



GAMIFIED KNOWLEDGE CROWDSOURCING: A MULTI-CASE STUDY

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ABSTRACT

Crowdsourcing is used by various businesses today to have tasks completed by an online community. Within this domain, knowledge crowdsourcing platforms like Quora.com let users ask and answer questions to determine the optimal solution. Game elements are frequently incorporated to increase user engagement. The literature on how gamified systems motivate users is vast, but we need qualitative research that accounts for each platform's context.

This study investigates user contributions, gamification affordances and monetary incentives, as well as their relationship with user contributions. Qualitative multiple case studies are done on Stack Overflow, Reddit, and Quora, with data triangulated from peer-reviewed articles, semi-structured interviews, and direct observations. Data is analyzed using deductive thematic analysis. Comparing and contrasting these situations, the author may draw strong cross-case inferences.

The research findings suggest that the primary game elements are points, badges, and leaderboards. Previous studies disregarded each element's mechanics, which may distinguish their impact. User contributions are driven by intrinsic motivation for learning and extrinsic motivations. Incentives vary by platform where Stack Overflow is more career focused and Redditors enjoy it as a hobby. Over time, users become extrinsically motivated to help and share. They act autonomously and are

motivated by integrated regulation. Game elements assist users reinforce intrinsic and internalize extrinsic motivation to contribute. Relevance to platform usage determines their effect with badges being more influential on Reddit than points on Stack Overflow. This study gave developers guidance. However, Quora and monetary incentives studies may be inconclusive due to constraints.

Keywords: Motivations, Gamification, Crowdsourcing



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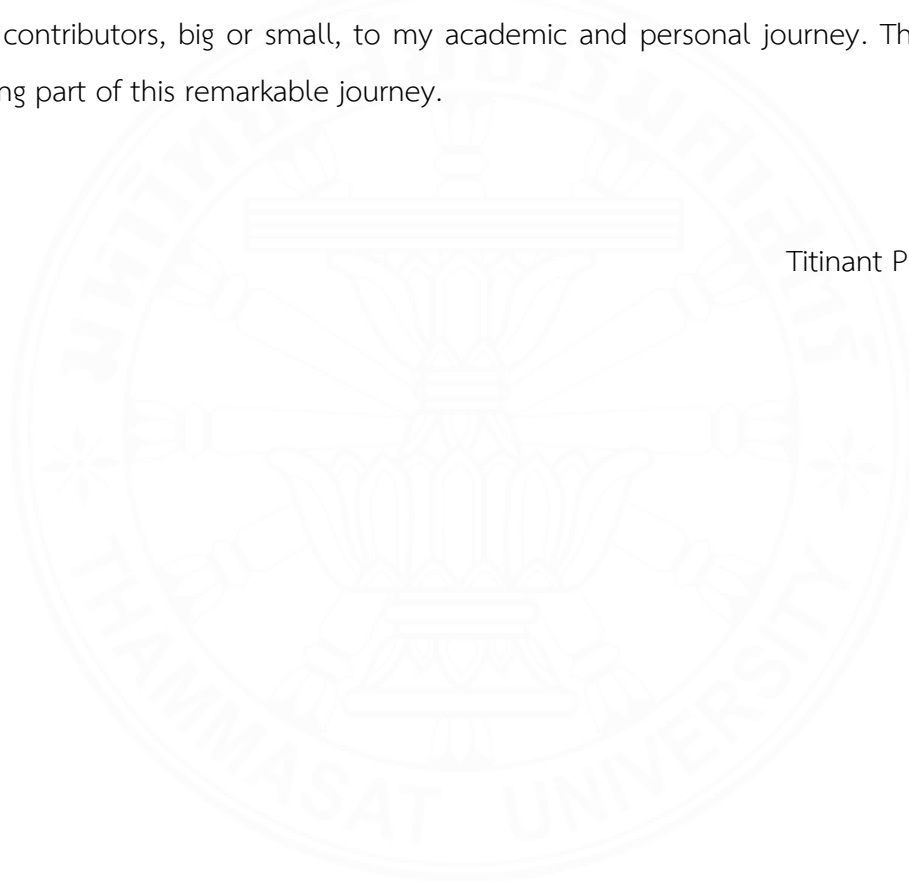


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CHAPTER 1

INTRODUCTION

1.1 Overview

Crowdsourcing is used by various businesses today to have tasks completed by an online community of people. It is considered an upcoming low-cost alternative to traditional outsourcing (Bhatti et al., 2020). But more importantly, organizations can capitalize on new and specialized knowledge beyond human and dedicated employee capabilities (Geri et al., 2017). In knowledge-intensive crowdsourcing, which aims for heterogeneous insightful contributions unlike simple tasks processing, the business may hold a competition for new ideas, with cash prizes for the top submissions. On the other hand, the collaborative crowdsourcing platform encourages users to work together to determine the optimal solution (Riar et al., 2022). This platform has been around for a long time, for example, Google Answer, since 2002. Professionals from the same field can form a community of practice within the specialized platform. Prime examples are CrowdMed for doctors, Avvo for lawyers, and Stack Overflow for programmers. However, only a few survive to make an impact on the world, while others fade into obscurity.

Both the quantity and quality of user contributions may determine the success of a knowledge crowdsourcing platform. More visitors usually mean more money in the bank for the platform's owners. With an ever-growing world knowledge database, a consistent stream of new knowledge must be added and open to multiple interpretations and changes for the platform to stay relevant. Experienced users and influential community members who generate valuable contributions are crucial for the platform's community building and continued contributions (Ye et al., 2015). This is still a significant challenge for the crowdsourcing platform, as they try to stimulate user engagement through various methods, not just monetary incentives, and user-friendly design.

Game elements like points, badges, leaderboards, and other mechanics are frequently incorporated into problem-solving crowdsourcing platforms to increase user engagement (Morschheuser et al., 2017). For instance, Stack Overflow, a well-known public question-and-answer website for professional and enthusiast programmers, assigns users with a reputation ranking that reflects their level of authority, respect, and technical skills. The users are drawn to actively contribute their wealth of knowledge within the community in the hope of intrinsic motivational factors like enjoyment or extrinsic factors like job opportunities, fame, or reciprocity. Platforms like Quora, a social question-and-answer website visited by over 300 million users a month in 2020, utilize an upvote point system as a feedback loop for desirable answers. The more users explore Quora and vote on answers, the more valuable the site will become. Eventually, the irrelevant responses will disappear, while the useful ones will rise to the top. Over time, popular users with many upvotes gain credibility and visibility as the site's go-to authorities.

Even so, these gamified systems could have inherent flaws or biases. Unwanted and even addictive behavior may arise from improperly implemented gamification. Users may be spamming the system with poor-quality or incorrect answers in exchange for quick points. On the other hand, there are cases where the system is designed to look like a game when it is just rhetoric or "fake" gamification that ignores or undervalues the ways in which players' minds and emotions are affected by the game's mechanics (Landers, 2018). Throughout the platform's lifespan, it may abandon gamification or incentive mechanics altogether should it produce an unfavorable outcome.

While there is a wealth of literature that empirically investigates how gamified systems foster users' motivation to participate, we need qualitative research that accounts for each platform's unique mechanics, business model, and history. To fully comprehend the mechanisms and catalysts that stimulate involvement and motivation, the measurement of user experience must move beyond the assessment of basic sentiments (Morschheuser et al., 2017). This research aims to delve into various facets of four platforms over an extensive period (Quora, Stack Overflow, and Reddit) to

learn about the effective implementation of gamification affordances and additional incentives in the knowledge crowdsourcing platform.

1.2 Research Questions

1. How do knowledge crowdsourcing platforms use gamification and additional incentives to encourage high-quality contributions from users?
2. How do the users contribute their knowledge within the platform?
3. How are these gamification and additional incentives affect the users?

1.3 Objectives

1. To study gamification affordances and additional incentives applied in the selected knowledge crowdsourcing platform
2. To study the motivations and contribution behaviors of the users.
3. To study the relationship between gamification affordances and additional incentives and contribution behaviors of the users

1.4 Scope of the Study

This study employs qualitative methods to examine the relationship between gamification affordances and additional incentive mechanisms and the knowledge contribution behavior of users. The key findings are then organized into a body of knowledge and refined into a concise guide for understanding knowledge-intensive crowdsourcing industries. The platforms selected for this multi-case study are gamified, some imbued with direct cash incentives, which are Quora, Stack Overflow, and Reddit. The duration of the research study is between 2013 and 2023. Source of information only includes those written and spoken in English or Thai languages. Although there are other gamification affordances such as avatars, progress bars, etc., these are excluded from the study as their impact on user contributions aspect may not be as significant when compared to points, badges, and leaderboards.

1.5 Expected Benefits

1.5.1 Theoretical Contributions

1. This research may incrementally contribute to the cooperative-based gamification understanding within an emerging context of knowledge crowdsourcing.
2. Using a theoretical lens drawn from motivational psychology, this study may make a small but meaningful contribution to our understanding of gamification's effect on user behavior.

1.5.2 Practical Contributions

1. This research would be beneficial to developers and organizations who wish to effectively promote knowledge contribution in their knowledge crowdsourcing platform, either during early adoption or long-term survival.
2. Communities of practice groups that are interested in creating their own intermediary websites or platforms would benefit from this study.

1.6 Terminology

- 1) Knowledge crowdsourcing is a type of business model based on the idea that problems are best solved when many people with specialized knowledge work together toward the same target (Allarakhia & Walsh, 2011).
- 2) Platform in this research is described as a hardware or software architecture that supports the development and operation of applications, processes, and technologies for business or work results. In the context of this research, the knowledge crowdsourcing platform takes the form of a website, though there may also be mobile applications available. The platform includes mechanisms for posing and answering questions by users.
- 3) Gamification is incorporation of game aspects into non-game environments to motivate user activity (Treiblmaier et al., 2018).
- 4) Community of Practice are composed of people who learn together in a common field (Wenger, 2011).

5) Incentive is direct monetary remuneration for users' contributions. Crowdsourcing can nevertheless result in some type of tangible or intangible reward, even if the work is done voluntarily and without payment.

6) Expert in the context of crowdsourcing, is someone who delivers several accurate, full, and trustworthy replies. (Ben Rjab et al., 2016).

7) Gamification Affordances are the use of game design elements such as points, badges, leaderboards, progression, status, rewards, and roles, to provide visual hint to their usage.

8) Mechanics are the rules that govern and guide the user's actions, as well as the response to them.



CHAPTER 2

REVIEW OF LITERATURE

This literature review will comprise four key elements to form a conceptual framework and research methodology.

2.1 Collaborative crowdsourcing question and answer platform

2.2 Knowledge contribution behavior of users in collaborative crowdsourcing question-and-answer platform

2.3 Gamification and additional incentives mechanics in knowledge crowdsourcing platform

2.4 Relationship between mechanics employed and knowledge contribution

2.1 Collaborative crowdsourcing question and answer platform

Crowdsourcing is a method of online, decentralized problem solving that uses the collective intelligence of a large online user base to complete specific projects and activities, rather than relying on a small number of full-time workers or outside vendors (Doan et al., 2011). A government agency, a charity, or a private enterprise may run the platform. The task may vary in terms of complexity and difficulty. The user brings in their knowledge, resources, and experience in exchange for enjoyment, job opportunities, monetary rewards, fame, self-esteem, and skills development. It is viewed as a mutual benefit as the platform can utilize users' contributions to accomplish their task objectives, while the users left satisfied with what the platform mechanics has provided.

Within this domain, knowledge crowdsourcing is a type of business model based on the idea that problems are best solved when many people with specialized knowledge work together toward the same target (Allarakhia & Walsh, 2011). Wikipedia, Quora, and Stack Overflow are examples of these platforms. The development of the internet, mainly Web 2.0, has made it possible to access the ideas and viewpoints of a diverse group of people, creating new avenues for interaction and the generation of

information. Connectivism views skill development and education as a socializing and technology-driven network (Siemens, 2006, as cited in Goldie, 2016). Connectivism states that knowledge and learning are distributed throughout networks of connections produced by people, cultures, organizations, and the technology that connect them (Goldie, 2016). Knowledge is fluid and dynamic, flowing across human and artifact networks. It can be interpreted and changed as it goes through the network. Learners construct knowledge by connecting with content, learning groups, and fellow learners through digital channels. They are encouraged to participate in using these digital platforms actively.

The collaborative knowledge crowdsourcing platform is a meeting place for professionals or individuals looking to develop their craft or broaden their horizons. Communities of practice are made up of people who participate in a process of group learning in a common area of activity. Not everything referred to as a community is a community of practice. A shared passion serves to define its identity. By helping one another, exchanging information, and taking part in group events and conversations, members pursue their interests in their domain. They establish connections with each other that let them share knowledge. Members of a community of practice are practitioners. Consequently, they produce a body of collective knowledge, or shared practice, comprising anecdotes, tools, and strategies for resolving similar problems. (Wenger, 2011).

The rise of these new social media platforms has created new opportunities for learners to collaborate and learn from one another. The crowd workers have new opportunities to combine collaboration and technology by leveraging social media to develop Professional Learning Network (PLN). Individuals who once had only a few colleagues at their disposal can now use Facebook, Twitter, Stack Exchange, Avvo, Quora, and other social media platforms to learn from peers worldwide at any time.

2.2 Knowledge contribution behavior of users in collaborative crowdsourcing question-and-answer platform

2.2.1 Types and aspects of contribution behaviors

Contributing knowledge is critical for the survival of a crowdsourcing platform. It is irreplaceable because of the quantity and breadth of knowledge beyond the capabilities of human/dedicated employees. While knowledge is expanding at a much faster rate, it is considered fluid and must be current, relevant, and consistent.

Past research suggests that contribution behaviors should be categorized further to understand what motivates such activities fully. Geri et al. (2017) claim that user-generated content websites would like to foster three key activities: adding content, acknowledging material (including reporting incorrect or inappropriate content), and referring people to the website. In an online open-content system like Wikipedia, Xu and Li (2015) underline that content contribution and community participation are two distinct types of contribution behaviors. To gain insight, these contribution behaviors should be studied individually rather than grouping them all as user contributions.

While knowledge contribution quantity helps the knowledge crowdsourcing platform gain momentum at an early stage, high-quality contributions determine its long-term sustainability. In collaborative crowdsourcing question-and-answer platforms, knowledge shared among users is heterogeneous and thus has a different value according to their individual qualities. The concept that implicit knowledge—such as firsthand experience with a product and recommendations for its enhancement—is more important than explicit knowledge—such as information found in documents and bulletins—has long been endorsed by literature on knowledge sharing. (Zhao et al., 2016). It is crucial to understand which key motivators influence high-value knowledge contributions in virtual communities. However, for knowledge crowdsourcing platforms, quality control is still a major issue to be tackled by control mechanics and expert user identification. If you can tell which individuals can be counted on, you can use that information to get more useful insights from their answers (Ben Rjab et al., 2016).

A sustained contribution builds community leaders and the community itself for the platform to flourish exponentially. Sun et al. (2012) declare that there are significant differences between initial and maintained engagement behaviors. Factors portrayed as crucial for initial participation may be insufficient to explain long-term participation. The long-run success of crowdsourcing platforms hinges on the motivation of long-term users.

2.2.2 Factors affecting knowledge contribution

Many factors may influence knowledge contribution in crowdsourcing platforms. Ye and Kankanhalli (2017) identified several theories applied in past literature to explain the solver's engagement behaviors in crowdsourcing, such as "value theory, value expectancy theory, motivation theory, social identity theory, and value-sensitive design theory". Because the real-world example is somewhat complex, the result may not be fully convertible between different platform types. It's also possible that actions don't always line up with intentions.

The benefits of knowledge contribution can range from winning monetary rewards to enjoyment, skill enhancement, work autonomy, and relatedness. When someone decides to offer their knowledge on a website, both internal and external factors may play a role. (Boudreau & Lakhani, 2011). Users are more likely to keep contributing knowledge if they feel trusted based on their identities, receive favorable feedback from their contributions, have possibilities for social exposure, can spread their contributions by word of mouth, and feel pressured to reciprocate (Guan et al., 2018). According to Ye et al. (2015), contributions of knowledge are positively impacted by users' opinions on the leader and community support.

The knowledge management literature, on the other hand, shows that when people share information, they risk having their efforts and power associated with that information undermined (Cillo, 2005; Kankanhalli et al., 2005). These liabilities have been proposed to deter individuals from contributing their expertise. While making their contributions, individuals may feel a loss of authority because of the information they have offered.

Many moderators that moderate knowledge contributions were identified and examined in past research. Chris Zhao and Zhu (2014) found that task granularity positively moderates external motivation and participation effort. Users' faith in crowdsourcing platforms, that they would secure their information, properly reward them, and not exploit their answers, according to Ye and Kankanhalli (2017), modulates the influence of monetary compensation on solvers' involvement in crowdsourcing. Individualistic motives, collective motives, or a combination of both can motivate cooperative behavior like content addition. Before gamifying a system, practitioners must first seek to understand their target audience (Riar et al., 2022). Still, so many other contextual factors are to be explored.

2.2.3 Self-Determination Theory

To better understand users' behavior, gamification past researchers use concepts from self-determination theory (Treiblmaier et al., 2018). Similarly prompted by Morschheuser et al. (2017), researchers should consider applying theory from (motivational) psychology, such as self-determination theory, when examining the motivational effects of gamification affordances.

Depending on the various reasons or objectives that prompt behavior, self-determination theory distinguishes between different forms of motivation. The most basic distinction is between extrinsic motivation—doing something for a different goal—and intrinsic motivation—doing something because it is innately interesting or delightful. (Ryan & Deci, 2000).

Even in the absence of reinforcement or rewards, people who engage in exploratory, enjoyable, and curiosity-driven activities experience high-quality learning and creativity thanks to intrinsic motivation (White, 1959). The reward was in the activity itself. The theory of self-determination explicitly frames the question of what social and environmental factors support or weaken intrinsic motivation (Ryan & Deci, 2000). Sub-theory of Self-Determination Theory known as Cognitive Evaluation Theory (CET) posits that “interpersonal events and structures (e.g., rewards, communications, feedback) that contribute to feelings of competence during action can increase intrinsic motivation for that action by satisfying the basic psychological need for competence” (Ryan & Deci, 2000). According to Cognitive Evaluation Theory,

feelings of competence alone won't boost intrinsic motivation; autonomy must also come with them (Ryan & Deci, 2000). The Cognitive Evaluation Theory argues that crowdsourcing platform settings can either encourage or hinder intrinsic motivation by supporting or resisting the need for autonomy and competence. This is true only if such activities are intrinsically appealing to the individual. When an activity is not intrinsically appealing, knowledge crowdsourcing platforms may take steps to influence extrinsic motives.

Extrinsic motivation contrasts with intrinsic motivation. Nonetheless, the Self-Determination Theory suggests that the degree of autonomy in extrinsic motivation might vary significantly (Ryan & Deci, 2000). Organismic Integration Theory (OIT) is another sub-theory of Self-Determination Theory. It explains the different forms of extrinsic motivation and the external factors that either facilitate or obstruct the assimilation and incorporation of the regulation of these actions (Deci & Ryan, 2013). Internalization is the process of assimilating a principle or rule, whereas the process through which the persons wholly incorporate the regulation into their own is known as integration. Internalization shows how an individual's motivation for activity might span from amotivation or disinterest to passive conformity to active personal commitment. Internalization leads to increased perseverance, enhanced self-esteem and improved level of participation (Ryan & Deci, 2000). This has sparked a growing curiosity about the internal and external motivations that may be used to anticipate whether or not people will adopt purely pragmatic or purely hedonistic information systems (Tamilmani et al., 2019; Wu & Lu, 2013).

2.3 Gamification and additional incentives mechanics in knowledge crowdsourcing platform

2.3.1 Monetary incentive in crowdsourcing platforms

Broadly speaking, Crowdsourcing websites may be split into two categories: compensated or volunteer (Borromeo & Toyama, 2016). Paid crowdsourcing services, such as MTurk, ZBJ, Upwork, Fiverr, and others, give requesters access to resources that will help them find reliable helpers for their jobs promptly in exchange

for monetary incentives. Even if the user receives no direct remuneration for their contributions in voluntary or unpaid crowdsourcing, alternative forms of either tangible or virtual compensation may be provided. They are not employed by the company that runs the crowdsourcing site. The unpaid platform has the same features as the paid ones but with no mechanisms for monetary incentives.

2.3.2 Gamified crowdsourcing

A growing number of crowdsourcing platforms have been infused with game-inspired motivational design elements, a process known as "Gamification" (Morschheuser et al., 2017). Gamification is the process of introducing features of games into environments that aren't games in order to motivate users to take desired activities (Treiblmaier et al., 2018). It is a subfield of game science based on the idea that games are the epitome of hedonic self-directed systems. Gamification investigates the different design strategies and considerations that can be used to incorporate game elements into current real-world processes (Landers et al., 2018). However, to avoid "fake gamification," which limits its full potential, it must be emphasized that gamification itself is not a product. The game aspects should be incorporated to alter an existing process's effect on people (not organizations). When gamification is removed from a given setting, it does not immediately go back to its "ungamified" state (Thom et al., 2012).

"Typical gamification elements adopted in crowdsourcing platforms incorporate points/scores, leaderboards/rankings, badges/achievements, levels, progress, feedback, virtual objects/resources, storytelling, virtual territories, teams, missions, and avatars/virtual characters" (Morschheuser et al., 2017). The existing research divides gamification into three parts, "the gamification affordances, the psychological results of gamification, and the behavioral outcomes of gamification" (Huotari & Hamari, 2016). Gamification can be supplemented with extra benefits, generally monetary incentives, such as payment in installments or a tournament award, which can have a greater impact on user motivation (Straub et al., 2015). A literature review by Morschheuser et al. (2017) showed the greatest range of affordances in research that studied crowdsourcing activity for problem solving, whereas publications on crowd-processing and crowd-rating revealed simpler kinds of gamification, such as simple point-and-

leaderboard combos. Crowd-creating and crowd-solving works included not only points and leaderboards but also storylines, quests, and avatars. Crowdsourcing techniques that tried to address complicated problems through creative and diverse contributions sometimes used elaborate gamification designs. “Several citizen-science projects to encourage participation, such as language acquisition and translation (DuoLingo), protein string folding simulation (Fold.It), genetic sequencing simulation (Phylo), historical records analysis (Old Weather), and mapping brain neural pathways (EyeWire)” (Prestopnik & Tang, 2015). In collaborative crowdsourcing question-and-answer platform contexts, such as Stack Overflow, Quora, Zhihu, etc., gamification incentive mechanics has been applied widely with points, badges, awards, and leaderboards for active participation and sharing information publicly. Chats, blogs, and ratings are all examples of social-related gamification mechanisms that can be used to foster interaction within platforms and increase a sense of community by encouraging more regular contact, sharing of expertise, and mutual aid (Francisco-Aparicio et al., 2013).

There are still many challenges to the successful application of gamification in collaborative knowledge crowdsourcing platforms. Unlike individualistic or competitive gamification design interventions works, platform-designed incentive mechanisms that promote cooperation seem to be insufficient. The term "gamification" might mean slightly different things to different people, both in the business world and the academic world (Landers et al., 2018). Fake or rhetorical gamification is another issue that prevents gamification from reaching its full potential. Rhetorical gamification occurs when features of games are added to non-game systems for the sake of making them more "game-like." Rhetorical gamification is not the same as real gamification in terms of the benefits it provides. However, other studies have shown that labeling an activity as a game can have a substantial psychological effect on how people feel about it. Surprisingly, game mechanics had little effect on the efficacy of “game-like” framing (Lieberoth, 2014). This can be due to the novelty effect and should be further investigated.

2.4 Relationship between mechanics employed and knowledge contribution

2.4.1 Monetary incentive relationship with knowledge contribution

Users' knowledge contributions can be prompted by using incentive mechanisms, although studies demonstrate that more is not always better. Positively, data suggests that consumers' time spent on the platform is significantly impacted by monetary considerations (Pinto & dos Santos, 2018). Without financial incentives in place, workers may be less committed, and the duration of the project could be pushed back without warning. Similarly, Goncalves et al. (2013) research found lower accuracy performance of unpaid situated volunteers compared to paid crowd workers. Still, surprisingly the task uptake rate is higher for unpaid situated volunteers. Borromeo and Toyama (2016) findings suggest that it takes longer to finish the job when people aren't getting paid to work on it but yields quality on par with or perhaps superior to the paid version. The findings of Mao et al. (2013) imply that different forms of payment systems affect the behavior of paid crowd workers in comparison to that of volunteers. It is possible that paid crowd workers, given the right incentive structure (e.g., pay per job, pay per time, or pay per annotation), could outperform volunteer workers in terms of speed while maintaining quality.

While research has shown that some forms of extrinsic rewards can decrease levels of intrinsic motivation in a variety of contexts (Deci et al., 1999; Ryan & Deci, 2000), this does not mean that all extrinsic incentives are necessarily viewed as authoritarian and thus undermine levels of intrinsic motivation (Cerasoli et al., 2014; Deci et al., 1999). Due to their apparent non-controlling nature, the findings of Deci et al. (1999) depict that awards that do not need the action of starting or finishing the assignment, do not alter intrinsic motivation. Contribution quantity is found to be strongly positively correlated with extrinsic incentives, but only moderately correlated with intrinsic motivation (Cerasoli et al., 2014). In addition, spamming is a frequent issue on paid crowdsourcing websites. Workers in paid crowdsourcing may be compensated regardless of the quality of their answers. To circumvent spam filters, they may be given the opportunity to randomly fill up form fields. But the study's authors were unable to rule out the possibility of spam in volunteer crowdsourcing. This area is not

adequately investigated (Pinto & dos Santos, 2018). For the long-term user, findings from Pinto and dos Santos (2018) depict greater importance given to intrinsic motivational factors compared to extrinsic ones, where monetary rewards proved irrelevant. In some studies, too much of a reward may weaken the motivation of providing deep and high-quality contributions and tacit knowledge sharing (N. Wang et al., 2021). The platform's intangible or virtual benefits may go unnoticed by some users. Findings suggest that this kind of understanding affects the way people share their expertise (Geri et al., 2017).

2.4.2 Gamification relationship with knowledge contribution

The role of gamification is to influence psychological elements that mediate outcome and knowledge contribution. The procedure would be to choose game features based on motivational affordance and their theoretical relevance to the desired psychological results. The desired psychological outcome must then be linked to desired behavioral change. Scholars continue to discuss whether gamification is driven primarily by internal or extrinsic motivations. According to market research, "gamification can provide richer data and boost participant involvement." (Bailey et al., 2015). Self-determination theory and social interdependence theory, among others, have been used to explain how gamification motivates. The common conceptual ground between these theories is the recognition that wants and needs drive human behavior. Gamification artifacts increase users' extrinsic and intrinsic motives, and hence their engagement (Prestopnik & Tang, 2015).

Many researchers agree that to attain better insight into the psychological mechanisms of gamification, the singular game components' impact on solvers' motivation should be investigated rather than bundled as a whole. Informational performance feedback (e.g., points) and clear challenging but attainable goals (e.g., levels, rankings) satisfies users' need for competence. However, it must be in a non-authoritarian and in a purely optional context. Points and feedback can have an impact on solvers' participation (Feng et al., 2018). Research by Rawsthorne and Elliot (1999) shows that informational feedback only drives the desire for competence in the context of skill acquisition or task mastery, but not performance objectives. Levels and leaderboards' effect on contribution quantity seems to be more pronounced, unlike

points alone. Findings about its effect on results quality are inconclusive (Cerasoli et al., 2014; Jung et al., 2010; Mekler et al., 2017). Badges and similar techniques may be the primary extrinsic motivator to share information on a user-generated content website where reciprocity plays a significant role (Geri et al., 2017). Aside from competence, game components may also fulfill other needs including autonomy and relatedness. The gamification approach should focus on supporting all three psychological needs rather than just one. The user may participate out of their own volition without penalty for sense of autonomy. The gamification affordances would provide reasonable challenges and provide informational feedback for sense of competence. Feeling appreciated and connected for a sense of relatedness could also be derived from the game component. The hope is that by addressing psychological needs, authentic motivations for learning will emerge as learners believe they have the ability to master the learning task and, as a result, internalize its value (Kam & Umar, 2018).

The technique of gauging one's own intrinsic motivation is also relevant to studies on the affordances of gamification. Observational measurements of freedom of choice may shed more light than self-reporting measures alone. For high-ranking users in Stack Overflow, self-reported intrinsic motivation indicates that helping others, reciprocity, and making an impact, are more important than financial gains or organizational pressures (Penoyer et al., 2018). However, it must be emphasized that not all aspects of games encourage player cooperation. Altruism can emerge from cooperative game mechanics, and it can motivate people to work together toward a common objective (a "we-goal") (Riar et al., 2022).

Many factors may moderate the relationship between gamification affordances and user knowledge contribution behavior, whether the badges and rewards are visible to the public influence the users' behavior. When contributions and rewards could be seen among everyone, there was higher user engagement (García et al., 2017). The manner in which feedback is offered or perceived is equally important. Users felt less capable when it came to regulating performance feedback versus informational feedback. Users' responses to feedback may be moderated by their causality orientation (Wang et al., 2012). Individuals who value autonomy see input as more informative than those who value control and acquire more fulfillment

on competence needs (Vansteenkiste et al., 2010). A study by Koivisto and Hamari (2014) reveals that demographic factors affect users' reactions to gamification, especially throughout the course of time.

Many potential moderators remain to be investigated in environmental, social, and situational characteristics, for example solvers' overall causality orientation, competitiveness level, age, gender, educational background, experience with games, voluntary choice of participation, and so on. Individual and contextual factors have a major impact on the effectiveness of motivating affordances (Dahlstrøm, 2012). Because the novelty effect may play a role in gamification research, the short-term experimental study may not provide insight into how game design aspects encourage users' knowledge contribution behavior in the long run (Koivisto & Hamari, 2014). There are many personality typologies used in research to categorize users' personality types, such as the Hexad scale, the five-factor model, or the Big Five. The purpose is to draw more understanding of preferred game components or mechanics and achieve personalized gamification with superior user engagement compared to the standardized version.

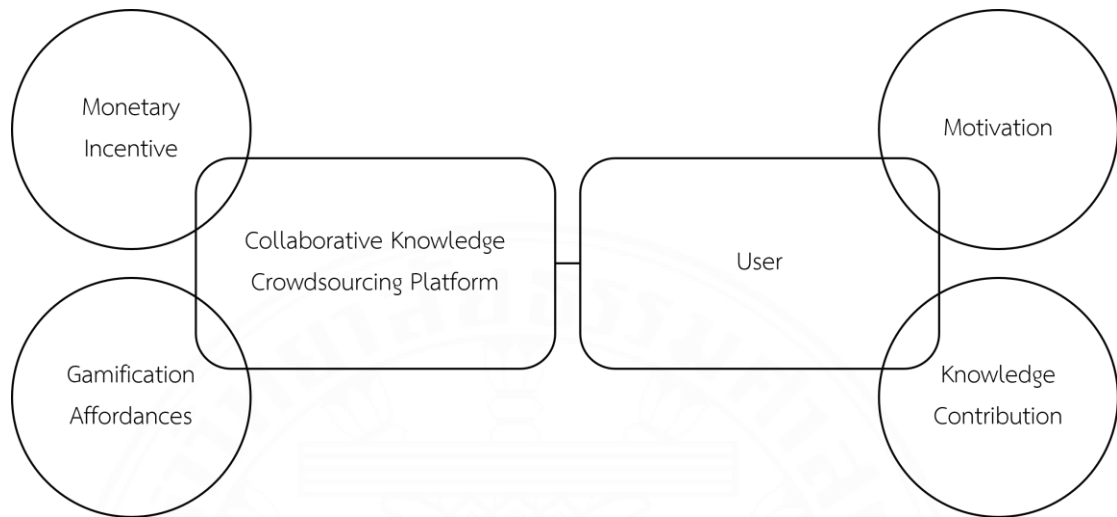
2.5 Conceptual Framework

The author proposes the following conceptual framework based on previous works of literature and related theories. It is hypothesized that monetary incentive mechanics and gamification affordances used in a collaborative knowledge crowdsourcing platform will influence user motivation and knowledge contribution behavior.

The collaborative knowledge crowdsourcing platforms utilize monetary incentive mechanisms to offer users a direct payment in return for their contributions. They may also employ gamification affordances and game mechanics within the site to interact with the users.

These factors may influence the user's range of motivations related to their contribution actions on site. Knowledge contribution behavior such as posting questions or answers may be affected as a result.

Figure 2.1
Conceptual Framework



CHAPTER 3

RESEARCH METHODOLOGY

“Gamified Knowledge Crowdsourcing: A Multi-case Study” examines the relationship between gamification affordances and additional incentive mechanisms, and user knowledge contribution behavior using qualitative multiple case study methods. The selected platforms are studied in detail and account for their history and gamification and additional incentive application context. Data triangulation is used to improve the reliability of data and the data collection process. The data would be collected from multiple sources which are documentations, semi-structured interviews, and direct observation. Once retrieved, they are analyzed through thematic analysis to find meaningful theme and linkages back to the research objectives in each case study. By performing multiple case studies where two or more cases of similar phenomena are investigated, the author could compare similarities and contrasts between these cases, then draw compelling cross-case conclusions based on evidence found in multiple cases. Ultimately, the author may create an informative recommendation for understanding knowledge-intensive crowdsourcing businesses. This section comprises of the following sub-sections:

3.1 Case Study Selection Criteria

3.2 Data Collection

3.3 Data Analysis

3.1 Case Study Selection Criteria

Three cases are chosen to represent a variety of contexts in which gamification affordances and additional incentives are applied. The author employs purposive sampling to select the knowledge crowdsourcing platform which provides answers to the research questions and objectives. The criteria are as follows:

1. The selected platform includes mechanisms for posing and answering questions by users.

2. The users within the selected platform form community of practice and professional learning network among them

3. The selected platform has a gamification system in place to motivate users' knowledge contribution.

4. Depending on the platform, there may or may not be monetary incentive mechanisms in place for users to contribute their knowledge.

5. The selected platform is in English language, active, and can be observed directly by the author.

From these five criteria, the selected platforms are Quora, Stack Overflow, and Reddit, as elaborated in the following summary table:

Table 3.1

Case Study Selection Criteria Summary

Selection Criterion	Quora	Stack Overflow	Reddit
1. The selected platform includes mechanisms for posing and answering questions by users.	Yes	Yes	Yes
2. The users within the selected platform form community of practice and professional learning network among them	Yes	Yes	Yes
3. The selected platform has a gamification system in place to motivate users' knowledge contribution.	Yes	Yes	Yes
4. Depending on the platform, there may or may not be monetary incentive mechanisms in place for users to contribute their knowledge.	Yes	No	Yes
5. The selected platform is in English language, active, and can be observed directly by the author.	Yes	Yes	Yes

Within these sites, the selected contents are from community of practice related to software developers and computer programmers. For Stack Overflow, the whole site is built around contributions and knowledge database related to software development and computer programming. For Reddit, this may include subreddits such as r/askprogramming, r/askpython, and r/learnprogramming, etc. Within these communities, users would post questions and answers related to programming and life or work as a software developer. The questions may be technical or general in nature. For Quora, this may include spaces such as Programming & Programmers, Code, and topics such as Computer Programming, etc.

3.2 Data Collection

3.2.1 Research Objectives and Tools Selection

To answer research questions and meet the objectives of this study. Data triangulation is used from multiple sources, which are documentations, direct observation, and semi-structured interview. Each source may or may not be able to answer every research objective. Together in tandem, however, these would provide the author with a more complete picture of the case study, as shown in the table below:

Table 3.2

Research Objectives and Tools Selection Summary

Objectives	Documentations and Secondary Data from the Internet	Direct Observation	Semi-structured Interview
1. To study gamification affordances and additional incentives applied in the selected knowledge crowdsourcing platform	No	Yes	No

Table 3.2*Research Objectives and Tools Selection Summary (cont.)*

Objectives	Documentations and Secondary Data from the Internet	Direct Observation	Semi-structured Interview
2. To study the contribution behaviors of the users	Yes	No	Yes
3. To study the relationship between gamification affordances and additional incentives and contribution behaviors of the users	Yes	No	Yes

3.2.2 Techniques and Tools Criteria

The main data collection instruments used in this research are documentations and secondary data on the internet, direct observations, and semi-structured interviews. The detail of each tool are as follows:

3.2.2.1 Documentations and secondary data on the Internet

The documentation and secondary data found on the internet would provide the author with stable, repeated reviews, and broad coverage in an extended time span. To scope the study clearly, the related documentations used in this research are peer reviewed content excluding citations, written in English, retrieved from Google Scholar database, published between 2013 to 2023.

Using a single keyword is inefficient for finding the best results, thus a query was created. We gather all relevant research by combining keywords with “OR”. The keywords used are the platform’s name, gamification affordances, platform’s specific gamification affordances name, platform’s incentive program name. To narrow down the search for only relevant literature, the query search in the title of the article, not just anywhere. From this, the query used, papers found, and papers selected from Google Scholar advanced search is as follows:

Table 3.3*Search Queries Summary*

	Quora	Stack Overflow	Reddit
With all of the words:	Quora OR Quora+ OR "Quora Plus"	StackOverflow OR "Stack Overflow"	Reddit
With at least one of the words:		Careers OR Career OR Reward OR Motivation OR Motivations OR Gamification OR Badge OR Badges OR Award OR Reputation OR Point OR Points OR Ranking OR Contribution OR Contributions OR Rating	karma OR point OR points OR trophy OR trophies OR award OR awards OR voting OR upvote OR downvote OR premium
Articles Results	96	27	33
Selected Articles	11	23	11

Remarks: Exception are made for Quora since combination of the platform name and gamification affordances yield very poor results of just 4 articles found with 3 remains relevant. This is elaborated in the limitations section in chapter 5.

From the search results, the author would read through the title and the abstract to verify their relevance. Only those which relate to the research objectives are selected for further analysis. The full list of articles can be found in Appendix A.

Additionally, secondary data on the internet could provide general data of the platform not available on site, such as its history, origin, business models, market valuation, etc.

3.2.2.2 Direct observation of the platform and its users

Direct observations in the platform as an observer would provide the author with contextual which covers event context along with insights on interpersonal behavior. The author would register as a user to navigate the platform and observe interactions among users, between users and the platform, as well as gamification affordances and additional incentive mechanics applied within the platform throughout its life span. The observation checklist of the gamification affordances and incentive programs may include but not limited to:

1. What are they and how do they work?
2. Their significance and relevance to the users?
3. How to earn, lose, or utilize such affordances?
4. Their status, whether they are active, cancelled, or suspended?
5. Their history, as available in the site's official announcement.
6. User perception, or thread discussion revolving around them.

3.2.2.3 Semi-structured Interview with users

Semi-structured interview would provide the author with targeted focus group insight, experienced users who contribute knowledge, which may not be covered in documentations or through direct observations. A minimum of 2 interviewees per platform is set as a target.

To scope this study clearly, the interviewee may either be Thai or English speaker of at least 18 years of age, has minimum of 1 years-experience on the platform, and continue to contribute regularly by answering posted questions. The interview should be conducted, recorded online using Microsoft Teams, and last between thirty and sixty minutes. Throughout, the interviewees would maintain their anonymity. A letter of consent detailing the specifics and procedures of the interview would be issued to them beforehand. The semi-structured interview script would be developed based on data collected from documentations and secondary data on the internet, including direct observations. The interview protocol which outlines full question guides can be found in Appendix B.

To secure the interviewees, different approaches are implemented for each platform. For Stack Overflow, there is an unofficial leaderboard by geographical location. The author lists out top users from Thailand and direct messaging and emailing those who provide their contact in their bio. Ultimately, the author has found two experienced Thai users who is willing to help with this study. For Reddit, no such leaderboard is available. The author had gone through programming-related subreddits such as r/learnprogramming, r/learnpython, etc., to search for active contributors who would fit interviewee criterion as seen in their past question and answers record. Once identified, the author would direct messaging to ask for an interview with small monetary incentive of 15 USD Amazon gift card in return of their time. The author was able to find 2 experienced Redditors who agreed to do an interview. For Quora, with limited personal network resources and imposed restrictions of only two direct messages to other users are allowed per day, the author could not find interviewees. This is highlighted in the limitation section in chapter 5.

3.3 Data Analysis

This research uses thematic analysis with deductive approach as the author has already established the conceptual model of gamification affordances and additional incentive mechanics relationship with knowledge contribution, from review of literatures. The conducted process would strictly follow AMEE Guide No.131 (Kiger & Varpio, 2020) to ensure validity and reliability. They use a six-step, recursive analytical process as follows:

1. Familiarizing Yourself with the Data. The author would transcript and read though the raw data, including interviews, observations, memos, actively and repeatedly without coding just yet.

2. Generating Initial Codes. The author would generate code which is the simplest part of the raw data that can be meaningfully analyzed about the phenomena. The author notes any possible links or patterns between the pieces at this point to help with the theme development that follows.

3. Searching for Themes. The coded and collected data extracts are examined in the third stage to seek potential themes of wider relevance. The researcher constructs themes by combining, evaluating, comparing, and even visually visualizing the relationships between the codes. The development of themes will be guided by established theories and/or theoretical frameworks for deductive analysis.

4. Reviewing Themes. Iterative process where the author asks whether there is sufficient data supporting the themes, or whether they are too vague or too broad. Data from different themes should be unique enough to warrant separation.

5. Defining and Naming Themes. In this step, the author would create a definition and narrative description of each theme. The author should also look for its importance to the research questions, while searching for overlap between themes.

6. Producing the Report/Manuscript. Final analysis and findings are written in this step. Relating themes to wider questions, referencing relevant works, addressing findings' significance, and criticizing the themes' assumptions or preconditions can widen the study.



CHAPTER 4

RESULTS AND DISCUSSION

4.1 Collected Data

The unit of analysis of this study is the platforms, which are Stack Overflow, Reddit, and Quora. This study examines user contributions, gamification affordances, and monetary incentives and their relationships. Multiple qualitative case studies incorporate peer-reviewed papers, semi-structured interviews, and direct observations to meet all study objectives. The author could better comprehend user contributions (objective 2) and gamification impact (objective 3) by reviewing relevant literature. While many papers cover quantitative and big data analysis, semi-structured interviews enhance and even better understanding as it provides underlying context for such actions and motivations. With dynamic nature of knowledge crowdsourcing platforms, direct observation would be required to get an up-to-date view on gamification affordances and monetary incentives employed (objective 1). Thematic deductive analysis examines data. The author may derive major cross-case inferences by comparing these situations.

4.1.1 Stack Overflow

Data comes from peer-reviewed articles, semi-structured interviews, and registered user observations. As the researchers could scrap the data from Stack Overflow public API, many papers focus on big data analysis on user contributions. From 27 Google Scholar query search results per data collection scope, 23 relevant non-repeating English papers were found. 9 studies discuss user motivations, whereas 14 discuss Stack Overflow gamification. We assess 6 papers but exclude them from the result section in Appendix A since their primary conclusions may not add to the case study findings. Some publications are inconclusive, analyze user personality, artificial intelligence, and gender disparities.

The author secured two Thai online interviews from Stack Overflow interviewees 1 and 2. To achieve this, the author lists out top users from unofficial Thailand-based user's leaderboard and direct messaging and emailing those who provide their contact in their bio. Finally, two experienced Thai users agreed to cooperate with this study. This case could also benefit from interviewee no. 4's insights. The interviewees basic information is as follows:

4.1.1.1 Interviewee No.1

Gender:	Male
Age:	46
Country:	Thailand
Education:	Master's Degree
Current Occupation:	IT Consultant
Platform:	Stack Overflow
Usage Duration:	7 years

4.1.1.2 Interviewee No.2

Gender:	Male
Age:	40
Country:	Thailand
Education:	Bachelor's Degree
Current Occupation:	Business Owner
Platform:	Stack Overflow
Usage Duration:	15 years

Direct observation was made on StackOverflow.com as a registered user. The author has observed the following but not limited to the home page, user profile page, other user profile page, questions and answers made in the questions section, meta community, and the tags section.

4.1.2 Reddit

Data comes from peer-reviewed articles, semi-structured interviews, and registered user observations. From 33 Google Scholar query search results per data collection scope, there are total of 11 relevant non-repeating English papers found. Many papers were found to be irrelevant as they are not about Reddit, but

only seek Redditors' opinion for their research topic. There are 8 papers with linkage to gamification, while the other 3 focus elsewhere. A total of 3 papers are analyzed but not included in the result section as denoted in Appendix A since their key findings may not contribute to the case study findings. This includes articles about Twitter vs. Reddit, user personality effect on Karma points, and impact from Redditors on wearables abandonment.

The author was able to secure 2 online interviews in English from interviewee no. 3 and 4 on Reddit. Unlike Stack Overflow which we can identify top users by geographical location, there is no such official or unofficial leaderboard available in Reddit. Additionally, with Reddit's anonymity in nature, Redditors don't typically leave their contact information in their bio. To find active contributors who met interviewee criteria based on their past question and answer record, the author searched programming-related subreddits like r/learnprogramming, r/learnpython, etc. Once found, the author would direct message to request an interview with a 15 USD Amazon gift card for their time. From 54 Redditors approached, the author was able to find 2 experienced Redditors who agreed to do an interview. The interviewees basic information is as follows:

4.1.2.1 Interviewee No.3

Gender: Female
 Age: 28
 Country: United States
 Education: High School
 Current Occupation: Software Developer
 Platform: Reddit
 Usage Duration: 10 years

4.1.2.2 Interviewee No.4

Gender: Male
 Age: 30
 Country: Canada
 Education: Polytechnic College
 Current Occupation: Software Developer

Platform: Reddit, Stack Overflow

Usage Duration: 9 years

Direct observation was made on Reddit.com as a registered user. The author has observed the following but not limited to the home page, user profile page, other user profile page, subreddits communities, and post page. Reddit became very dynamic in 2023 with its cancellation of the long-running Award badges gamification system. Public announcements, online articles, and other secondary information from the internet are used to provide better clarity and context, especially for the case where game elements do not exist anymore.

4.1.3 Quora

Data comes from peer-reviewed articles and registered user observations. With the limited number of papers from the query search in Google Scholar per data collection process, the author extends the scope of the search to include every article with the word “Quora” in the title. Through this revised method, there are total of 11 relevant non-repeating English papers found. However, no papers related to gamification impact on user contributions were found since most articles related to user behaviors.

The author was not able to secure experienced Quorans for a semi-structured interview. This is due to limited personal network and imposed restrictions of only two direct messages to other users are allowed per day, preventing direct messaging strategy unlike Reddit and Stack Overflow.

Direct observation was made on Quora.com as a registered user. The author has observed the following but not limited to the home page, user profile page, other user profile pages, spaces, topics, questions, and answers, and following page. Quora has been around for a long time since 2009. The gamification system employed has gone through changes and cancellations along the way. In the absence of game features, public announcements, online articles, and other secondary information from the internet provide clarity and context.

4.2 Case Study 1, Stack Overflow

From 17 chosen documentation, 3 semi-structured interviews' insights, and direct observation outcome as registered user, the results can be categorized into the following sections:

4.2.1 To study gamification affordances and additional incentives applied in the selected knowledge crowdsourcing platform.

4.2.1.1 Reputation Points

4.2.1.2 Badges

4.2.1.3 Leaderboards

4.2.2 To study the motivations and contribution behaviors of the users.

4.2.2.1 Extrinsic Motivation for Career Advancement

4.2.2.2 Extrinsic Motivation for Site Utilization

4.2.2.3 Intrinsic Motivation for Knowledge and Competence

4.2.2.4 Extrinsic Motivation for Sharing

4.2.2.5 Extrinsic Motivation for Social Image

4.2.2.6 Long-term Contribution

4.2.2.7 High-quality Contribution

4.2.2.8 Contribution Across Multiple Platform

4.2.3 To study the relationship between gamification affordances and additional incentives and contribution behaviors of the users

4.2.3.1 Reputation Points

4.2.3.2 Badges

4.2.3.3 Leaderboards

4.2.1 To study gamification affordances and additional incentives applied in the selected knowledge crowdsourcing platform.

4.2.1.1 Reputation Points

"Reputation" points on StackOverflow.com refer to a numerical score that reflects a user's contributions and interactions on the platform. Reputation points are a central part of the Stack Overflow community, motivating users to

contribute valuable content and fostering a culture of knowledge sharing and collaboration. Reputation points can be gained and lost mainly through the upvote and downvote system which is designed to promote a fair and balanced approach to content assessment. It allows the community to collectively determine the quality and relevance of contributions. Votes are anonymous, meaning that other users can't see who specifically upvoted or downvoted a post. This anonymity encourages users to vote based on the content's merit rather than being influenced by the voter's identity.

When a user's question or answer or article receives an upvote, the user earns +10 reputation points. An upvote signifies that the content has contributed positively to the community and that other users should consider it valuable. A response that is tagged as "accepted" earns the writer +15 reputation points. Accepting a proposed edit gives the editor an additional +2 reputation point. Posts with more upvotes are prioritized and displayed more prominently on the platform. This ensures that high-quality content is easily discoverable by other users seeking solutions to similar problems.

On the other hand, downvotes can lead to a reduction in the user's reputation score for both the voter (-1 point) and the receiver (-2 points). Downvotes serve as feedback to the author, indicating that improvements are needed to make the content more valuable and relevant. It encourages authors to revise their posts to address the concerns raised by the community. Users can also downvote questions and answers that they believe are poorly researched, inaccurate, unclear, or not useful. A downvote indicates that the content has problems or does not meet the platform's quality standards. Posts with more downvotes are pushed down in the ranking and are less likely to be seen by other users. Users may also lose reputation points by offering bounties on questions they find particularly challenging or important. A bounty is a reward offered from askers to users who provide the best answer to the question within a specified time frame.

Reputation points serve several purposes on Stack Overflow. Higher reputation scores generally indicate a user's level of expertise and involvement in the community. As users contribute valuable content and participate in discussions, their reputation points increase. This can lead to increased recognition and trust among other users. In turn, reputation points then unlock certain privileges on the platform. These privileges allow users to perform actions such as upvoting and downvoting, commenting, editing posts, and even closing or re-opening questions. As a user's reputation increases, they gain access to more of these advanced moderating features. These privileges are meant to ensure that users who demonstrate their expertise, positive contributions, and familiarity with the platform's guidelines are given more control over the quality and maintenance of the content. They can help review and flag posts, participate in meta discussions, etc. This system encourages active participation and helps maintain the integrity of the Stack Overflow community.

4.2.1.2 Badges

"Badges" on StackOverflow.com are virtual awards or achievements given to users for specific actions, accomplishments, and contributions on the platform. These badges serve multiple purposes, including recognizing and encouraging positive behaviors, showcasing expertise, and fostering a sense of community engagement. Badges are an additional way for users to earn recognition and demonstrate their level of participation and knowledge within the Stack Overflow community.

Users earn badges automatically as they meet the criteria associated with each badge. Each badge comes with a description that outlines the actions or accomplishments required to earn it. Users can view these descriptions to understand what they need to do to earn specific badges. In your profile page, you can see the badges you've earned and the ones you're close to earning. Some users may engage in "badge hunting," where they actively work towards earning specific badges. This can lead to friendly competition and engagement within the community.

When a user completes the required actions, the badge is added and publicly displayed on a user's profile. Badges can be viewed by clicking on a user's profile and navigating to the "Badges" section. Some badges also come with profile flair, which are small graphical icons displayed on a user's profile to indicate their badge achievements.

There are various types of badges on Stack Overflow, each awarded for different types of actions and accomplishments. Some common categories of badges include Question Badges, awarded to users for their actions related to asking questions, such as the "Nice Question" badge given to users who achieve a question score of 10 or more. Answer Badges are awarded to users for their actions related to answering questions, such as the "Teacher" badge given to those who answer a question with a score of 1 or more. Furthermore, there are Participation Badges related to site participation, Tag Badges which are awarded contributions to non-community wiki answers, Moderation Badges associated with site moderation activities like flagging, or voting, and Other Badges for other things.

Many badges come in multiple tiers or levels, each requiring a certain level of activity or achievement. For example, a badge might have bronze, silver, and gold tiers, with each tier representing a higher level of accomplishment. To bring a joyful and lighthearted touch to the community over the holidays, there are also seasonal badges, like the one for "Winter Bash," an annual event on Stack Exchange that encompasses Stack Overflow. By taking part in different events on the platform, users may win virtual hats during the Winter Bash event, which usually runs from mid-December to early January.

4.2.1.3 Leaderboards

A "Leaderboard" is a dynamic display that ranks users based on various criteria, typically related to their contributions and activities on the platform. There are reputation leaderboards publicly available on StackExchange.com with StackOverflow as its sub-community, and a "Top Users" leaderboard for each tag ranking users by either questions or answers. Leaderboards provide a way to see how users compare to each other in terms of reputation points, badges earned, answers, or other metrics that indicate their involvement and expertise within the community.

Some leaderboards are time-bound and show users who have gained the most reputation or earned the most badges within a given week or month. These leaderboards encourage ongoing participation and competition.

Leaderboards honor and promote the accomplishments of informed and involved community members. They create a reputation among their peers and deliver a sense of accomplishment. Leaderboards incentivize users to answer questions, enhance information, and participate in debates to foster a healthy sense of competitiveness and stimulate community involvement. People may find users who are highly involved in the community or who are experts on particular subjects by using leaderboards. Leaderboards help to ensure that the content is of a high caliber. Top-ranking users frequently contribute accurate and useful information, which results in better-quality debates and solutions.

4.2.2 To study the motivations and contribution behaviors of the users.

There is a mixture of extrinsic and intrinsic motivations for participation in Stack Overflow, however, their primary source of motivation is intrinsic.(Lu et al., 2021). The highest-ranked user prioritized assisting others, reciprocity, and impact over money rewards and corporate pressures. Extrinsic motivation may be useful in the beginning to increase participation; however, intrinsic motivation becomes the driving force (Penoyer et al., 2018).

4.2.2.1 Extrinsic Motivation for Career Advancement

Opportunities for career advancement are a major factor in encouraging developers to contribute significantly, and gamification awards serve as a way to achieve career-related goals (Lu et al., 2021; Xu et al., 2020). Achievements and indicators within the platform can verify their expertise in a specific field or coding language during job interviews. It is an important career signaling tool. This can be depicted in the following interview transcript.

“I remember those moments when I accumulated a lot of points. I kept them to impress my friends or just in case they might come in handy for future work or something like that, you know, just a little bit of insurance.” (Interviewee 1, Interview, 30 June 2023)

“I attached myself to Stack Overflow to gain reputation not only in Thailand but also internationally. I wanted to be able to compare my work with others and see how well I was doing.” (Interviewee 2, Interview, 18 July 2023)

“I wanted to take my profile and compare it with opportunities abroad.” (Interviewee 2, Interview, 18 July 2023)

“From my perspective, if you want to work for international companies, you need certain qualifications beyond what you write in your resume, such as language skills, both soft and hard skills, and more.” (Interviewee 2, Interview, 18 July 2023)

“I can take the platforms where people come in and show that we have real knowledge in this area. That's what I need, something to prove that I truly have the knowledge in this field.” (Interviewee 2, Interview, 18 July 2023)

Hiring companies use Stack Overflow to scout for talents. In relation to this, users may contribute significantly more during job search or towards graduation to improve future employment prospects (Xu, 2016; Xu et al., 2020). After finding a new job, documentations show varying contribution behavior. Xu (2016) states in the first few months of a new job, contributors ask 14.7% more questions on Stack Overflow, probably due to the need for learning new tools related to a new job. While Xu et al. (2020) result shows answering activities decrease in comparison to editing.

Stack Overflow doesn't provide monetary incentives for user contributions such as asking or answering questions. Users don't expect direct incentives from their contributions as well considering how career advancement in tech industry yields much higher impact financially. This is depicted in the following interview transcript.

“I didn't receive any money, nor any other incentives.” (Interviewee 1, Interview, 30 June 2023)

“No, there isn't any (monetary incentive). Yes, but when it increases, they call it increasing our credibility, right? It also makes our hourly work rate higher.” (Interviewee 2, Interview, 18 July 2023)

Firstly, programmers who use Stack Overflow are already doing well financially. Maybe some students or young individuals might use it, and there could be some incentives for them, but for the domain of programming questions, I can't think of any effective incentives. The social incentives, like the reputation points and such, seem to be sufficient. (Interviewee 1, Interview, 30 June 2023)

4.2.2.2 Extrinsic Motivation for Site Utilization

With a privilege system in place, to perform different types of activities and functions available within the platform such as editing questions, the users must gain a certain number of reputations or pass certain criteria. This motivates the bystanders to register as a user and contribute to the community. This is depicted in the following interview transcript.

“If I want to upvote someone else's post, I need to be a member first and earn points. Then, if I want to edit or post questions, I must have earned points.” (Interviewee 2, Interview, 18 July 2023)

“So, I registered, started asking questions, and then went on to answer questions, something like that.” (Interviewee 2, Interview, 18 July 2023)

I wanted to be actively involved and have a full engagement experience. In the beginning, I intended to ask questions first. When I did ask questions, sometimes I encountered issues and found other people asking similar questions but not getting suitable answers or no answers at all. So, I started answering those questions. As I engaged more, I earned many points. (Interviewee 2, Interview, 18 July 2023)

“After we unlock ourselves, we could then ask questions, upvote, downvote, or anything like that.” (Interviewee 2, Interview, 18 July 2023)

“So, I started reading about the badges, like how can we unlock everything.” (Interviewee 2, Interview, 18 July 2023)

In the beginning, my score was not high enough, and I couldn't even edit answers. The features on Stack Overflow were quite limited, and we didn't have much privilege to edit tags or do other things. So, I set a goal for myself, like, “Hey, I need to earn a lot of points, reach a hundred or a

thousand, so that I can have the privileges to use this and that feature." The voting rights, upvotes, and downvotes were crucial at that time because the scores had an impact on the usability of the site. It was like, from a certain point onwards, I started accumulating points, and it was fun, you know. I set a goal to reach a thousand and then two thousand or even ten thousand. There were different phases along the way, and it was enjoyable. (Interviewee 1, Interview, 30 June 2023)

"I do remember that in the early stages, I was eager to provide good answers, but I couldn't edit or do much due to my low score. So, I aimed to get more points to access the various features of Stack Overflow." (Interviewee 1, Interview, 30 June 2023)

4.2.2.3 Intrinsic Motivation for Knowledge and Competence

Users follow specific topics that are inherently interesting or related to their work. This may cover programming language tags such as Java, Python, and CSS, or categorical tags such as database, arrays, windows, etc. Checking new questions and answers from competent professionals helps them get better at becoming an expert in their field. Answering or asking questions and gaining constructive feedback from the community help users gain knowledge and confidence in their skills. This is depicted in the following interview transcript.

I started using it from the early stages, and sometimes when I asked a question, people from Google themselves would answer, like one or two individuals...I happened to use Google Colab and answered questions to help others, which was good. By doing that, I gained a lot of knowledge by reading other people's answers. Those who work at Google and answer questions are developers themselves, so we get to hear what they say, right? We gain knowledge. (Interviewee 1, Interview, 30 June 2023)

"Or even just reading other people's answers gives me knowledge. It provides some kind of motivation." (Interviewee 1, Interview, 30 June 2023)

“I followed along because I wanted to become an expert in using Google Colab. When someone asked something I had previously searched and found the answer for, I answered it because I had already done the research.” (Interviewee 1, Interview, 30 June 2023)

Uh, especially in the beginning because in the in the beginning I learned just how good of a a tool it was to learn from, like even though I was attempting to help others. I was learning tons of information just by being on the platform like for for example. I currently work as a JavaScript developer. I never actually sat down and learned JavaScript. I accidentally learned JavaScript just from exposure to Stack Overflow because I I read questions about how the language would work, and then I'd see an expert answer and I would learn a little bit. And then I read another question and expert would answer and I learned a little bit more and over the course of years, eventually I learned JavaScript and that's what I'm currently employed of. (Interviewee 4, Interview, 14 October 2023)

The purpose of the beginning was for me to get help and then, like I said, I learned as I'm using the site I learned just what else you can get out of it. That's why I learned closure, for example the language closure. My favorite language, and I learned it just because I happened to read a question that was about closure, and I looked at the code and like, well, that's a pretty cool looking language. And then I ended up learning it and writing it for three years just because I happened to see it on Stack Overflow one day. Seeing what programming was all about, because especially in the beginning when I only knew C++, my exposure in my outlook of what programming was very narrow. (Interviewee 4, Interview, 14 October 2023)

“It's a great way to learn and as I'm sure that given this is the entire purpose of your study here, it's very addicting. Uh, you want to keep doing it.” (Interviewee 4, Interview, 14 October 2023)

4.2.2.4 Extrinsic Motivation for Sharing

Users feel good if other people find their answers useful or if they can contribute to the community positively. By contributing and sharing their knowledge, they are helping people as a public service. At the same time, novel knowledge, alternative solutions, or bug fixes are not lost but documented properly for others to find in the future. This is depicted in the following interview transcript.

“Some questions are easy to answer, so I help out, and it feels good when people like my responses.” (Interviewee 1, Interview, 30 June 2023)

“People liking my answers, they genuinely benefited from it, right? It means it's good.” (Interviewee 1, Interview, 30 June 2023)

“As for me, it's good that I can provide knowledge to people, gain merits, or earn points, something like that.” (Interviewee 1, Interview, 30 June 2023)

“Sharing knowledge was also an important aspect. It felt good to share and benefit others, knowing that they could gain something from it.” (Interviewee 1, Interview, 30 June 2023)

“It's still a form of sharing, even though I don't have a blog, I can share my knowledge on Stack Overflow instead.” (Interviewee 1, Interview, 30 June 2023)

“I think it's good to contribute our knowledge here and share it with the public. It's beneficial for everyone.” (Interviewee 1, Interview, 30 June 2023)

It means the person who asks the question must have gone through almost an auto-suggested process right there. Here, it might be a question that is an odd or unexpected error they have never encountered before. Well, it could be something I've encountered in my previous work, and I might be able to answer it. (Interviewee 2, Interview, 18 July 2023)

Well, this whole scoring thing is just one aspect. It's not like money; it's about recognition and reputation. One thing that's really important and makes sense is the aspect of knowledge. I want there to be knowledge available somewhere that people can come and find answers. It's like

when we look for something, and we can't find anyone to answer, it's frustrating. I want there to be answers available for things that might not have been known or are interesting topics. I can easily provide answers for these kinds of questions. If there's still a question that nobody knows or something intriguing, I can research and help find the answer. I keep the answers here so that in the future, people won't have to struggle to find them again. When they come looking for answers, they can find them right here. It makes things more convenient for people, and it's like a little act of kindness, and it also adds to our reputation a bit. (Interviewee 1, Interview, 30 June 2023)

Contribution is not only limited to just answering questions. Upvoting good answers or questions, editing answers, and moderation activities, can be other forms of contribution that serve the community good as well. This is depicted in the following interview transcript.

“I haven't reached out or contacted anyone. But I have helped by voting, voting for several years, like 3 or 4 years consistently, especially when someone is running for moderator.” (Interviewee 2, Interview, 18 July 2023)

“There are cases where they are mistagged, and when I notice that I go and correct them.” (Interviewee 1, Interview, 30 June 2023)

“It's about upvoting too; I upvote sometimes. For example, with Colab, if I see someone else has given a good answer, I might not answer ourselves but just help by upvoting.” (Interviewee 1, Interview, 30 June 2023)

“The truth is, it has zero votes, like 0, or even -2 votes, right? But in reality, it's actually a good question, you know. It shouldn't be like, let's say, a good question but got downvoted like this. It's like, "Hey, let's fix it for them." (Interviewee 2, Interview, 18 July 2023)

Contributions are born from personal experience and interest. Users might not make the extra effort to respond to questions on subjects outside of their areas of expertise. This is depicted in the following interview transcript.

“Once it became questions related to Ruby, .NET, or something like that, well, hey, I could answer those. I could answer those types of questions.” (Interviewee 2, Interview, 18 July 2023)

The answer with the most upvotes was not mine, but it was similar to the problem I encountered. I had the same problem, and I used the flow I found there, but it didn't work, right? It didn't work, as they said, it's no longer valid or something like that. Then, I finished, and I went to find my own answer. I had to go and write code, something like that, and I got my answer, which was my code that worked. So, I posted it. (Interviewee 2, Interview, 18 July 2023)

“But honestly, it's not that I want them to come and upvote. It's because I encountered this problem myself, and no one has answered it. No one has asked it here, so I will ask the question.” (Interviewee 2, Interview, 18 July 2023)

“So, it's like, Flow is born from personal issues, issues I faced before.” (Interviewee 2, Interview, 18 July 2023)

“I wanted to share it with others. It wasn't tiring at all because it was knowledge I had already found before.” (Interviewee 1, Interview, 30 June 2023)

On Quora, you need to write well, and it's more about the style of answering like on Stack Overflow where you can give a code snippet that works without needing to have excellent language skills. You just provide the code, it runs, and that's it. So, I tend to answer on Quora less because it requires longer explanations, and I'm not confident that my language skills are that good. (Interviewee 1, Interview, 30 June 2023)

4.2.2.5 Extrinsic Motivation for Social Image

Users want to be perceived as someone competent or an expert in their field. By competing and comparing themselves either directly or indirectly with other well-known experts or their friends, users are motivated to contribute more. This may coincide with introjection regulation type of extrinsic motivation since the behavior is performed to attain ego-enhancement or pride. This is depicted in the following interview transcript.

“I am ranked at 9th in Thailand...there's no (official) way to show off that you've reached the 9th position or anything like that. (Interviewee 1, Interview, 30 June 2023)

“I might (Facebook) post something like, "Oh, I've reached 10,000 points!" and others might still be at 1,000 points, and they would be like, "Wow, how did you progress so fast?"” (Interviewee 1, Interview, 30 June 2023)

“It (Reputation Points) can be used to tease each other, like, "Oh, look at your score! Is it higher than mine?" We can playfully compete with friends” (Interviewee 1, Interview, 30 June 2023)

“Initially, I wanted to go and ask questions because I wanted to be someone who could ask good questions.” (Interviewee 2, Interview, 18 July 2023)

I used to look at the Leaderboard. Because, you know, I wanted to be in the Top 100 or something like that and keep climbing up. (Interviewee 2, Interview, 18 July 2023)

It's like a competition. You want to be as good as him, you know, be skilled like him and all that. I've got one thing though, I've got more upvotes than him. I'm really happy about it, you know. I got more upvotes than John Skeet, but I can't remember which one. (Interviewee 2, Interview, 18 July 2023)

4.2.2.6 Long-term Contribution

Contribution behaviors change over time based on their motivation at the time. After reaching a certain point, e.g., 10,000 points, full functionalities, and set goals are achieved therefore contribution pattern changes. Toxic comments and expert bias (favorable treatment) moderate contribution levels. Politeness and positive feedback in comments can prompt continued contributions. Receiving negative remarks and downvotes even with fewer posts, may play a role in discouraging new users from seeking help again from StackOverflow (Mahbub et al., 2021). Comments expressing gratitude can inspire responders to produce better quality content (Fangl et al., 2018). This is depicted in the following interview transcript.

“My real target was to get over ten thousand points, and I achieved that. So, I could do everything in the platform, like editing other people's questions, editing answers, upvoting.” (Interviewee 2, Interview, 18 July 2023)

“I was okay after reaching ten thousand points, and I felt happy with that. I didn't want to pursue it further.” (Interviewee 2, Interview, 18 July 2023)

“Before, I would come every 1-30 minutes, and I would wait to see if there were any new questions.” (Interviewee 2, Interview, 18 July 2023)

“I think I play every day, do it every day from Monday to Friday. Then, I set myself for about 30 minutes each morning.” (Interviewee 2, Interview, 18 July 2023)

“However, the points kept increasing because people liked the answers I had previously given.” (Interviewee 1, Interview, 30 June 2023)

“I just go in, look around, and notice that my reputation increases when someone likes my answers.” (Interviewee 1, Interview, 30 June 2023)

Personal events such as job changes or getting a promotion may impact contribution behaviors. Contributors who take on management roles experience a drop in online activity, since management-related jobs require less hands-on coding tasks (Xu, 2016). This is also depicted in the following interview transcript.

“I focused on the company, and as for personal matters, I put them aside completely.” (Interviewee 2, Interview, 18 July 2023)

“I don't really care about earning points for myself. I don't actively try to accumulate points for myself.” (Interviewee 2, Interview, 18 July 2023)

4.2.2.7 High-Quality Contribution

High-quality answers and the majority of all answers come from expert users (Movshovitz-Attias et al., 2013). The highest voted answer may be outdated and not always be the best answer due to new content's dynamism (Amancio et al., 2021). The platform wants to attract and reward experts who contribute high-quality answers through a combination of communication and coding skills (Vadlamani & Baysal, 2020). It is evident from the data on global user distribution and contribution that most users are from the United States and India. Nonetheless,

European nations, as well as Australia, Canada, and New Zealand, rank higher in terms of participation and contribution (Wijekoon & Merunka, 2022). Higher education levels usually mean higher participation and answer quality (Wijekoon & Merunka, 2022). Low-quality contributions such as repeating, not interesting, demotivate expert participation (Vadlamani & Baysal, 2020). This is depicted in the following interview transcript.

“The majority of questions are repetitive, and Stack Overflow and Google Colab tools haven't introduced many new features lately. There's not much novelty in that regard.” (Interviewee 1, Interview, 30 June 2023)

The tool becomes popular when many students or young people use it, and they tend to ask questions rather than searching for older stuff. So, there are many unanswered questions, and later on, I become lazy to answer. The same questions keep coming up. (Interviewee 1, Interview, 30 June 2023)

4.2.2.8 Contribute Across Multiple Platforms

Users are not restricted to or bound by a certain community or platform. Most extremely engaged users registered on across several sites and contribute interchangeably (Sajedi et al., 2014; Vadlamani & Baysal, 2020). They could go between groups and forums to find interesting questions. Each site may provide suitable use over Stack Overflow, such as open-ended questions on Quora.com, or code collaboration projects on GitHub.com. This is depicted in the following interview transcript.

Yes, there are many questions on Quora, and Reddit too, but I don't use Reddit much. On Quora, sometimes I come across questions related to management or topics that are not programming-related. Those questions can be found more often on Quora. (Interviewee 2, Interview, 18 July 2023)

“I used platforms like Stack Overflow and GitHub, which are gamified in nature. GitHub, for example, looks at whether your code is open source, whether it has been forked by others, and if it has received stars.” (Interviewee 1, Interview, 30 June 2023)

4.2.3 To study the relationship between gamification affordances and additional incentives and contribution behaviors of the users.

Gamification affordances motivate users to contribute more to Stack Overflow. Without these, the site may not be as successful or has survived thus far. Users have positive opinions on gamification elements' impact on users' contribution. This is depicted in the following interview transcript.

“Because if there's no Gamification, you know, it would just be me using it, I go in and get my answer, and that's it. But with Gamification, I start wanting to contribute.” (Interviewee 2, Interview, 18 July 2023)

“If there's no Gamification, I would probably see it as having very little opportunity for me to contribute. I'd just be an ordinary consumer.” (Interviewee 2, Interview, 18 July 2023)

So, I see it as Stack Overflow becoming a great knowledge platform for programmers. It's really because Gamification was combined with what used to be called forums, so they took the forum and combined it with Gamification, which made it a better platform. (Interviewee 2, Interview, 18 July 2023)

If Stack Overflow didn't have these game elements, I don't think it would survive. People who contribute would need some form of recognition. People who provide knowledge need some motivation, such as earning points and achieving a high rank in Thailand's leaderboard, for instance. It serves as a little boost of motivation and encouragement. (Interviewee 1, Interview, 30 June 2023)

On the other hand, Stack Overflow operates differently. Its behavior encourages people to contribute helpful comments and receive positive feedback. When people provide valuable answers, they receive upvotes, which boosts their reputation. That's the primary design. However, other behaviors are also rewarded with badges, like participating in voting or any other positive behaviors. Badges are used more broadly to encourage different types of behavior. It might be more complex because some badges are based on social behaviors and the

actions of others. It's not like playing games where the behavior is solely within the game itself. (Interviewee 1, Interview, 30 June 2023)

“I never thought that upvoting and downvoting would help and make the programming world easier. When they implemented it, I was like, "Oh, it seems Gamification has an impact on the quality of answers and questions.” (Interviewee 2, Interview, 18 July 2023)

4.2.3.1 Reputation Points

Reputation or point element promotes user contribution. It is often regarded as a measurable outcome of a user's contribution and effort. Some find joy in collecting and beating certain targets set by themselves or their peers, e.g., 10,000 points. Reputation points indirectly serve as expert signaling tools. Therefore, it is heavily tied to extrinsic motivation for career advancement for programmers in the tech industry. Its relationship with the Stack Overflow privilege system also motivates users to contribute more. This is depicted in the following interview transcript.

“I think it's fun, you know? Like, I enjoy it. Getting 10 points today, getting 20 points tomorrow, it feels like we've achieved something by answering.” (Interviewee 1, Interview, 30 June 2023)

“When it increases, they call it increasing our credibility, right? It also makes our hourly work rate higher.” (Interviewee 2, Interview, 18 July 2023)

It's fun to create, knowing that, in the past, we didn't even know about Stack Overflow reputation points, like getting 20,000 points or something like that. We used to think, "Oh, 20,000 is not much." But we didn't think about building it to do something. However, later on, having those points proved something. When someone asked me, "Can you write in Ruby? Can you write in C# or something like that?" I would just open Stack Overflow and check for myself. I would look at the answers and see that I got it. That's the only benefit of it, you know, having that proof, having that evidence. (Interviewee 2, Interview, 18 July 2023)

“I've heard people say that if you get over 10,000 points, Google will hire you or something like that, but I'm not sure if it's true or not. Anyway, during that time, I reached 10,000 points and more.” (Interviewee 1, Interview, 30 June 2023)

“But back then, it was like, who knows if it's true or not. But if people talk about it, it means that at least these scores might have some value, right?” (Interviewee 1, Interview, 30 June 2023)

“It's like if you're an academic, you need to have a lot of citations, right? It's like choosing our field, and I chose Stack Overflow.” (Interviewee 1, Interview, 30 June 2023)

“And then, I think playfully, that this can be like a part of my CV, right? It's a contribution, and this may not have the same effect for everyone, but having this one point, in some cases, may have some value, and it's good to have it.” (Interviewee 1, Interview, 30 June 2023)

Consequently, users form strategies to intentionally accumulate as many Reputation points as they can through the platform developer's intended method such as bounty questions answering. According to Bosu et al. (2013), reputation can be rapidly established by being the first reply and being prompt. A contributor may also choose to concentrate on subjects with less expert participation. In addition to having less competition, topics with low expert numbers frequently have greater median response intervals. A contributor can prepare their response more thoroughly as a result. A contributor can also be active while most experts are not (i.e., between 4:00 to 8:00 GMT). Ultimately, it is important for a contributor to engage frequently and respond to as many inquiries as they can. By taking these steps, the contributor will increase their influence and likelihood of receiving upvotes. This is depicted in the following interview transcript.

I logged in every day and encountered questions I knew the answers to. I would go ahead and answer them, and after a while, I would come across new knowledge. I would then set my own questions and answer them myself, earning 2 points each time. There was this one question I created, and I answered it twice. People came along, liked both the question and

the answers, and I got 3 points in total. (Interviewee 1, Interview, 30 June 2023)

If I haven't encountered Colab, I might have to answer other topics to earn reputation points. We need to have subjects that we're knowledgeable about. For example, if I want to earn a lot of reputation points, I have to go to Colab and focus on answering questions there regularly, for a period of time.” (Interviewee 1, Interview, 30 June 2023)

I would attempt to debug other people's code just as they were asking them as quick as quick as I could figure out their problem, I would try to get out in in the beginning I get my answer out first. You know the fastest gun in the West phenomenon. Uh, where I I wanted to be the first one to answer. I quit doing that because that's the quality goes down when you're rushing. (Interviewee 4, Interview, 14 October 2023)

Reputation point alone is not an effective expert signaling tool without consideration of other factors like badges and deeper insight into its origin. High accumulated reputation points may be from starting early or asking questions, but not from answering. Instead of responding to questions, 13.8 percent of the users in the study obtain their majority reputation points by posing inquiries. Generally, users gained their reputation points from a relatively tiny percentage of highly voted responses, with the majority of uploaded answers receiving either none at all or extremely few (S. Wang et al., 2021). Reputation is sought after as there has been evidence of reputation gaming, such as voting rings, and bounty gaming. While an algorithm is in place to prevent this, it is not 100% effective. (Mazloomzadeh et al., 2021). Adversely, asking questions is perceived as incompetence.

4.2.3.2 Badges

Documentations yield mixed results on badges' effect on user contribution. Users who obtain a badge for editing, according to Marder (2015), tend to make more edits in the 30 days leading up to the badge than in the 30 days following it. Users don't seem to be encouraged to up their activity levels to receive badges for asking questions, according to their findings. On the other hand Cavusoglu

et al. (2015) found that badges promote voluntary contributions. This is depicted in the following interview transcript.

“At first, I found badges more intriguing than points. When I joined, I was focused on collecting badges. I wanted to collect as many badges as possible.” (Interviewee 2, Interview, 18 July 2023)

“Badges were more fun. At the beginning, badges were more exciting for me. Even the simplest ones were fun.” (Interviewee 2, Interview, 18 July 2023)

“It was just in the beginning, and then I didn't care much about the Leaderboard. I lost interest in the Leaderboard faster than the Badges. Badges are more interesting. I've been collecting Badges for many years now.” (Interviewee 2, Interview, 18 July 2023)

Badges are good too; there are many different badges. Some badges require us to like other people's answers or slide other people's answers if they answer the same question as we do. There are some unique badges as well. I try to get those badges just to see what they're like. It's a good mechanism to motivate people to use different features and encourage different behaviors. It's a well-designed system. (Interviewee 1, Interview, 30 June 2023)

Users intentionally contribute per badge condition by reading through instructions. However, it may have different impacts varying between highly active and non-active users. For these consumers, an alternative set of incentives might be required. Conversely, medium-activity users are a good target for system designers since they often contribute to Stack Overflow and show appreciation for badges (Yanovsky et al., 2021). Users' intentional hunt for badges is depicted in the following interview transcript.

“I started looking for other ways to earn badges. It's like figuring out how to get badges from various activities.” (Interviewee 2, Interview, 18 July 2023)

“I intentionally followed the criteria and created things accordingly.” (Interviewee 2, Interview, 18 July 2023)

“I really want to get a lot of these, like, a lot. At first, I wanted to get a lot. So, every day, I would come and wait, like, come and wait, hoping to get that badge, you know, like, how can I get that badge?” (Interviewee 2, Interview, 18 July 2023)

Actually, in the past, there weren't many badges. Back then, there were probably about 20 badges, not more than that. So, we would choose which badges we wanted first. I wanted to get badges like the Popular ones, like Popular Question, Popular Answer, and such. I wanted to get around those. (Interviewee 2, Interview, 18 July 2023)

“Actually, back then, I really wanted to get Gold Badges, you know, but I was lazy and didn't do it, right.” (Interviewee 2, Interview, 18 July 2023)

“There was Silver Badges or Gold Badges at the beginning. Like, “Hey, how can I get a Gold Badge? I've never gotten a Gold Badge before. To get the first one, what should I do to earn it?” (Interviewee 1, Interview, 30 June 2023)

4.2.3.3 Leaderboards

The official leaderboard is not appealing since it's too hard to compete, especially as time goes by. Early users can accumulate lots of points which demotivate new users from competing. The users made an unofficial leaderboard ranked by country which is more popular within the community. There is room for improvement for the official leaderboard to motivate contribution better. This is depicted in the following interview transcript.

At first, in the early days, I used to look at the Leaderboard. Because, you know, I wanted to be in the Top 100 or something like that and keep climbing up. But later on, when more people joined and there were many sections, it means there were many programming languages and more questions and answers, you know, when the list became longer, I stopped looking at the Leaderboard. (Interviewee 2, Interview, 18 July 2023)

It's not a public leaderboard. You have to write the SQL query yourself, and there's no way to show off that you've reached the 9th position or anything like that. You can't capture and post on Facebook that you're now ranked 9th. It's not like a competition where everyone competes with their queries because it's not limited to any specific country, and their system doesn't design leaderboards at the country or tag level. (Interviewee 1, Interview, 30 June 2023)

4.3 Case Study 2, Reddit

From 8 chosen documentation, 2 semi-structured interviews' insights, and direct observation outcome as registered user, the results can be categorized into the following sections:

4.3.1 To study gamification affordances and additional incentives applied in the selected knowledge crowdsourcing platform.

4.3.1.1 Karma Points

4.3.1.2 Awards (Badges)

4.3.1.3 Trophies (Badges)

4.3.1.4 Contributor Program (Incentives)

4.3.2 To study the motivations and contribution behaviors of the users.

4.3.2.1 Intrinsic Motivation for Enjoyment

4.3.2.2 Extrinsic Motivation for Sharing or Helping

4.3.2.3 Upvote or Downvote as Moderating Tool

4.3.2.4 Contribution Across Multiple Platform

4.3.3 To study the relationship between gamification affordances and additional incentives and contribution behaviors of the users

4.3.3.1 Monetary Incentives

4.3.3.2 Karma Points

4.3.3.3 Awards (Badges)

4.3.3.4 Trophies (Badges)

4.3.1 To study gamification affordances and additional incentives applied in the selected knowledge crowdsourcing platform.

4.3.1.1 Karma Points

Karma points on Reddit are a way to measure a user's contribution and popularity within the platform. The term "fake internet points" is a colloquial and somewhat humorous way that some Reddit users refer to karma points. It's used to emphasize the idea that karma points have no real-world value or significance beyond Reddit itself. There are two types of karma points, post karma and comment karma. Post karma is associated with the posts that a user shares on Reddit. Comment karma is linked to the comments you leave on posts and subreddit discussions. Karma points can be gained or lost.

Positive comment karma is earned when other people upvote your comments. If they downvote your comments, you will forfeit your comment karma. Similarly, when you submit a post to a subreddit, you gain or lose post karma when others upvote or downvote your post. An upvote is a way for users to indicate that they like, agree with, or find value in a post or comment. When you upvote a post or comment, you are essentially giving it a positive rating.

Posting low-quality content, including spam, being disrespectful, using offensive language, self-promotion without contributing to the community, or irrelevant posts or comments, can result in downvotes and a loss of karma. Breaking subreddit rules or the site-wide rules of Reddit can also lead to downvotes, post removal, or even account suspension. Trying to artificially inflate your karma by using multiple accounts or engaging in upvote manipulation can result in negative consequences, including account suspension. Reddit has a system in place to prevent karma farming, where users might try to artificially inflate their karma scores by using multiple accounts or other means. Reddit's algorithms and moderators actively monitor and combat such practices.

Karma points are not directly tied to any specific privileges on Reddit; they are more of a reputation system and a way for users to gain recognition for their contributions. Earning karma can make your posts and comments more visible, as content with higher upvotes tends to rise to the top of a subreddit or even the

front page of Reddit. Downvoted posts and comments receive negative ratings, and they may be pushed down in the ranking, becoming less visible. Having a positive karma score can also lend credibility to your account and help you engage more effectively in discussions.

While karma points can be an indicator of your contributions and reputation on Reddit, the primary goal should be to participate in discussions and share content that adds value to the community. Focusing solely on accumulating karma can lead to inauthentic interactions and may not align with the ethos of many subreddits, which prioritize quality contributions and meaningful engagement.

With the “Contributor Program” introduction in September 2023, Karma points might not be just fake internet points anymore since the amount of Karma points earned in a 12-month period impacts the real money payout rate.

4.3.1.2 Awards (Badges)

"Awards" on Reddit are a way for users to recognize and reward quality content and contributions by other users. These awards are a form of virtual tokens or badges that can be given to posts or comments on the platform. Awards serve as a way to show appreciation, support, or amusement for a particular piece of content or the person who posted it. The criteria for awarding a post or comment are entirely up to the individual user. Users give awards to content they find interesting, helpful, funny, or otherwise deserving of recognition. Some subreddits may also have specific guidelines or awards for contributions that align with their community values. When a post or comment receives an award, the recipient typically gains a certain number of Reddit Coins as a reward. Additionally, posts or comments with awards often stand out and are highlighted with an award icon, making them more noticeable to other users.

To give an award to a post or comment, you'll need to have Reddit Coins, which can be purchased with real money or earned through various means, such as participating in Reddit Premium or from specific promotions. When you have Reddit Coins, you can click on the "Give Award" option below a post or comment. Each award has a different cost in Reddit Coins.

Reddit offers a wide variety of awards, each with its own unique design and meaning. Some popular awards include "Silver," "Gold," and "Platinum," but there are many others with different names and icons. Awards range from simple gestures of appreciation, such as "Starstruck Award" which cost 20 coins, to more valuable and prestigious awards, such as "Platinum Award" which cost 1,800 coins. The most prized and costly honor on Reddit is the Ternion: The All-Powerful Award, sometimes abbreviated as Ternion. It is around \$120 (50,000 Reddit coins) in price. Higher-tier awards grant the recipient more Reddit Coins and provide more benefits to the user who received the award. For instance, some Reddit Awards, such as Gold and Platinum, come with premium features for the recipient. These features may include an ad-free experience, access to a private subreddit (r/lounge for Gold), and a premium user profile theme. Some subreddits offer custom awards that are specific to their community. These awards may have unique names and designs related to the subreddit's theme. Custom awards are created by subreddit moderators and can only be given within that specific community.

Once an award is given, it cannot be taken back or transferred to a different post or comment. Awards are a one-time, non-reversible action, and they remain with the content or user they were awarded to.

Reddit has made an announcement in July 2023 that "Awards" (including Medals, Premium Awards, and Community Awards) will no longer be available after September 12. The purpose as stated in the announcement was "We mentioned early this year that we want to both make Reddit simpler and a place where the community empowers the community more directly. With simplification in mind, we're moving away from the 50+ awards available today. Though the breadth of awards have had mixed reception, we've also seen them - be it a local subreddit meme or the "Press F" award - be embraced. And we know that many redditors want to be able to recognize high-quality content. Which is why rewarding good content will still be part of Reddit. Though we'd love to reveal more to you all now, we're in the process of early testing and feedback, so aren't ready to share official details just yet. Stay tuned for future posts on this!" (u/venkman01, 2023).

In replacement of the “Awards” and “Coins”, “Gold” was introduced in September 2023 as a pilot in a few subreddits with close monitoring by developers. Users can now purchase gold directly from the post or comment that they are looking to reward. The main differences between “Awards” and “Gold” are that the latter can be cashed out into real (fiat) money given if the users and the contributions made pass Reddit “Contributor Program” criteria such as gold is not eligible in NSFW, trauma support, or quarantined subreddits. Also, the new version of “Gold” will no longer be connected to Premium and users won’t be able to purchase Premium for other users anymore. At the time of writing this research, “Gold” is not available site-wide yet and is being monitored closely for things like gold purchases, moderator impact, and user safety.

4.3.1.3 Trophies (Badges)

In Reddit, "trophies" are digital badges or awards that users receive for various achievements and milestones on the platform. Trophies are a way for users to showcase their accomplishments and contributions on Reddit. While they don't have any intrinsic value, they can serve as a form of recognition and a source of pride for users. Users may see the presence and variety of trophies in a user's trophy case as a testament to their involvement and commitment to the Reddit community.

Trophies are automatically awarded to users based on specific criteria, such as achieving certain milestones, participating in events, or receiving recognition from the Reddit community. Trophies are not something that users can directly request or purchase; they are earned through your actions and engagement on Reddit. Users can view their earned trophies in their "trophy case," which is displayed on their Reddit profile page. The trophy case showcases the various trophies a user has earned, and each trophy may have a brief description indicating why it was awarded. The specific trophies and their criteria may change over time as Reddit evolves and introduces new features. The exact requirements for some trophies may not always be publicly disclosed, and Reddit may occasionally add new trophies or retire old ones.

There are several different categories of trophies, and each category represents a specific type of achievement or event. Some common trophy categories may include anniversary trophies, awarded on the anniversary of their Reddit account creation, verified email trophies, received when they verify their email address associated with their Reddit account. Some trophies are "hidden" or not publicly displayed on a user's profile. These are often special or rare trophies given for unique events or achievements. Users may discover hidden trophies when they qualify for them, but they might not always be aware of their existence until they check their trophy case. Reddit do not have a mechanism for users to lose trophies once they were earned.

4.3.1.4 Contributor Program (Incentives)

Through Reddit's Contributor Program, users who fulfill the required qualifications and make eligible contributions can get financial rewards. Along with "Gold," this was just introduced in September 2023 and is now in the pilot stage only available in the USA at the time of writing this research. Users' earnings increase based on the gold they receive from their posts and comments, as well as the karma they accrued over the course of a year. A Redditor who qualifies and reaches the required minimum Karma points and gold criteria will be asked for personal and banking information before they may receive cash rewards.

Contributor and Top Contributor are the two ranks that make up the Contributor Program. Within a year, a Contributor earns between 100 and 4,999 Karma points. A Top Contributor receives more than 5,000 Karma points in a year. A base compensation rate of \$0.90 per gold is available for contributors, and a higher payout rate of \$1.00 per gold is available for top contributors.

Redditors must fulfill specific eligibility conditions and undergo a verification procedure to be eligible to participate in the Contributor Program. In addition to other qualifications, the applicant must be at least eighteen years old, live in one of the approved countries (the United States initially), and have an account that is in good standing.

Redditors who sign up for the program will get paid monthly. A Redditor's earnings are determined by the quantity of gold and karma they have accrued from their qualified contributions. Starting from the day you first received gold, Reddit will determine your karma for the Contributor Program. There will be no credit applied to your Contributor Program karma balance for any karma you earned prior to getting gold.

4.3.2 To study the motivations and contribution behaviors of the users.

4.3.2.1 Intrinsic Motivation for Enjoyment

Reddit as a community and as a platform is a lot more casual compared to Stack Overflow. Users can have fun and joke around as a past time activity. They feel free to contribute to the platform without fear of criticism or high commitment required. This is depicted in the following interview transcript.

I think I joined Reddit and started doing the same on Reddit about five years ago. I moved on from stack over. Yeah, I moved on from Stack Overflow because Stack Overflow is just a lot more stressful. Uh, like it's such a good site because it's full of experts that are willing to point out problems immediately. That's good for that reason, because misinformation tends to get shut down very quickly because everybody wants to point out how wrong. How wrong your answer is, uh, but that, that's stressful. Over time, every time I post an answer, I could feel my blood pressure spike and all they're gonna point out this tiny little flaw in what I said or something like that. Even if it's even if it's a petty issue, a lot of people like to really drill down and point out even petty things that don't really have much bearing to the original question. Just because they can. But Reddit is a lot more casual. People will still point out flaws in what you said, but they're usually a lot nicer about it and it's just a lot more friendly community. So I slowly moved over to Reddit and actually discord is actually one of the main platforms I'm using now. (Interviewee 4, Interview, 14 October 2023)

So I take half an hour lunch break in the middle of the day while I'm eating lunch. I might just look at Reddit, usually because Reddit's a lot more casual. Casual there's not as much commitment Stack Overflow. If you post an answer on Stack Overflow, you kind of have to commit to it a little bit. Uh, because somebody might voice a criticism and then you have to respond and fix your answer. You'll get downvoted. Reddit is a lot more casual where I can just kind of throw an answer out there and that's a little more tolerated. (Interviewee 4, Interview, 14 October 2023)

“If I just want to have fun and just joke around or whatever, I might do that too.” (Interviewee 4, Interview, 14 October 2023)

Additionally, even if they are frequent answerers, users on Reddit are reluctant to pose programming-related queries or serious work-related questions here. Compared to Reddit, which is more dispersed, Stack Overflow is a better place to get answers with its consolidated community. This is depicted in the following interview transcript.

I don't ask on Reddit. Even though even though I answer on Reddit, I don't find it's a very good platform to ask on. Just because I know it sounds weird, but a lot of people ask on Reddit, but I don't think it's a very good platform to ask programming questions on. Stack Overflow is a very big community. Everybody is exposed to the questions that you post, regardless of what language they're in. Reddit is very fragmented. There's a different community for every single language. There are multiple Python communities, for example, so unless experts are jumping between every single community to look the questions, the exposure is just not very good. So if I the time that I actually do need to ask a question, I do that on Stack Overflow almost exclusively. (Interviewee 4, Interview, 14 October 2023)

“I don't ask my own questions for programming.” (Interviewee 3, Interview, 1 August 2023)

4.3.2.2 Extrinsic Motivation for Sharing or Helping

When they can favorably impact the community or if other people find their responses valuable, users feel good about themselves. They are performing a public service by lending a hand and sharing their expertise. Instead of merely responding, users go above and beyond to locate solutions or monitor outcomes. This is depicted in the following interview transcript.

I like to help people with programming, so I like to look at use it that way, and then sometimes I'll go on to post a question of my own on different subreddits. Just looking at the learn programming subreddits to see if I can help people. Uh, I just wanted to help people learn programming and there's just not a lot of websites to do that. Every day I check it. You'll see if there's any questions I can help with. I have a multi-reddit which is just a group of different subreddits. I just looked for questions that I can answer and if I think I can help, I post the content. (Interviewee 3, Interview, 1 August 2023)

“If they talk to me, I reply. Sometimes, sometimes I do follow up just to see, uh, what they end up doing.” (Interviewee 3, Interview, 1 August 2023)

“Yeah, it feels good to help people. I like making a difference.” (Interviewee 3, Interview, 1 August 2023)

If I'm reading a question and I see somebody else's already answered it. Yeah, I think, uh, I can improve on their answer, like give some context that they might have missed. I might add to it and say just as a more context, you know that this might be important to keep in mind. Here's a flaw that you might want to be aware of if you're going to use this method, something like that. (Interviewee 4, Interview, 14 October 2023)

Instead of me running into problems during my work that I need to figure out, people are posting questions that I can then figure out on their behalf. Many of them, though I'm reading documentation or source code or some other material to learn what the answer is that I can test to make sure that I'm correct in my solution, and then I share it. (Interviewee 4, Interview, 14 October 2023)

“I've a few niches that a few particular topics that I have a particular interest in, like in Python specifically, there's a few bugs that I enjoy explaining the cause of. So, if I see stuff like that, I might jump at it.” (Interviewee 4, Interview, 14 October 2023)

Additionally, examining fresh queries and responses from knowledgeable experts aids in their improvement as a subject matter expert. By responding to inquiries and soliciting helpful criticism from the community, users can increase their knowledge. This is depicted in the following interview transcript.

Yeah, helping people also helps me get better at programming. So if you if you are reading other people's code, you're practicing, you're practicing reading code, and if you're helping someone solve their problem, you're practicing your problem solving. You can learn a lot by helping people. (Interviewee 3, Interview, 1 August 2023)

4.3.2.3 Upvote or Downvote as Moderating Tool

Users contribute to the platform by upvoting good questions or answers as a feedback mechanism. Since users would compile content and construct narratives by utilizing voting system (Leavitt & Robinson, 2017). With visibility in Reddit driven by ranking algorithms, this promotes good content to be visible to the community. This is depicted in the following interview transcript.

“You know, if none of them had upvotes or downvotes, you would just have a lot of answers that you might not know which ones are good.” (Interviewee 3, Interview, 1 August 2023)

Yeah, but I upvote if someone has a good answer. Yeah, sometimes I see somebody explain something in a really good way and I think ohh I you know, I can learn to explain things like that. I don't vote very often. Yeah, but it's something I do like to do is something you know is exceptionally good or exceptionally bad. (Interviewee 3, Interview, 1 August 2023)

Inappropriate, misinformation, insensitive, or disrespectful queries or responses are downvoted to reduce the exposure of and moderate useful content. Downvoting can be hurtful, thus users use caution when doing so. Instead,

they only act when the motivation is blatantly malevolent. This is depicted in the following interview transcript.

I don't really like to downvote unless I think somebody being malicious. I've actually seen people intentionally posting misinformation. There's been not many instances of that, but there's been a couple that they troll they like to go into new programming communities and just spread nonsense. Uh, typically they get shut down pretty fast. Uh, by stuff like downvoting like we wanna make sure that harmful information is kind of brushed under the rug. It's made obvious that it's false information, so I might downvote in those cases. (Interviewee 4, Interview, 14 October 2023)

Well, if I think someone's asking a bad question, I will downvote it. The type of question I downvote is if someone does not know anything about programming but they want to they want to make something like they say I want to make this mobile app want to make another Facebook and they're just and they just ask how do I do it? If someone answers a question and their answer is wrong, I will downvote it. Or if their answer at the answer is unhelpful. Or, uh, if someone is being rude. (Interviewee 3, Interview, 1 August 2023)

So, if somebody answers a question and it's very clear that they are in newbie themselves and are guessing and are wrong. So, in those cases I do like to address those, because especially when you're in a community with a bunch of new programmers, it's very easy for somebody to post misinformation and then all the newbies eat it up. And adopted as though it was real knowledge, like accurate knowledge. I don't like that because then there's been instances where I've left it because I don't feel like dealing with that comment like I'm tired, whatever. And then I see the same misinformation being posted the next day because a bunch of people thought they learned something. And then went to go share it and now it's like this misinformation virus that's spreading. You gotta shut them down before they start to spread. Like there's a few misconceptions in

Python. People keep believing them and they keep reposting them. (Interviewee 4, Interview, 14 October 2023)

4.3.2.4 Contribute Across Multiple Platforms

Users are not exclusive to or tied down to any one community or platform. They may switch between communities and platforms in search of intriguing questions of interest. This is depicted in the following interview transcript.

I have Multireddit which is just a group of different subreddits. It's a custom feed of different subreddits and I have in this Multireddit all the subreddits for learning programming, like learning Python and learning Java. There are all of those different subreddits, and I sort by new, so I see the newest questions, and then and I just see if I can answer any of them. (Interviewee 3, Interview, 1 August 2023)

Well, just I have actually have some tabs open on Reddit right now to the to the Python community on Reddit, so I I don't exclusively use one like actually have one tab open for Stack Overflow, 1 tab open for Reddit, and then I also have the Discord client open. And when I'm when I'm bored and I'm just looking to, you know, help out or, you know, just contribute to the community, I'll just kind of bounce between the three. Uh, if I if I exhaust it and I go over the front page on Stack Overflow and there's nothing, then I'll switch to Reddit and I have about. Five or six different communities on Reddit that I frequent, learn Python, learn programming, learn JavaScript, and ask programming. I just kind of jump between those, see if there's any questions that interest me. (Interviewee 4, Interview, 14 October 2023)

4.3.3 To study the relationship between gamification affordances and additional incentives and contribution behaviors of the users

4.3.3.1 Monetary Incentives

Users do not anticipate direct monetary benefits from their contributions. Reddit does not compensate users for their contributions, such as asking or answering questions. Despite the possibility of being approached for compensated

side jobs, the pay is quite low and not very appealing given their high hourly rate in the tech industry. This is depicted in the following interview transcript.

I have actually made a little bit of money. Uh, very, very little. Like less than \$100. So, I wrote a user script, a little piece of JavaScript code that you put in a browser in an extension. It was about 2 hours of work, and she offered me about 30 bucks for it. Ah, so right, very poor pay. I mean, that's less than I'd get for my job, but I was learning how to do something new. I had never done any. I've never automated YouTube UI interaction before, so I learned how to do some of that stuff, and you know it's just a little fun little project that I got 30 bucks for it. (Interviewee 4, Interview, 14 October 2023)

4.3.3.2 Karma Points

Karma or the point aspect encourages user contributions, but more is not always better since it is not a commonly used metric to assess qualitative worth (Richterich, 2014). Due to the fierce battle for readers' attention, posts and comments may be overlooked for a variety of reasons, including poor timing, dull subjects, and poorly worded or titled articles. A single arbitrary upvote or downvote on a Reddit post has the potential to skew the post's score due to the herding effect (Weninger et al., 2015). Most users don't even read the articles they vote on (Glenski et al., 2017). As a result, Reddit has implemented a system in some subreddits where the scores of new posts and comments are hidden for a certain period to reduce bandwagon voting and encourage genuine voting based on content quality. While receiving many Karma points is encouraging, the real significance lies in the good feedback one receives on their contributions. Beyond post ratings, context and comment style can determine whether new users return to Reddit following their initial post (Klugman, 2023). This is depicted in the following interview transcript.

Uh, well, there's, I mean there's it's, it's all upvotes and fake Internet points. There's been times where I'll answer a question which I thought was just going to be some benign question that I help one person and then it gets forgotten about, and then I wake up the next morning and the question went viral. For whatever reason, because a bunch of people thought it was

interesting I might have, you know, a few 100 or 1000 upvotes on my answer. (Interviewee 4, Interview, 14 October 2023)

“It's a little bit because I like helping uh, but it's also just because there's the there's the, the little kicks you get out of it every time you answer a question, yeah.” (Interviewee 4, Interview, 14 October 2023)

You have Karma, which is uh it's just based on how many upvotes you get as it gives you points. And it's just a number. You can't spend it or anything, but some people really like having a higher number. Uh, I don't care about having the highest number. Uh umm, it feels good when I get a lot of upvotes, because it means a lot of people found it helpful. Uh, so it's validating. I don't care too much about how many of those you know. I think 10 upvotes or 300 upvotes is the same to me. Yeah, because I think the quantity depends on luck. But if I if I get any upvotes it means you know if people agree with my post. Yeah, yeah, I think I think some people, some people, it matters a lot, but to me it's meaningless because you can, you know, if you go on a very popular coast and you just, you just make a joke, you could get thousands of upvotes for making a joke just because a lot just because you did it on a popular post and a lot of people saw it, a lot of people laughed and clicked up. Ah and meanwhile I can put time and effort answering a programming problem and maybe no one really reads it except for the person I am helping and they give me one uproot for helping them. You know that makes me happy. Just getting one or two and there is more meaningful than if I get a lot of outlets on, you know, making a joke somewhere popular. (Interviewee 3, Interview, 1 August 2023)

Downvote demotivates contribution and community engagement as it negatively impacts users emotionally especially when used in an abusive manner, such as random downvoting, or controlling manner, such as downvoting to police opinion. Even for the right reasons, that can nonetheless be hurtful since it is interpreted as rejection or lack of appreciation. Downvotes can still be helpful for

learning if they are accompanied by an explanation. This is depicted in the following interview transcript.

“I don't really care that much, but it does bother me if I get a lot of downvotes on something. Usually if I get a lot of downvotes, I'll get frustrated and delete my comment. Yeah, because no one's here because I'm not being appreciated.” (Interviewee 3, Interview, 1 August 2023)

I don't mind being downvoted. Because if I'm wrong, I want to know that I'm wrong for my own benefit. Like if I post an answer that's incorrect, I want to know if the information that I have in my head is wrong, because then I want to fix it. I want to improve, and I don't want to spread misinformation, so if I post something that's incorrect and somebody downvotes it and gives me a comment. The downvote might have stung a little bit. You know, it hurts to get downvoted. Everybody, nobody likes community disapproval. Ah, but I'm not gonna be butthurt about it. You know, I'll take it in stride. (Interviewee 4, Interview, 14 October 2023)

If I think it's just some newbie who they thought they knew something, but it turns out they misinterpreted what they have read previously or something like that, I usually don't downvote because it that kind of hurts engagement. Like you don't want to necessarily make somebody feel bad if they are just, they're trying to be helpful, but maybe they're a little bit confused. So, in that case I might post a comment saying, you know, uh, this isn't quite correct. This is actually how it works, and then I might to prove my case. I might link documentation or source code that backs up my correction or something like that, but I used I don't like to be negative. I don't want to be hurting engagement in a community unless I feel that somebody's being malicious or. So careless that they're being harmful. (Interviewee 4, Interview, 14 October 2023)

What bothers me though is there's I don't even know why this bothers me, but there's been some questions where I can see that somebody went into the question and downvoted literally every participant in the question. And that bothers me that like I, I like

community engagement. I like people talking. I don't think we should have blanket, you know, one person going in, downvoting everybody. Suddenly, people scores or zero or negative. Uh, and it doesn't feel good. You know it's not. It's not something that promotes conversation and engagement and all that, and I don't know if it affects other people, but clearly give it Reddit has a point system that uses people do put some weight into the points or Reddit like presumably wouldn't use. So yeah, it's the intent. I think that matters the downvotes themselves. Whatever they're a mechanism of the site, but the intent behind the downvote I think is important.”

(Interviewee 4, Interview, 14 October 2023)

In question and answer for programming it's not based on a pinion, it's just based on the fact of you know is your answer correct or not? Uh, but in other communities, it might be used as a way to police opinions. They'll downvote people with different opinions, but they're not wrong, but they're getting down this just for having a difference of opinion. I think it's more objective because now people are just judging if your answer is correct or not. People can have different opinions, but in programming, if you answer a question, your answer is just right or wrong. (Interviewee 3, Interview, 1 August 2023)

4.3.3.3 Awards (Badges)

An award shows users how much their assistance is valued, which encourages contribution. The activity of awardees increases once they make an award-winning post. Recipients make longer, more frequent posts (Burtch et al., 2022; Tulasi et al., 2022). Burtch et al. (2022) finds that the effect is more pronounced among newer community members, while Tulasi et al. (2022) finds that its effect subsides within 36 hours. Even though the award has no use outside of Reddit, recipients felt honored and grateful when they received it. As an illustration, the silver award which has no perks emphasizes how users may be motivated to utilize a specific prize due to its implicit or explicit significance rather than its cost or benefits (Trujillo, 2022). Increasing the number of reward possibilities benefits users, who enjoy seeing others

submit awards and feel good about giving or receiving them (Trujillo, 2022). Additionally, the Reddit community's attitude toward the awardees has become softer and more respectful (Tulasi et al., 2022). This is depicted in the following interview transcript.

But in the past, I have gotten awards before. Though I did, I didn't seek it out. It was just people wanted to thank me for helping them. This happened 6 times. And this I remember this this I remember, because it does feel meaningful. That when that happens because it means someone appreciated my help so much that they wanted to give me an award. (Interviewee 3, Interview, 1 August 2023)

There's been a couple times where I wake up in my comment has awards on it. Not many times, so there's been a couple times where there's like a common misconception and I address it well. So somebody actually decides to give me award for it. And even though I know that this is all fake and useless and doesn't actually mean anything. Uh, it feels good. You know, you look at the, you look at the number and you think, wow, potentially hundreds of thousands of people read this and thought this is good. And you know, you kind of internalize them. (Interviewee 4, Interview, 14 October 2023)

However, active answerers on Reddit themselves might not spend their money on the platform to earn coins and award other users. This decision to withhold spending money on Reddit might be fueled by Redditors' dissatisfaction against site management, such as the 2023 Reddit Blackout controversy regarding API third-party app fees charging (GRANTHAM-PHILIPS, 2023). This is depicted in the following interview transcript.

I still don't like Reddit, so I don't give awards. I don't spend any money on the site. I don't really want to support Reddit with money. Umm, one thing they did was they increased the price of using the Reddit API to a very unreasonable price point. And because of these third-party applications that people use to access Reddit, they all had to be shut down because none of them could afford the new price for the API. The developers try to work with Reddit, and Reddit was very, very unhelpful and just acted

very badly. You're just treating these developers very badly over it. don't want to fund them. I'm never going to spend money on the side. (Interviewee 3, Interview, 1 August 2023)

“I never spent money on Reddit. Well before I was upset with Reddit, I didn't have the money to spend.” (Interviewee 3, Interview, 1 August 2023)

I've never actually bought ah coins or whatever Reddit in platform currency was. They've gotten rid of awards now. Ah, but I know I've never actually bought the money on Reddit, so the only awards I've ever been able to give out are ones that I got as a result of being given an award. Because if you're given an award, you're given some credits that you can then use to give out another award. So from the awards I've been given, I think I've earned enough coins or credits or whatever to give, though maybe two or three awards in the entire time I've been on Reddit, maybe a little bit more than that, but not very many. And I'm not sure I've ever given them out on anything programming-related. (Interviewee 4, Interview, 14 October 2023)

4.3.3.4 Trophies (Badges)

“Trophy” does not promote contributions. Users don't pay much attention to or pursue it actively. This is depicted in the following interview transcript.

“I don't put a whole lot of thought into because, but when you when you said trophies, I actually had to think about what you were referring to. That's how little thought I put into them.” (Interviewee 4, Interview, 14 October 2023)

“I I just ignore that completely. I don't care at all about the trophies.” (Interviewee 3, Interview, 1 August 2023)

4.4 Case Study 3, Quora

From 8 chosen documentation and direct observation outcome as registered user, the results can be categorized into the following sections:

4.4.1 To study gamification affordances and additional incentives applied in the selected knowledge crowdsourcing platform.

4.4.1.1 Credit Points

4.4.1.2 Top Writers (Badges)

4.4.1.3 Most Viewed Writers (Leaderboards)

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4.4.2 To study the motivations and contribution behaviors of the users.

4.4.2.1 Many Questions Left Unanswered

4.4.2.2 Anonymous Questions

4.4.2.3 Contribution by Expert Users

4.4.1 To study gamification affordances and additional incentives applied in the selected knowledge crowdsourcing platform.

4.4.1.1 Credit Points

"Credits" to help incentivize and reward user contributions. Quora Credits are a virtual currency or points system used within the Quora platform. These credits can be earned by contributing valuable content to the community and can be used for various purposes.

Users can earn credits by providing high-quality answers to questions on Quora. The number of credits earned may depend on factors such as the quality and popularity of the answer. Users can also earn credits by asking questions if their questions receive positive engagement from the community.

Users can spend their Quora Credits to promote their answers or questions, increasing their visibility to a wider audience. Furthermore, they can ask inquiries and receive answers by giving credits to particular people. This may encourage specialists to answer specific questions. As a thank you for their efforts, users can give other users Quora Credits.

In 2015, Quora phased out Credits and replaced them with their new “Ask to Answer” system where anyone can send a request to anyone else. Requests will be prioritized based on both quality and volume. High-priority requests will go directly to the intended recipient and other requests will be aggregated. This is to simplify things according to the developers. However, the community speculates this may be an effort to boost the number of questions, and in turn, bring more traffic and revenue to the site. As of current, “Credits” is not visible or active on the platform.

4.4.1.2 Top Writers (Badges)

The Top Writers program on Quora is an initiative that recognizes and celebrates the most influential and knowledgeable contributors on the platform since 2012. It's designed to acknowledge and reward users who consistently provide high-quality content, engage with the community, and demonstrate expertise in specific topics.

Being designated as a Top Writer comes with several benefits, including a special badge displayed on their profile, enhanced visibility for their content, and the opportunity to engage with other top contributors and Quora staff. Top Writers are celebrated on Quora's blog and social media channels. Quora often publishes interviews and articles featuring Top Writers to showcase their expertise and insights. Top Writers are evaluated periodically to maintain their status and to reflect any changes in their activity or expertise.

Quora's team selects Top Writers based on a combination of factors, including the quality and impact of their contributions, their level of engagement with the community, and their expertise in particular subject areas. The selection process typically occurs annually, and Quora may invite users to participate or nominate others for consideration.

While Quora has not announced the “Top Writers” program stoppage, the last Top Writers badge given was in 2018. As the platform scales up, it becomes increasingly harder to keep track of talented and influential writers. It is speculated by the community that the credibility of the awards sunk with questionable winners. Therefore, Quora stopped giving out this award altogether. As of current, the past “Top Writers” badge from 2012 to 2018 is still visible in the users' profile section.

Following this program, the “Top Question Writers” badge was also introduced in 2016. Though, it has not received much attention.

4.4.1.3 Most Viewed Writers (Leaderboards)

"Most Viewed Writers" is a recognition and ranking system on Quora that highlights users who have accumulated a substantial number of views on their content. This program is designed to recognize and celebrate the contributions of users whose answers have gained significant visibility and readership. The "Most Viewed Writers" ranking is dynamic, and users' positions can change over time based on the views their answers continue to receive.

The primary criterion for being recognized as a "Most Viewed Writer" is the total number of views on a user's answers. Users who receive a high volume of views on their content are more likely to be featured in this category. Users are ranked as "Most Viewed Writers" within specific categories or topics based on the views their content receives in those areas. Quora has a wide range of categories, and recognition can be earned in multiple areas. Quora maintains a leaderboard that ranks the top "Most Viewed Writers" in various categories and topics. Users can see who the most viewed writers are in specific subject areas.

Being recognized as a "Most Viewed Writer" can lead to enhanced visibility and credibility within the Quora community. It serves as a testament to a user's ability to create engaging and valuable content. Most Viewed Writers are often seen as influential voices in their respective fields or areas of expertise. Their answers are trusted and referenced by many in the Quora community. Most Viewed Writers" would receive a special badge on their Quora profile to indicate their achievement, however, this is not visible as of 2023.

4.4.1.4 Quora+ (Incentives)

Quora+ launched in September 2021 as a new subscription program for Quora users to support creators, access more content, and unlock a premium ad-free version of Quora by paying \$6.99/month or \$47.88/year as of September 2023. Revenue from Quora+ subscriptions is shared between participating creators. Space owners from eligible countries and a small initial group of active

creators outside of Spaces can join this program. The opportunity to contribute to Quora+ outside of Spaces may be expanded to all creators in the future.

When a creator enrolls in the Quora+ earnings program, they become eligible to receive a share of the subscription fee paid by readers, based on engagement with their content. As the pool of subscriber revenue grows, more creators will earn and earnings per creator will grow. Creators who become top earners will likely have high engagement (views, upvotes, and comments) as well as high numbers of Quora+ subscribers among their reader bases.

4.4.1.5 Spaces (Incentives)

Quora Space allows users to create and curate communities around specific topics or interests. It's similar to a group or community where users can gather to discuss and share content related to a particular theme. Any Quora user can create their own Space. Spaces can be created around a wide range of topics, interests, and themes, allowing for niche communities to form. Space creators and moderators can curate content by selecting and featuring specific questions, answers, and posts within Space. Members can engage in discussions, ask questions, and provide answers related to the Space's topic. It serves as a dedicated area for like-minded users to share their expertise and knowledge.

Creators can earn money by offering Space followers a paid monthly or yearly subscription. Posts that are reserved for subscribers can be selected by creators. In addition to setting their own rates, creators oversee creating material that their paying customers find worthwhile. For content producers who are dedicated to consistently delivering great information to their audience, subscription services are the best option.

Quora also option of an adaptive paywall that balances free content views and earnings on each post in Spaces. Unlike a traditional paywall which would prohibit all views of subscription content from non-paying subscribers, the adaptive paywall will regularly show a selection of paid content for free to non-paying subscribers. This supports chances to earn money as paying subscribers read and interact with creators' work while keeping their material available to as many people and followers as possible, including those without paid memberships.

Another way of earning in Space is from advertisement revenue sharing. It is the quickest and most straightforward approach to make money while preserving the free nature of Space's content for all users. A percentage of the advertisement income from impressions on their content will be paid to participants. By viewing or clicking on advertisements while browsing information from Space, Space will make money from advertisements. The income from advertising on a space is typically correlated with its viewership.

4.4.1.6 Quora Partner Program (Incentives)

Quora's first attempt at monetization was with the Quora Partner Program in 2018, which retired across all languages in 2023. To battle the shortage of good questions, invited-only users are rewarded for asking questions that go on to attract significant viewership and quality answers. It is unknown exactly what qualifications are needed to become a Quora Partner. The amount users are paid is determined by the amount of traffic they bring to Quora, not by the total number of questions they ask. The program has been controversial with spam and system abuse in the hope of monetary return. Therefore, QPP was axed in 2022 for the English version, and in 2023 across every version.

4.4.2 To study the motivations and contribution behaviors of the users.

4.4.2.1 Many Questions Left Unanswered

Many questions are left unanswered in Quora since it is irrelevant, opinion-based, and low-quality with no valid answer. This is called "Insincere questions", a major problem that needs to be filtered out from the site (Roy, 2020). When a person who is in desperate need of an answer doesn't get one because of awkward questioning techniques or poorly phrased questions, it might have a bad effect on them psychologically and cause them to eventually stop using the platform. According to Maity et al. (2018) studies, whether the questions got answered or not, or answerability, may be effectively determined by the writing style and editing activities that users employ while composing the question content.

4.4.2.2 Anonymous Questions

Users may openly publish anonymous questions on Quora, and this kind of behavior in the community has become accepted rather than frowned upon. On Quora, up to 38.7% of queries are posed in an anonymous manner on the topics of depression, anxiety, social ties, and personal issues (Mathew et al., 2019). The language structure of queries made anonymously and those posted non-anonymously is nearly the same, according to Mathew et al. (2019) studies. However, anonymity has a big impact on the length and subjectivity of the answers (ul Haq et al., 2020).

4.4.2.3 Contribution by Expert Users

Expert contributions are very valuable to Quora with its large following. A person with extensive and authoritative knowledge or competence in a certain field is generally referred to as an expert. They can be identified by examining the characteristics of their responses, activities, and language (Patil & Lee, 2015). Higher contributors and well-written answers on Quora typically have a larger following. More friends (following) who can respond to their inquiries and upvote their responses give these well-connected people an added benefit (Wang et al., 2013) and better page ranking (Rughiniş et al., 2014). Most experts were driven by intrinsic rather than by extrinsic motivation to lead and write Quora answers (Nwadiugwu & Nwadiugwu, 2021). A thoughtful response was primarily seen as a way to connect with a specific audience and boost engagement, but prejudiced and sloppy responses might foster mistrust (Nwadiugwu & Nwadiugwu, 2021).

4.5 Discussion

From the results of the study, we can synthesize the key findings by looking for similarities, differences, and patterns between these platforms. The key findings are linked back to the initial research questions and compared with previous research for an alignment or surprising points. Potential follow-up research studies may arise as a result as well.

4.5.1 Knowledge crowdsourcing platforms utilize similar game elements but with different mechanics, depending on the focus of the platform.

How these game elements interact with the users varies based on the mechanics behind them as the point and badge elements in Stack Overflow and Reddit differ greatly. This may not have been widely discussed in past works as the focus was on the game elements but not the mechanisms connected to them.

When comparing Stack Overflow and Quora to Reddit, the point aspect stands out more because of the point exchange mechanism. Points serve as a currency on the platform not just for credibility signaling alone. Users can spend their earned points for their own benefits like asking their own questions to specific industry experts or bounty rewarding their questions for the best answers. In the same sense, users can't ask questions without contributing high-quality answers to the community first. This exchange mechanism gives the point system importance in Stack Overflow and Quora, in comparison to Reddit.

Because of the community aspect on Reddit, the award or badge feature is more prominent than on Stack Overflow and Quora. In Reddit, awards are given by the users to their peers. As there aren't any explicit requirements as in Stack Overflow and Quora, it is more adaptable to one's judgment. Outside of expert signaling, awards also serve as a token of appreciation that users' contribution has been positively reciprocated. Therefore, awards or badge elements are essential for Reddit since community fostering is at its heart.

Reddit and Quora have programs that provide monetary incentives to users in return for their contributions. However, each platform utilizes a different mechanism. On Reddit, users can tip other users for their contributions by awarding them "Gold". Then the awardee may cash out their awards into real (fiat) money. Meanwhile, on Quora, users can set up a subscription paywall for their content. They may also earn a portion of advertisement revenue should their content garner traffic. We are unable to determine which model would perform better since Reddit's model is immature.

To completely comprehend the gamification affordances employed in the knowledge crowdsourcing website, we must evaluate the underlying processes in addition to examining the affordances themselves. Although these websites incorporate "badges" or "points" to encourage user participation, the importance of these features varies depending on how the user interacts with the game's elements. By giving points a role as an exchange currency, or badges usage as a token of appreciation, gamification affordances become impactful behavior change drivers, rather than just a fad or a result. Future research could seek to include user contribution behavior under the same game elements of different mechanisms.

4.5.2 Point and badge systems were employed in all the studied platforms at some point in time, but a few got canceled along the way.

These replacements were supposed to provide a superior experience, though users think it has more to do with money despite these claims. Past research unravels how these gamification affordances impact the users but not the business or the platform profitability itself. The big alternative question is if the game elements find success in prompting high-quality contributions, why would they get discarded from time to time again?

According to official statements by developers, these occurrences were to simplify the user experience. Quora phased out "Credits" (points) in 2015 and replaced them with their new "Ask to Answer" system where anyone can send a request to anyone else, without the need to gain Credits from their useful contributions and spend them to do so. Reddit got rid of their "Awards" and replaced them with a "Gold" system. While both are similar in a way, the perks that the receiver attains differ with "Gold" convertibility to real (fiat) money.

It was hypothesized by users that these modifications were done because gamification affordances that facilitated the platforms' early growth also acted as roadblocks in later stages, restricting their expansion and profitability. Quora and Reddit have had trouble turning a profit despite having large user bases. Reddit and Quora have not yet undergone an initial public offering (IPO). Plans existed; however, they were put on hold due to the 2022 tech stock crash. Quora's last valuation of 1.8 billion USD at around 100 times its revenue was from its Series D funding in April 2017.

It is still a private venture-backed company. Quora makes money primarily through advertising. They are on track to be cash flow positive from ads alone (D'Angelo, 2021). To fuel this ambition, the platforms seek to bring in additional traffic and ads profits by attracting new users. Between 2015 and 2016, Quora modified its strategy. It was unhappy with its small community and made the decision to adopt growth, outreach, and expansion as its new guiding principles. One main concern was the lack of questions as depicted in the following announcement, “We (Quora) have dealt with the question shortage in different ways throughout our history.” (D'Angelo, 2020). A few solutions made to rectify this were the “Quora Partner Program” or incentive for questions, “Quora Prompt Generator” or question-generating bots, and discontinuation of the “Credits” system, shifting away from quality and a move towards quantity.

Reddit has also undergone similar changes compared to Quora. Reddit's last valuation of 10 billion USD was from its Series F funding in 2021. The initial public offering (IPO) was postponed since then with Reddit remaining under the status of an operating subsidiary of Condé Nast's parent company. Advertising is their main revenue stream in support of Reddit Premium, a premium membership package with no ads. Reddit has not yet become profitable. Therefore, they are investing heavily in expanding the advertising business and launching new products. Some major initiatives steered from this may include the decision to charge third-party apps API access which caused the “2023 Reddit Blackout” controversy and public outrage, and the decision to replace “Awards” with “Gold”. Users will no longer be able to purchase Reddit Premium ads-free browsing for other users because “Gold” no longer be linked to Premium as it was previously. By eliminating this perk, the company would be able to monetize advertising revenue from their existing users better.

Discontinuation of gamification affordances may not be so simple and come at a cost. Users may lose trust in the developers should these changes be made with financial gains in mind. For example, Reddit’s decision to sunset “Awards” and “Coins” resulted in widespread outrage. Redditors felt betrayed as their accumulated coins were now useless with no form of compensation. Thousands of Redditors have voiced their displeasure, especially those who have already loaded up

with coins. The loss of iconic “Awards” may aggravate users who are already angry with Reddit over new API fees that pushed some well-known third-party applications to close. This is similar to when Quora removed its “Credits” system resulting in Quorans expressing their disappointment especially when there was no replacement. Although it is normal for seasoned users to be resistant to change, the complete removal of gamification affordances might permanently alter the platform. This calls for future research on user behavior differences pre and post-gamification.

There are alternative ways of generating new revenue without killing the essential game elements. The first example is Stack Overflow which made no significant changes to its core gamification system with its business model focusing on its product sales, Stack Overflow for Teams. Stack Overflow was acquired by Prosus & Naspers for \$1.8B on Jun 2, 2021. Their revenue growth contributes mainly from Stack Overflow for Team, advertising, and employer branding. According to the 2022 Year-end financial statement report, the business grew revenue by 20% to 94 million USD, as Stack Overflow for Teams contributed slightly over 50% of revenue. As of March 2023, Stack Overflow had over 950 paying teams, bringing approximately US\$55 million in recurring income annually—a 31% yearly increase. Any changes made to "Reputation" points and "Awards" might come with more risks than rewards given the company's growth trajectory in products like Stack Overflow for Teams. Another example is Zhihu, nicknamed the “Quora of China”, which still retains its gamification affordances that promote high-quality contributions. Paid membership services where users can read premium content like novels and other stories online have emerged as the company's more recent growth engine, taking the place of advertising income. Zhihu also explored further into other monetization options such as vocational training, reading apps, and other consultancy services to grow their revenue. From this dilemma, future work could seek more understanding of how game elements could motivate high-quality user contributions and profit at the same time.

4.5.3 Even though all studied platforms are considered knowledge crowdsourcing platforms, each has its own specific use with different user motivations.

Consistent with past work by (Boudreau & Lakhani, 2011), users are motivated to contribute for a variety of reasons, both internal and external. Users contribute not exclusively but interchangeably between platforms depending on their use, such as to find professional written answers in Stack Overflow, or to pass time in Reddit.

Reddit is more laid-back where users find intrinsic enjoyment from participation as a pastime activity. Users may remain anonymous with an alias and avatar. They can joke around and have fun in the welcoming community. Past research from Ye et al. (2015) has suggested similarly that perceived community support and perceived leader support positively affect users' knowledge contribution. This is in alignment with Reddit's focus on community building rather than a serious professional community of practice site. Due to this, expert users may answer questions, but don't post their own questions here and go to Stack Overflow instead.

Stack Overflow is more serious and driven by extrinsic motivation for career advancement. It requires more commitment since user contributions will be critiqued more thoroughly by professionals and experts within the tech industry. Many newbies may steer away from the site given the toxic behavior demonstrated by veteran users who may nitpick every little flaw they find. The site's "Privileges" system, which grants access in tiers, extrinsically motivates users to contribute to unlocking all its features, for instance, editing, voting down, etc. In contrast to normal consumers, users may establish goals for themselves to meet to obtain enough Reputation points to fully engage with Stack Overflow.

4.5.4 User motivations and contribution behavior are dynamic and can change over time.

This is consistent with past research findings from Sun et al. (2012) that there are significant differences between initial and maintained engagement behaviors. In the beginning, aside from site-specific motivations mentioned above, common motivation among users across these platforms is intrinsic motivation for

learning and competence. People come to ask their own questions and read other questions as well as answers in pursuit of knowledge on the topic of their interest. In the beginning, users are highly engaged. They would dedicate time in a day to log in to the site and consistently search for new queries in their followed feed to read or to answer.

Later, the level of activity may drop in comparison. This may be due to life events or the novelty effect wore off. Similarly, across all studied platforms, other than reinforced intrinsic motivation for learning and competence, users' motivation shifts towards extrinsic motivation for helping others and sharing their knowledge. Their motivation is on the spectrum of integrated regulation, with their actions more autonomous or self-determined than not. In alignment with self-determination theory, users have gone through an internalization process when their orientation may be progressing from external regulation with the hope for rewards like career prospects or moderation tool access in mind, to integrated regulation where they become someone who finds joy in helping others learn programming and sharing their knowledge. Their self-determined actions are performed with autonomy. This is not limited to just one platform since users contribute interchangeably between platforms with the same motivation. Future work could seek a better understanding of design implications to foster extrinsic motivation for helping others.

4.5.5 Gamification affordances may encourage user contributions.

Lining up with past research from Prestopnik and Tang (2015), game elements encourage user contributions as they help users reinforce their intrinsic motivation and internalize extrinsic motivation to contribute. Their level of influence is determined by how relevant they are to the way users use the platforms. In Stack Overflow, the point element is more influential than the badge element, however, in Reddit, the badge element is more influential.

The point element may positively or negatively impact user contributions. It provides direct feedback and tangible outcomes on users' contributions. This aligns with past research findings by Feng et al. (2018) stating that points and feedback can have an impact on solvers' participation. By gaining points help validate their level of competence and acceptance or appreciation by the

community. Should the user participate out of their own free will, attaining points could help users develop or shift their orientation to intrinsic motivation for the act of knowledge contribution itself by fostering a sense of competence in a non-controlling manner. This coincides with past work by Rawsthorne and Elliot (1999) highlighting that informational feedback drives the desire for competence in the context of task mastery.

With its mechanism or other use, such as trustworthiness signaling, or exchange mechanism, points could internalize extrinsic motivation as well. In Stack Overflow, external regulation extrinsic motivation for career advancement is prominent. Users would initially be externally prompted to contribute to the platform in the hope of these rewards. Along the way, the point system would help users internalize and progress towards integrated regulation extrinsic motivation like helping others which is more self-determined.

However, In Reddit, while Karma points have the same use of user credibility signaling, its impact to encourage user contributions in the early stage may not be as strong since career prospect is not the site's focus.

Adversely, the point system can demotivate user contributions as well. Receiving a negative point, regardless of intention, can be hurtful to the receiver. Especially for new joiners who may leave after just the first downvoted post. It could be interpreted as their contributions are not appreciated or welcomed. The platform may need to take preventive measures to prevent this occurrence which can damage users' contributions.

The badge system may positively impact user contributions. Acquiring badges gives a sense of accomplishment and feeling of competence to the receiver. For "Awards" in Reddit which are given by other users within the community, the badges not only provide feedback on their competence, but also sense of relatedness for the receiver. Like point, if performed autonomously, through the non-controlling cultivation of a sense of expertise, obtaining badges may assist users in evolving or changing their focus to intrinsic motivation for the act of knowledge contribution itself.

In conjunction with points, badges normally have another role of expert signaling as well. Badges provide more context of the achievement in comparison to points. Recruiters would use both points and badges when considering the candidate from Stack Overflow since looking at points alone may be misleading. Together with points, badges may support internalization and integration process from external regulation to integrated regulation extrinsic motivation. Early on users would participate in hope for rewards such as “Top Writer” badge in Quora, “Top Contributor” badge in Avvo, “Badges” in Stack Overflow. Along the journey, the badge system would support users in internalizing and advancing toward integrated regulation extrinsic motivation, such as helping others or life-long learning, which is more self-determined.

Its relevance to the users determines the degree of positive impact it has on user contributions. For badges like “Trophy” in Reddit awarded by the developer where user don’t really pay attention to, has negligible to no effect. In Reddit where community building is the core focus, badges like “Award” with its sense of relatedness may be more impactful to user contribution behaviors when compared to “Karma” points. This is consistent with past research which states badges may be the primary motivator on user-generated content sites when reciprocity is key (Geri et al., 2017).

Site-wide leaderboards provided on these platforms are not very relevant to most users. Only the world’s top contributors could enjoy close competition while the rest may just watch. Even on the sub-categories level, the competition is still too fierce. Therefore, leaderboards element has negligible impact on user contributions. To make this relevant to them, users have made their own competitions by developing their own leaderboards outside of the platform, such as Karmalb.com for Reddit, and Top Users by Country Queries for Stack Overflow created by Samuel Liew. Or play with their friends in a close group.

Monetary incentives rewarded from user contributions are very small and have negligible impact on user contributions. Given the studied community practice of technology industry, users have high income on average, especially for expert users interviewed. Future research could focus on the community of practice

with lower income on average. The rewards earned from side projects and direct incentives from contribution are very small in comparison with their hourly payrate. With limitations of Reddit's "Contributor Program" at pilot stage and no interviewer for Quora, we could not analyze its impact on user contributions.

4.5.6 Design Implications for Gamification System

The success of the knowledge crowdsourcing platform may be significantly impacted by gamification done right. It has great potential to turn consumers into contributors. Though, there are many challenges associated with its implementation. To avoid common pitfalls, adverse effects and good design practice should be carefully considered as well.

While points element can provide tangible feedback to users and its positive sentiment may encourage them to contribute more, negative remarks could thwart contribution especially for new joiners. Downvoting may be performed as a form of opinion policing, random trolling, or toxic behavior. Stack Overflow has put a few mitigation actions to prevent random abusive behavior such as voting down requires 1 Reputation point from voter, and the voter must gain "Vote Down" privilege by attaining 125 Reputation points first. Proper constraints should be put in place along with moderation incentives to prevent an unwelcoming community.

Points system gaming can make the point seem less meaningful and erode the user's confidence in the site. Users would find illegal loopholes in the system, such as forming a voting ring, rigging a bounty questions, or legal strategy at the expense of quality such as being the fastest answerer, focusing on popular topic only, etc. Stack Overflow has imposed maximum earned points per day restriction, and detection algorithm as a countermeasure. But it is still not perfect.

Like how Karma-points are not a commonly used way to quantify qualitative worth, unfair treatment such as celebrity effect and herding effect where users would attain unreasonable number of points could diminish relevancy of the point system as well. Reddit has implemented some timeframe after posting where users would not see initial upvotes or downvotes counts to tackle this dilemma.

Badge system presents itself as more appealing than point system when considering its limited adverse effects. It is perceived as more fun and provides better context to the why's and how's user would receive such tangible feedback. Users would intentionally contribute per badges condition outside of their routine. Putting in place a fitting badge system would be the biggest challenge.

Low, medium, and high-activity users require different incentives. System designers can target medium-activity users, who actively contribute and like badges. Badges tiering in difficulty levels and badges type diversification promote higher awarding rate. However, the generic site-awarded badge like anniversary badges may be irrelevant and disregarded by users.

Aligned with Geri et al. (2017), badges may be the primary extrinsic motivator on a user-generated content website where reciprocity plays a significant role. For peer-rewarded badge, the awardee behavior changes after receiving badge may sustain only for a matter of days. Users would have positive sentiment when receiving one. Offering more award possibilities benefits users, who enjoy seeing others submit awards and receiving or giving awards. Still, only a few would be considered the core badges for awarding.

Leaderboards granularity is critical to its success. Users are not motivated to compete in too big or too small of a community. By presenting users with filters for geographical locations, timeframe, and topics of interest, like Stack Overflow's unofficial query leaderboards, they can find leaderboards suitable for their current level, progressing from city to country, and finally internationally.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This is a qualitative multiple case study research with an objective to understand gamification affordances and their effect on user contributions in knowledge crowdsourcing platforms, through data triangulation of documentations, semi-structured interviews, and direct observations. The following conclusions about the research may be drawn from thematic analysis.

From this research, we can answer the following research objectives which are:

5.1.1 To study gamification affordances and additional incentives applied in the selected knowledge crowdsourcing platform

5.1.2 To study the motivation and contribution behaviors of the users

5.1.3 To study the relationship between gamification affordances and additional incentives and contribution behaviors of the users

5.1.1 To study gamification affordances and additional incentives applied in the selected knowledge crowdsourcing platform

The primary game elements employed in the studied knowledge crowdsourcing platforms are points, badges, and leaderboards. However, they are not identical between platforms, the same game elements may have different mechanics behind them. Over time, some game elements are phased out or replaced.

Reputation points in Stack Overflow, Karma points in Reddit, and Credit points in Quora are used to indicate credibility. Users get moderating tools and privileges with more points. Users earn or lose points from community feedback. Upvoted articles with interesting queries, high-quality responses, or moderation get points. Downvoted contributions also result in points loss. The exchange system on Stack Overflow and Quora uses points. Users may use their points to reward the best answers or ask industry experts questions. Quora discontinued credit points in 2015.

Stack Overflow badges, Reddit Trophies & Awards, and Quora's Top Writer Program are visual representations of success that demonstrate legitimacy and expertise. Certain site actions or criteria are needed to acquire a badge. Awards are given to Reddit users to show appreciation or reactions to their contributions. Unlike Stack Overflow and Quora, it's more subjective. Reddit replaced award badges with Gold badges, which provide recipients with different perks from before, and Quora discontinued the Top Writer program in 2019.

Quora and Stack Overflow use similar leaderboards. Users' points over a specific time frame, such as the last week or all time, rank them in sub-communities or themes. The leaderboard signifies niche expertise. Users cannot be rated by geography or social circle.

Reddit and Quora users may earn money for their efforts. Each platform uses a different technique. Redditors can "Gold" other users for their efforts. After that, the winner can convert the award to fiat money. Quora writers can impose a paywall on their content. Additionally, if their content is popular, they may receive ad revenue.

5.1.2 To study the motivations and contribution behaviors of the users

User contributions are driven by internal and external motivations. Each platform has its unique application and user incentives. Stack Overflow is more serious and extrinsically driven by career advancement. The site's "Privileges" system, which unlocks functionality in tiers, extrinsically encourages users to contribute. Reddit is more relaxed, and users intrinsically enjoy participating as a hobby. Due to this, experts may answer questions but not publish them here; go to Stack Overflow. In addition to site-specific motivations, users across various platforms initially have an intrinsic drive for learning and competency. Over time user motivations shift from just intrinsic learning and competency to extrinsic helping and sharing. They act autonomously and are motivated by integrated regulation. Activity level may decline after a sustained period.

The platform encourages expert users since their contributions are relevant and high-quality. However, repetitive, or dull contributions may deter them. To cope with intriguing questions running out, users participate in multiple sites and communities interchangeably.

5.1.3 To study the relationship between gamification affordances and additional incentives and contribution behaviors of the users

Game elements encourage user contributions as they help users reinforce their intrinsic motivation and internalize extrinsic motivation to contribute. Relevance to platform usage determines their effect with badges being more influential on Reddit than points on Stack Overflow.

The point element can promote or undermine user contributions. As an expert signaling tool, it significantly connects to extrinsic motivation for software programmers' career progression in Stack Overflow. Since Reddit is not about professional prospects, its influence on user contributions may be weaker. The point system might also discourage user contributions. No matter the motive, receiving a bad score may sting, especially for newcomers.

The badge system may positively impact user contributions with users intentionally contributing per badge condition. Stack Overflow badges give an expert indicator in tandem with points. Reddit "Awards" provide users feedback on their expertise plus a sense of belonging is impactful since community reciprocity is highly valued. For developer-awarded Reddit badges like "Trophy" which users don't care about, have no effect.

Site-wide leaderboards on these platforms are irrelevant to most users. While financial incentives for user contributions are low and have little effect. However, this is not conclusive due to research limitations.

5.2 Recommendations

5.2.1 Recommendations for Knowledge Crowdsourcing Platform Developers

5.2.1.1 For gamification affordances to effectively impact psychological outcomes and behavioral outcomes, the developers must consider the mechanics behind them and their relevance to targeted users.

If the platform's main priority is the quality of the contributions. When points are used in an exchange system between questions and answers, they also encourage extrinsic motivation for asking questions as well. High-quality

contributions would be encouraged by the supply and demand cycle. Or when points are used to unlock moderating tools or privileges within the site, users would contribute under such extrinsic motivation, not only for fame or other rewards alone. Only credible users who have passed the required number of points can perform moderating activities for the community.

If badges are awarded by one user to another, extrinsic motivation for relatedness could be fostered. This is suitable if community building is the focus of the platform.

The leaderboards would not have an impact on the user if they were too challenging and became irrelevant. Most people could find a friendly rivalry between close friends or within their own nation or area more meaningful than the competition between the finest in the world. As an example, many health promotion applications, such as the “Nike Run Club” application offer the user a variety of custom challenges and leaderboards, especially for competition among invited friends. Extrinsic motivation for the competition drives user participation.

5.2.1.2 Developers should prioritize fostering the motivations of expert users since they are the primary suppliers of high-quality contributions to the platform.

From past studies, countries in Europe, Australia, Canada, and New Zealand rank higher in terms of engagement and contribution. Participation and answer quality are often better amongst those with higher education levels. Politeness, expressing thanks, and providing good feedback in comments should be advocated to promote ongoing contributions and higher-quality material. Things that could thwart their engagement are poorly written, low effort, repetitive, and uninteresting questions.

5.2.1.3 To promote user contributions, the platform must provide both internal and external motivation.

While intrinsic motivations are preferable, not all tasks are inherently interesting. External regulated extrinsic motivation such as rewards, career prospects, and direct monetary incentives, may be important, especially during an early stage.

Gamification affordances can be employed to foster these extrinsic motivations. As elaborated in the first recommendation, points can be used in an exchange system or linked to perks or utility inside the platform. Leaderboards and badges can be added as well. However, the developers should not expect this would have an impact on the users forever.

To promote long-term contribution, developers should aim to reinforce intrinsic motivations for the act of contribution itself, as well as shift the orientation from external regulation extrinsic motivation for rewards to integrated regulation extrinsic motivation for sharing and helping others. To do this, the gamification affordances employed should provide users with a sense of competence and relatedness while not being controlling. The developers may highlight how users' contributions are positively impacting others. Such as how many people their answers have reached. How many helpful flags or votes they have made thus far. When this happens, people feel not only competent and connected but also self-determined, as they engage in extrinsically valued activities.

They can also capitalize on the fact that users contribute interchangeably between platforms once interesting questions run out. Some major tasks include how the platform can provide users with a limitless number of intriguing inquiries and how they can recruit people who already have integrated regulation from other reputable platforms to contribute to theirs.

5.2.1.4 When the platform discards the gamification system, typically to draw in more traffic and ad revenue during a later stage when the platform must be profitable and ready for either an initial public offering or an exit buyout, there can be an unwanted consequence.

Users may lose trust in the platform should this change come abruptly without believable reasons like what we have observed with Reddit's "Awards" cancellation controversy. Furthermore, the quality of the contributions can decline.

Developers should look for additional revenue streams to reduce the requirement for this. The platform can then rely less on advertising revenue and continue to generate high-quality contributions. Like Stack Overflow for Teams,

Zhihu vocational training, reading apps, and other consultancy services, which help generate income without sacrificing the gamification affordances that drive high-quality input thus far.

5.2.2 Recommendations on Future Research

1. When past studies discussed game elements, the focus was on the game elements but not the mechanisms connected to them. Future studies can aim to understand the difference in user motivations and contribution behaviors between the same game element of different mechanisms.

2. From direct observations, it was found that the gamification system was discarded time and time again. Future studies can aim to understand what the underlying reasons behind such decisions may be. As well as the user behavior differences pre- and post-gamification.

3. Past research has focused on how gamification affordances can encourage high-quality contributions. Additionally, future studies can aim to understand how they can generate profit at the same time.

4. From the key finding of how extrinsic motivation for sharing and helping others is prominent in knowledge crowdsourcing platforms, future studies can aim to understand what are the design implications that may foster such motivations.

5. Since the community of practice selected for this study is software programmers and developers, future studies can target different communities of lower income on average. Such as to analyze whether, with different CoPs, direct monetary incentives would have a higher impact on user contributions or not.

5.3 Limitations

1. There aren't many studies found on Quora gamification, user motives, or contribution behaviors. The author of this study also could not secure an interview with experienced Quora users in the programming community as well.

2. The Impact of direct monetary incentives on user contributions could not be studied since an interview with a veteran Quora user could not be arranged by the author. For Reddit, the newly launched “Contributor Program” is still at the pilot stage only available in the few selected communities, and very immature.



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APPENDICES

APPENDIX A

DOCUMENTATION SEARCH RESULTS

Table 1

Stack Overflow Documentations Search Results

No.	Platform	Title	Remark
1	StackOverflow	Involvement, Contribution and Influence in Github and Stack Overflow	Included
2	StackOverflow	Recency and quality-based ranking question in CQAs: A Stack Overflow case study	Included
3	StackOverflow	Motivation Under Gamification: An Empirical Study of Developers' Motivations and Contributions in Stack Overflow	Included
4	StackOverflow	Is reputation on Stack Overflow always a good indicator for users' expertise? No!	Included
5	StackOverflow	One size does not fit all: A study of badge behavior in stack overflow	Included
6	StackOverflow	Reputation Gaming in Stack Overflow	Included
7	StackOverflow	Exploring the Effect of Politeness on User Contribution in Q&A sites: A Case Study of Stack Overflow	Included
8	StackOverflow	Analysis of Factors Influencing User Contribution and Predicting Involvement of Users on Stack Overflow	Included
9	StackOverflow	Patterns of User Participation and Contribution in Global Crowdsourcing: A Data Mining Study of Stack Overflow	Included
10	StackOverflow	Voluntary Contribution to Online Public Goods: Who Contributes What on GitHub & Stack Overflow?	Included

Table 1*Stack Overflow Documentations Search Results (cont.)*

No.	Platform	Title	Remark
11	StackOverflow	Stack overflow badges and user behavior: an econometric approach	Included
12	StackOverflow	Building reputation in stackoverflow: an empirical investigation	Included
13	StackOverflow	Analysis of the reputation system and user contributions on a question answering website: Stackoverflow	Included
14	StackOverflow	Studying software developer expertise and contributions in Stack Overflow and GitHub	Included
15	StackOverflow	Can gamification motivate voluntary contributions? The case of StackOverflow Q&A community	Included
16	StackOverflow	IMPACT OF USERS' MOTIVATION ON GAMIFIED CROWDSOURCING SYSTEMS: A CASE OF STACKOVERFLOW.	Included
17	StackOverflow	What makes geeks tick? a study of stack overflow careers	Included
18	StackOverflow	Gender differences in participation and reward on Stack Overflow	Not included in Results
19	StackOverflow	A journey of bounty hunters: analyzing the influence of reward systems on stackoverflow question response times	Not included in Results
20	StackOverflow	Examining the Impact of Generative AI on Users' Voluntary Knowledge Contribution: Evidence from A Natural Experiment on Stack Overflow	Not included in Results

Table 1*Stack Overflow Documentations Search Results (cont.)*

No.	Platform	Title	Remark
21	StackOverflow	Understanding the Reputation Differences between Women and Men on Stack Overflow	Not included in Results
22	StackOverflow	Modeling the effect of the badges gamification mechanism on personality traits of Stack Overflow users	Not included in Results
23	StackOverflow	Quick Trigger on Stack Overflow: A Study of Gamification-Influenced Member Tendencies	Not included in Results
24	StackOverflow	Towards Recency Ranking in Community Question Answering: A Case Study of Stack Overflow	Repeating
25	StackOverflow	Badges of Friendship: Social Influence and Badge Acquisition on Stack Overflow	Irrelevant
26	StackOverflow	Interpreting cloud computer vision pain-points: A mining study of Stack Overflow	Irrelevant
27	StackOverflow	MOTIVATION TO RESPOND ON STACK OVERFLOW Q&A WEBSITE	Irrelevant

Table 2*Reddit Documentations Search Results*

No.	Platform	Title	Remark
1	Reddit	karma, precious karma!karmawhoring on reddit and the front page's econometrisation	Included
2	Reddit	How do peer awards motivate creative content? Experimental evidence from Reddit	Included

Table 2*Reddit Documentations Search Results (cont.)*

3	Reddit	Consumers and curators: Browsing and voting patterns on reddit	Included
4	Reddit	Random voting effects in social-digital spaces: A case study of reddit post submissions	Included
5	Reddit	Upvote my news: The practices of peer information aggregation for breaking news on reddit. Com	Included
6	Reddit	Understanding the Impact of Awards on Award Winners and the Community on Reddit	Included
7	Reddit	Assessing Peer Award Diversification on Reddit	Included
8	Reddit	Do first encounters make or break new users?	Included
9	Reddit	Where should one get news updates: Twitter or Reddit	Not included in Results
10	Reddit	Here, have an upvote: Communication behaviour and karma on Reddit	Not included in Results
11	Reddit	Impact of reddit discussions on use or abandonment of wearables	Not included in Results
12	Reddit	Researching Social News–Is reddit. com a mouthpiece for the 'Hive Mind', or a Collective Intelligence approach to Information Overload?	Outdated
13	Reddit	" Social News" Web-sites with Democratic Interfaces: Analysis of One Month's Voting from Reddit. Com	Outdated
14	Reddit	Random Voting Effects in Social-Digital Spaces: A case study of Reddit Post Submissions	Repeating

Table 2*Reddit Documentations Search Results (cont.)*

No.	Platform	Title	Remark
15	Reddit	Karma, Precious Karma!Karmawhoring on Reddit and the Front Page's Econometrisation image	Repeating
16	Reddit	Identification of disease or symptom terms in reddit to improve health mention classification	Irrelevant
17	Reddit	Discussion of Climate Change on Reddit: Polarized Discourse or Deliberative Debate?	Irrelevant
18	Reddit	Dank or not? Analyzing and predicting the popularity of memes on Reddit	Irrelevant
19	Reddit	Dark, clear or brackish? Using Reddit to break down the binary of the dark and clear web	Irrelevant
20	Reddit	Upvote or Downvote ABA for Autism? Content and Support in Reddit Posts	Irrelevant
21	Reddit	Love, Hate Thy Neighbour? Or Just Don't Care Much about Them: A Sentiment Analysis of China-Related Posts and Comments on Reddit. Com	Irrelevant
22	Reddit	"Is this Herpes or Syphilis?": Latent Dirichlet Allocation Analysis of Sexually Transmitted Disease-Related Reddit Posts During the COVID-19 Pandemic	Irrelevant
23	Reddit	What makes a trophy hunter? An empirical analysis of Reddit discussions	Irrelevant
24	Reddit	Upvote or downvote ABA for autism? Content and support in Reddit posts	Irrelevant
25	Reddit	Variational Bayesian PCA versus k-NN on a Very Sparse Reddit Voting Dataset	Irrelevant

Table 2*Reddit Documentations Search Results (cont.)*

No.	Platform	Title	Remark
26	Reddit	Superman, Superwoman, or Superhero? A Thematic Analysis of Reddit User Discussions of Female Superheroes	Irrelevant
27	Reddit	To upvote or downvote: Parental supervision of screen time on Reddit	Irrelevant
28	Reddit	Hi Reddit! I am Jennifer Maclachlan, a small chemical business owner and science café founder. Ask me anything about entrepreneurial happenings or tips in the chemical sector.	Irrelevant
29	Reddit	Reddit redesign: Triumph or fiasco for the 'front page of the internet'?	Irrelevant
30	Reddit	Deny or accommodate?-Discursive response strategies of gaming companies facing institutional complexity on Reddit	Irrelevant
31	Reddit	Feast or Famine in the Public Sphere: A Content Analysis of Links Shared in Civic Conversations on Reddit	Irrelevant
32	Reddit	Reddit Recruit of Women Refused Abortion or Contraception Due to Their Provider's Conscientious Objection	Irrelevant
33	Reddit	... that my death has a fixed 100% probability, CMV [Change My View].”(Reddit np) Paulogy, an anonymous user on the website Reddit, posts a challenge that ...	Irrelevant

Table 3*Quora Documentations Search Results*

No.	Platform	Title	Remark
1	Quora	Wisdom in the social crowd: an analysis of quora	Included
2	Quora	Detecting experts on Quora: by their activity, quality of answers, linguistic characteristics and temporal behaviors	Included
3	Quora	Multilayer convolutional neural network to filter low quality content from quora	Included
4	Quora	Analyzing the linguistic structure of question texts to characterize answerability in quora	Included
5	Quora	Computer-supported collaborative questioning. Regimes of online sociality on Quora	Included
6	Quora	Community matters more than anonymity: analysis of user interactions on the Quora Q&A platform	Included
7	Quora	Influencing Followership: Understanding the Perspective of Those Leading Active Discussions on Quora	Included
8	Quora	A cross-cultural analysis of the modes and effectiveness of collaborative production of knowledge on Quora	Included
9	Quora	Digital Rhetoric in Collaborative Knowledge-Making: Reading Answers and Super-Answers to Existential Questions on Quora	Included
10	Quora	An Analysis of Language Differences between Female and Male in a Quora Application	Included
11	Quora	Deep Dive into Anonymity: Large Scale Analysis of Quora Questions	Included

Table 3*Quora Documentations Search Results (cont.)*

No.	Platform	Title	Remark
12	Quora	Deep dive into anonymity: Large scale analysis of quora questions	Repeating
13	Quora	Language Use Matters: Analysis of the Linguistic Structure of Question Texts Can Characterize Answerability in Quora	Repeating
14	Quora	Detecting experts on Quora: By their activity, quality of answers, linguistic characteristics and temporal behaviors	Repeating
15	Quora	Quora insincere question classification	Irrelevant
16	Quora	Analysis and prediction of question topic popularity in community Q&A sites: a case study of Quora	Irrelevant
17	Quora	Classification of insincere questions using deep learning: quora dataset case study	Irrelevant
18	Quora	Natural language understanding with the quora question pairs dataset	Irrelevant
19	Quora	Quora: Situs Komunitas Tanya Jawab Sebagai Medium Diskursus Ruang Publik	Irrelevant
20	Quora	Collaborative identity decolonization as reclaiming narrative agency: Identity work of Bengali communities on Quora	Irrelevant
21	Quora	Anti-Asian discourse in Quora: Comparison of before and during the COVID-19 pandemic with machine-and deep-learning approaches	Irrelevant
22	Quora	Identifying semantically duplicate questions using data science approach: A quora case study	Irrelevant

Table 3*Quora Documentations Search Results (cont.)*

No.	Platform	Title	Remark
23	Quora	Climate change communication in an online q & a community: A case study of quora	Irrelevant
24	Quora	How technological affordances predict political expression via Quora: Mediated by risk appraisal and moderated by social motivation	Irrelevant
25	Quora	Quora Insincere Questions Classification Using Attention Based Model	Irrelevant
26	Quora	Recommending the world's knowledge: Application of recommender systems at Quora	Irrelevant
27	Quora	THE EFFECTIVENESS OF QUORA APPLICATION TO IMPROVE STUDENTS'READING SKILL	Irrelevant
28	Quora	Language use matters: Analysis of the linguistic structure of question texts can characterize answerability in quora	Irrelevant
29	Quora	What framework promotes saliency of climate change issues on online public Agenda: A quantitative study of online knowledge community Quora	Irrelevant
30	Quora	Experiments on paraphrase identification using quora question pairs dataset	Irrelevant
31	Quora	Quora question answer dataset	Irrelevant
32	Quora	A Review of Classification of Insincere Questions in Quora Using Deep Learning Approaches	Irrelevant
33	Quora	Using data analytics to filter insincere posts from online social networks. A case study: Quora insincere questions	Irrelevant

Table 3*Quora Documentations Search Results (cont.)*

No.	Platform	Title	Remark
34	Quora	Detection of duplicates in Quora and Twitter corpus	Irrelevant
35	Quora	quoras: A Python API for Quora Data Collection to Increase Multi-Language Social Science Research	Irrelevant
36	Quora	Understanding coronavirus disease 2019 (COVID-19) vaccine hesitancy: Evidence from the community-driven knowledge site Quora	Irrelevant
37	Quora	Quora Question Pairs Identification and Insincere Questions Classification	Irrelevant
38	Quora	Quora question pairs using XG boost	Irrelevant
39	Quora	Listening to the user's voice: A temporal analysis of autism-related questions on Quora	Irrelevant
40	Quora	Improve Quora Question Pair Dataset for Question Similarity Task	Irrelevant
41	Quora	Are the new ais smart enough to steal your job? iq scores for chatgpt, microsoft bing, google bard and quora poe	Irrelevant
42	Quora	Lexicon-based text analysis for twitter and quora	Irrelevant
43	Quora	Assessment of long short-term memory network for quora sentiment analysis	Irrelevant
44	Quora	The Effectiveness of Using Quora Website in Improving Students' Descriptive Text Writing	Irrelevant
45	Quora	Opinion extraction from quora using user-biased sentiment analysis	Irrelevant
46	Quora	Text classification using recurrent neural network in Quora	Irrelevant

Table 3*Quora Documentations Search Results (cont.)*

No.	Platform	Title	Remark
47	Quora	Quora question duplication	Irrelevant
48	Quora	Exploring profile textual features for cross-network linkability: application to Quora and Twitter users	Irrelevant
49	Quora	Comparison of basal cell carcinoma posts, comments and authors between Reddit and Quora forums	Irrelevant
50	Quora	An Enhanced Deep Learning Model for Duplicate Question Detection on Quora Question pairs using Siamese LSTM	Irrelevant
51	Quora	Understanding public perceptions of K-12 computational thinking education through an analysis of Quora	Irrelevant
52	Quora	When Tinder Swiping Gets Challenging: Women's Narratives of Gender-Based Violence as Shared Through Quora	Irrelevant
53	Quora	Student's Perspective of Using Quora: An Authentic Learning Experience in Digital Platform	Irrelevant
54	Quora	Analysis of students' perception of good mathematics teachers and teaching using informal conversations from Twitter and Quora	Irrelevant
55	Quora	Friendship paradoxes on Quora	Irrelevant
56	Quora	Quora Based Insincere Content Classification & Detection for Social Media using Machine Learning	Irrelevant

Table 3*Quora Documentations Search Results (cont.)*

No.	Platform	Title	Remark
57	Quora	Politeness strategies used in the Covid-19 vaccine controversies in real and anonymous Quora accounts	Irrelevant
58	Quora	An Unaccepted Official Quora: The Process of Guiding Online Youth Opinion by the Chinese Communist Youth League	Irrelevant
59	Quora	Duplicate Quora Questions Pair Detection using Siamese Bert and Ma-LSTM	Irrelevant
60	Quora	Computer-supported collaborative accounts of major depression: Digital rhetoric on Quora and Wikipedia	Irrelevant
61	Quora	Competing topic naming conventions in quora: predicting appropriate topic merges and winning topics from millions of topic pairs	Irrelevant
62	Quora	Classification of Quora Insincere Questionnaire Using Soft Computing Paradigm	Irrelevant
63	Quora	Should wikipedia and quora collaborate?	Irrelevant
64	Quora	Discourse Representation of Quora App Users' Comments on Najwa Shihab: Critical Discourse Analysis	Irrelevant
65	Quora	Quora Question Duplication Problem	Irrelevant
66	Quora	Medical Quora Tagging using MATAR and LDA Algorithm	Irrelevant
67	Quora	Case Study: Quora Question Pairs	Irrelevant
68	Quora	ASSESSING GILLETTE ONLINE ADVERTISING BACKLASH IN QUORA USING NETNOGRAPHY.	Irrelevant

Table 3*Quora Documentations Search Results (cont.)*

No.	Platform	Title	Remark
69	Quora	PAA black holes, Khan, and Quora: mapping understanding of isotopes through existing data sources	Irrelevant
70	Quora	QUORA QUESTION PAIRS ANALYSIS USING PERT	Irrelevant
71	Quora	To what extent NLP with RNN and Transformer Based Deep Neural Network can be used to classify Insincere questions on Quora	Irrelevant
72	Quora	COHERENCE ANALYSIS OF RACIAL PREJUDICE IN THE ANSWERS TO QUORA APPLICATION'S QUESTION WHAT IS THE MOST RACIST THING	Irrelevant
73	Quora	Identification and Analysis of Fallacious Argument of Socio-political Discourse: A Case Study of Computer-mediated Discourse on Quora	Irrelevant
74	Quora	“Liquid Job:” The Emotional Text (Ure) of Work Uncertainty in Quora Site	Irrelevant
75	Quora	A GUI BASED GRADING APPROACH FOR QUORA QUERIES AND MESSAGES USING MACHINE LEARNING TECHNIQUES	Irrelevant
76	Quora	Answering the Queries on Covid-19 Pandemic: Profiling the Contribution of Social Q&A Site Quora	Irrelevant
77	Quora	Quora Question Pair Similarity	Irrelevant
78	Quora	A Question Pairs Similarity Detection With Data Mining Applications Using Natural Language Processing And Machine Learning: QUORA	Irrelevant
79	Quora	QUORA INSINCERE QUESTIONS CLASSIFICATION	Irrelevant

Table 3*Quora Documentations Search Results (cont.)*

No.	Platform	Title	Remark
80	Quora	Sentence embeddings for Quora question similarity	Irrelevant
81	Quora	Quora Question Answering Chatbot	Irrelevant
82	Quora	ANALYZING STRUCTURE OF QUESTION TEXTS TO CHARACTERIZE ANSWERABILITY IN QUORA USING SEO: A SURVEY	Irrelevant
83	Quora	Detecting Experts on Quora: By their Activity, Quality of Answers, Linguistic Characteristics and Temporal Behaviors	Irrelevant
84	Quora	NEUROANTHROPOLOGY: EXAMINING ONLINE DISCOURSE OF ADDICTION AMONG QUORA USERS	Irrelevant
85	Quora	THE DEVELOPMENT OF STUDENTS CRITICAL THINKING IN THE FORM OF WRITING BY USING QUORA AS AN ENGLISH LEARNING PLATFORM	Irrelevant
86	Quora	Quora Question Pairs	Irrelevant
87	Quora	Build Your Brand and Business With Quora Like a Boss: How Get Millions of Views, Thousands of Email Subscribers, and Become a Thought Leader.	Irrelevant
88	Quora	The The Effect of Quora application to improve transactional speaking skill of the second grade students at senior high school 12 Makassar	Irrelevant
89	Quora	Characterization of COVID-19 Vaccine Clinical Trial Discussions on the Social Question-and-Answer Site Quora	Irrelevant
90	Quora	Answer to Quora Site Question	Irrelevant

Table 3*Quora Documentations Search Results (cont.)*

No.	Platform	Title	Remark
91	Quora	Predicting Duplicate Questions in Quora	Irrelevant
92	Quora	Siamese Based Network for Detecting Quora Questions Similarity	Irrelevant
93	Quora	Politeness Maxims and Language Features in Covid-19 Vaccination Comments on Quora	Irrelevant
94	Quora	Deanonymizing Quora Answers	Irrelevant
95	Quora	Insincere Questions Classification on Quora using pre-trained word embeddings	Irrelevant
96	Quora	Quora Question Pairs	Irrelevant

APPENDIX B

INTERVIEW QUESTION GUIDE

Hello, my name is Titinant Pongdumbun and I am a master's student at Thammasat University in Thailand. I am conducting a study on Gamified Crowdsourcing Platforms and these interviews are my main source of data. This study will be used only for educational purposes, and its goal is to uncover the significance of gamification in knowledge crowdsourcing platforms and produce a best-practices document that will enhance the developers' strategies for platform development. Through conducting interviews with individuals who possess a comprehensive understanding of gamified crowdsourcing platforms beyond my current knowledge, I aspire to acquire valuable insights and obtain profound responses that will serve to inform the study's conclusive findings.

This interview should last approximately 30 to 60 minutes. It should be noted that all interviews will be recorded and, if necessary, an interpreter will be employed to facilitate communication. However, this recording is audio only and will be stored securely, and personally identifying information like your name will not be included in the interview transcripts. You will remain anonymous throughout. You also have the right to stop the interview at any point; if you choose to do so, the recording will be deleted immediately.

So, knowing that the interviews are recorded and approximately 30 to 60 minutes long, do you consent to continuing with the interview? (*Yes/No*)

No = Thank you for your time; enjoy your day.

Yes = Thank you for your participation!

Basic Demographics

We're going to start out with some basic information about you. This is so I can better understand how different people respond to the same questions.

1. How should I call you? [Close]
2. What is your age? [Close]

3. In which country are you currently living? [Close]
4. What is your highest completed level of education? [Close]
5. What is your current profession? [Close]
6. How did you come across this platform? [Open]
7. Why do you use this platform, and for what purpose? [Open]
8. When do you use this platform in the day and week? [Close]
9. How frequently do you use this platform? [Close]
10. How much time do you spend on the platform? [Close]
11. How many years have you been using this platform? [Close]

Objective 1: To study gamification affordances and additional incentives applied in the selected knowledge crowdsourcing platform

Ok, now we're going to talk about game elements and incentive systems on the platform.

1. Have you noticed any game elements within the platform, such as points, badges, or rankings? Please elaborate. [Open]
2. What is your status on these game elements (if you can recall)? [Close]
3. Is there any way to make money on this platform directly? And have you participated in it? [Close]
4. Is this your primary source of income? [Close]

Objective 2: To study the contribution behaviors of the users

This next group of questions deals with your knowledge contribution and activities on the platform.

1. Do you actively provide answers to questions on this platform? [Close]
2. What kind of questions do you often answer on this platform? Any specific topic? [Close]
3. Why are you answering these questions? What is your goal? [Open]
4. How much time do you spend answering questions? Per question? [Close]
5. Do you commit to regularly answering questions on this platform? Why so? [Open]

6. How would you describe your style of answering questions? [Open]

7. Do you usually do your research before answering questions? Or what is your normal flow? [Open]

8. Do you usually follow up on the feedback of your answers? Or what is your normal flow? [Open]

9. What do you like to do on this platform besides answering questions? Such as voting, commenting, tagging, editing, reporting, and asking questions [Close]

Objective 3: To study the relationship between gamification affordances and additional incentives and contribution behaviors of the users

Finally, I'm going to ask you about the influence gamification, or incentive may have on your contribution.

1. How do you find these game elements? Do you like it? How so? [Open]

2. What do you feel when you gain or lose points? Or when you achieve new awards/achievements? Or rank higher on the leaderboard? [Open]

3. Do you think these game elements motivate you to contribute more? Or less? How so? [Open]

4. Without game elements, how do you think you would act? How so? [Open]

5. Do you think game elements influence your contribution behavior over time compared to the beginning? How so? [Open]

6. How do you find an incentive system? Do you like it? How so? [Open]

7. Do you think these incentives and rewards motivate you to contribute more? How so? [Open]

8. Without an incentive system do you think you will still actively answer questions? Please elaborate. [Open]

That is the end of my questions. The goal of these interviews is to study gamified knowledge crowdsourcing platform. Through these interviews, I aspire to gain novel insights and knowledge pertaining to the aforementioned subject matter.

As I said at the beginning, the recording of this interview will be stored securely and anonymously. If you have any further questions about this study, you can contact me – I will type my e-mail address into the chat. As a part of my gratitude for your time, please accept this Amazon Gift Card which I will send to your email as my token of appreciation. Thank you again for this interesting and informative interview; enjoy the rest of your day.

