory helps uncover the collective value of niche demands and underscores the role of player communities in innovation. It shows how co-creation empowers underrepresented users, contributing to greater fairness in digital gaming.

3.2. The crowdsourcing theory

Crowdsourcing is an open production model that relies on distributed collaboration to solve complex problems [12]. Compared with traditional closed processes led by a small number of developers, crowdsourcing mobilizes the knowledge and skills of a broad user base, allowing for a more flexible response to diverse needs [13]. This advantage is particularly evident in the field of game accessibility design. Due to the highly personalized needs of players with disabilities, official development teams often struggle to cover all usage scenarios because of limited resources, technical blind spots, or cognitive biases [8].

In such cases, community members actively participate in the development of plugins and mods, filling the gaps through collaborative crowdsourcing and effectively enhancing inclusivity in gaming [5]. The *Hearthstone Access* mod for *Hearthstone* was developed by a community developer independently of the official game team. It provides features such as voice guidance and shortcut operations, significantly improving the gaming experience for visually impaired users [11]. Although driven by a small group of contributors, the mod has been widely disseminated and adopted, reflecting a robust system of technical sharing and cooperation within the community.

This mode of collaboration—driven by interest, self-organization, and non-economic incentives—extends the application of crowdsourcing theory within digital culture. It is not merely a technical supplement but also a form of collective empowerment and social practice. Crowdsourcing theory

DOI: 10.54254/2754-1169/2025.BL24125

thus offers a framework for understanding the role of community co-creation in game accessibility design and demonstrates the efficiency of distributed intelligence in addressing complex, niche demands.

3.3. Participatory design

Participatory Design emphasizes the active role of users in co-creating digital products [14]. Instead of being passive recipients, users help shape tools and experiences with developers [15].

Traditional game development often leaves out disabled players. Decisions are top-down, with limited feedback loops. Participatory design counters this by fostering user inclusion and iterative adjustment.

For instance, GuideDev continuously refined *Hearthstone Access* based on community input, tailoring it to the actual habits of visually impaired players. This reflects participatory design in action—where players become co-designers, not just users.

Participatory design reframes accessibility as a shared, evolving process, rather than an afterthought. It creates space for negotiation and adaptation, making inclusive design more sustainable and user-driven [16].

4. Breaking structural limitations through long-tail crowdsourcing

A core challenge in accessible game design is how to meet the unique needs of marginalized players. These players are often ignored because they seem too scattered and costly to support. However, their unmet needs have led to a bottom-up solution from player communities. This paper calls it *long-tail crowdsourcing*—a model that combines niche demand with collaborative effort. It works without strong incentives, but still shows high resilience. This approach highlights how communities can play a key role in making games more accessible.

4.1. Long-tail crowdsourcing: from conceptual proposal to practical solution

Based on the preceding analysis, this paper proposes the concept of long-tail crowdsourcing to describe the autonomous collaboration mechanisms exhibited by player communities in meeting niche demands—particularly in adapting games for accessibility. This concept combines the long-tail theory's emphasis on "the aggregate potential of overlooked needs" with the core crowdsourcing idea of "solving problems through collective effort." It highlights how communities, motivated by non-economic incentives such as altruism or social reputation, actively fill design gaps in the system.

The concept aims to move beyond traditional crowdsourcing's emphasis on large-scale, high-efficiency tasks, shifting the focus toward sustainable, loosely coupled collaboration aimed at serving niche groups. Unlike conventional crowdsourcing, which prioritizes efficiency maximization, this model values self-organization, continuity, and mutual support—making it particularly suitable in domains like accessible game design, where professional resources are limited but real user needs persist [17].

4.2. Community response in practice: the case of *Hearthstone*

The Hearthstone Access mod is a vivid embodiment of the long-tail crowdsourcing mechanism. The specific needs of players with disabilities are often deprioritized by game companies due to their low expected commercial return. However, independent developers within the community, driven by personal experience, altruism, or professional interest, often take the initiative to meet these needs. This particular mod was created by independent developer GuideDev in response to long-term feedback from the visually impaired player community. Its features include voice navigation and

DOI: 10.54254/2754-1169/2025.BL24125

keyboard control, making a visually intensive card game "hearable and playable" for blind users [4, 11].

Although Hearthstone Access is not officially supported and lacks wide market influence, its ongoing updates and active engagement with users allow it to consistently serve a small but genuinely dependent user base. Within this niche group, the mod has had a significant and positive impact. This case is not about optimizing for universality but about offering real, targeted support to a specific user group. Such "small but effective" practices exemplify the unique value and potential of the long-tail crowdsourcing model in bridging the digital divide and promoting digital equity. It demonstrates that even needs with limited commercial return can be met effectively when driven by community effort.

4.3. Theoretical and social reflections on long-tail crowdsourcing

At its core, long-tail crowdsourcing goes beyond the traditional commercially driven perspective. It explores how communities, motivated by non-profit intentions, collaborate to address and solve specific problems in the real world. It is not just an extension of traditional crowdsourcing models but a revelation of a new mode of social collaboration—one that suggests a path toward digital inclusion and social justice. This model breaks away from the previous paradigm where innovation and problem-solving were dominated by a few commercial actors. Instead, it highlights the power of decentralization and individualized contributions.

It emphasizes that even groups considered "marginal" under standard market logic can gain technological support and actively participate in digital culture creation through community involvement. Within this framework, players with disabilities are no longer passive recipients but active agents who, by expressing their needs, help steer game design toward greater inclusivity and diversity. This model restores agency to marginalized groups in the digital sphere and reveals the community's unique value in compensating for market failures and promoting social equity.

5. Insights from the modding ecosystem of *Hearthstone*: collaborative innovation by player communities

5.1. Co-creation and participatory design: a responsive strategy

In traditional game development, the needs of players with disabilities are often underrepresented, resulting in features that fall short in real-world use. In contrast, community-led initiatives such as Hearthstone Access offer more agile and responsive approaches. Its developer, GuideDev, maintained close communication with blind users and addressed detailed usability issues through frequent updates, significantly enhancing practical accessibility.

This ongoing feedback loop exemplifies a participatory design process where users are not passive recipients but active collaborators. Community members provide bug reports, suggestions, and even code contributions through platforms like Reddit and GitHub, which organically integrates end-users into the design workflow. If game companies create formal channels like feedback forums or inclusive testing programs, these collaborations can improve design efficiency and deepen user engagement. Over time, this fosters a culture where users become co-creators of digital environments, not just consumers.

5.2. Strategic support and long-tail value

Despite the demonstrated value of accessibility mods, many game companies remain cautious or ambiguous in their stance toward third-party tools, primarily due to concerns about game balance and security. However, assistive mods like *Hearthstone Access* fill critical gaps in official design and

DOI: 10.54254/2754-1169/2025.BL24125

should be differentiated from exploitative hacks. Blizzard's tacit tolerance of the mod allowed innovation to flourish, but this hands-off approach is unstable and legally fragile.

To ensure both sustainability and safety, developers should create clear policies that support accessibility mods. Tools like whitelist systems or dedicated APIs can protect innovation while keeping games secure. These actions are not just about goodwill—they make strategic sense. As long-tail theory suggests, niche demand can add up to major impact. Even if accessibility features serve small groups, they often improve the experience for many. For example, UI changes from Hearthstone Access also helped sighted players. Supporting mod-driven innovation can attract more users and help developers prepare for a more inclusive future.

6. Conclusion

This study has examined the value of player co-creation in optimizing game accessibility, analyzed its theoretical underpinnings, and used the modding ecosystem of *Hearthstone* as a case study to offer insights for future accessible game design. The findings suggest that player communities play a vital role in advancing accessibility, and that the model of long-tail crowdsourcing effectively addresses the shortcomings of traditional market-driven approaches. Moving forward, collaboration between game developers and communities will be a crucial pathway toward enhancing accessibility in the gaming industry.

References

[1] *Newzoo. (2024). Global games market report 2024. Retrieved from https://newzoo.com/resources/trend-reports/newzoos-global-games-market-report-2024-free-version*

[2] *MarketingCharts. (2008). Disabled gamers comprise 20% of casual-videogame audience. Retrieved from https://www.marketingcharts.com/industries/media-and-entertainment-4920*

[3] *Hassan, L. (2024). Accessibility of games and game-based applications: A systematic literature review and mapping of future directions. New Media & Society, 26(4), 2336-2384.*

[4] *Guide Dev. (2022). Hearthstone access. Retrieved from https://hearthstoneaccess.github.io/*

[5] *Merritt, D. (2017). User-generated accessibility in virtual world games. International conference on virtual, augmented and mixed reality (pp. 349-358). Cham: Springer International Publishing*

[6] *Andrade, R., Rogerson, M. J., Waycott, J., Baker, S., & Vetere, F. (2019). Playing blind: Revealing the world of gamers with visual impairment. Proceedings of the 2019 CHI conference on Human Factors in Computing Systems (pp. 1-14).*

[7] *Cairns, P., Power, C., Barlet, M., & Haynes, G. (2019). Future design of accessibility in games: A design vocabulary. International Journal of Human-Computer Studies, 131, 64-71.*

[8] *Baltzar, P., Hassan, L., & Turunen, M. (2023). "It's Easier to Play Alone": A Survey Study of Gaming With Disabilities. Journal of Electronic Gaming and Esports, 1(1).*

[9] *Anderson, C. (2006). The long tail: Why the future of business is selling less of more. Hyperion.*

[10] *McKay, P. (2011). Culture of the future: Adapting copyright law to accommodate fan-made derivative works in the twenty-first century. Regent University Law Review, 24, 117.*

[11] *Sultan, H. (2022). Hearthstone access: The story of the modder opening up Blizzard's game for more players. Eurogamer. https://www.eurogamer.net/hearthstone-access-the-story-of-the-modder-opening-up-blizzards-game-for-more-players*

[12] *Howe, J. (2006). The rise of crowdsourcing. Wired Magazine, 14(6), 176-183.*

[13] *Estellés-Arolas, E., & González-Ladrón-de-Guevara, F. (2012). Towards an integrated crowdsourcing definition. Journal of Information science, 38(2), 189-200.*

[14] *Sanders, E. B. N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. Co-design, 4(1), 5-18.*

[15] *Bodker, S. (1996). Creating conditions for participation: Conflicts and resources in systems development. Human–computer interaction,11(3), 215-236.*

[16] *Sousa, C., Neves, J. C., & Damásio, M. J. (2022). The pedagogical value of creating accessible games: A case study with higher education students. Multimodal Technologies and Interaction, 6(2), 10.*

[17] *Humayun, H., Malik, M. N., & Ghazali, M. (2024). Analysis of Motivational Theories in Crowdsourcing Using Long Tail Theory: A Systematic Literature Review. International Journal of Crowd Science, 8(1), 10-27.*