LUND UNIVERSITY
School of Economics and Management
Department of Informatics

The Contestants' Willingness to Join Competitions in Contest-based Crowdsourcing

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Authors: Amirali Sariaslani
Bohui Yu

Supervisor: Blerim Emruli

Grading Teachers: Saonee Sarker
Nicklas Holmberg

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AUTHORS: Amirali Sariaslani, Bohui Yu

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ABSTRACT (MAX. 200 WORDS):
Contest-based crowdsourcing is a popular method for companies to gather ideas or information in a creative way, and the contestants' motivations to participate in such competitions are not the same. Different factors influence the willingness of contestants to participate in contests. Yet these motives are not applicable to all types of crowdsourcing. This paper investigates the motivations and finds out what factors are most influential from the contestants' point of view. The research was carried out by using the qualitative research method, and the interview questions' design is supported by existing literature in the contest-based crowdsourcing field. The selected interviewees are the active participants in crowdsourcing contests that are from various occupations, their answers are transcribed and coded. The research finds that the intrinsic incentives of contestants outweigh the extrinsic ones, and the most influential motivation is to obtain experience and knowledge by practicing their skills when competing. The result also suggests that the intrinsic and extrinsic factors that might influence each other and permeate mutually, and can independently motivate contestants as well.

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1 Introduction

The recent development of information and communication technologies (ICT) has made a foundation for crowdsourcing to become a trendy research topic in the last decades. Technology advancement in recent decades has enabled enterprises and people to collaborate easily and closely across the globe. In such an interactive environment, crowdsourcing has emerged as a successful problem-solving approach used by many firms to exploit the untapped potential of human intelligence, knowledge, and creativity (Karachiwalla & Pinkow, 2021). The act of crowdsourcing occurs when organizations or institutions utilize the power of the collective wisdom of an unlimited network of people to help solve problems (Pedersen, Kocsis, Tripathi, Tarrell, Weerakoon, Tahmasbi, Xiong, Deng, Oh, & Vreede, 2013). Crowd intelligence has also brought many internet applications, like crowdsourcing, to leverage the collaboration between humans and machines to provide solutions to real-world problems (Li, Zheng, Fan, Wang, & Cheng, 2017a). The online environment is the central feature of crowdsourcing that enables a vast number of user groups to communicate in a decentralized way and achieve the project goal by cooperating with each other (Hammon & Hippner, 2012). Crowdsourcing has provided an opportunity for many businesses and firms to access collective intelligence and creativity from the crowd to solve their internal problems, rapidly adapt to customer needs and the market's demand, reduce product life cycles, as well as increase overall innovation efficiency (Pedersen et al., 2013; Ikediego, Ilkan, Abubakar & Victor, 2018; Karachiwalla & Pinkow, 2021).

From the information systems (IS) perspective, crowdsourcing is considered to be a type of labor system that creates informational commodities and services primarily through crowd contributions (Geiger, Rosemann, Fielt, & Schader, 2012). In addition, the notion of open innovation has been regarded by organizations in the past decade, and IS has a prominent role to play in creating the necessary baseline for the implementation of open innovation models (Whelan, Conboy, Crowston, Morgan, & Rossi, 2014). Open-source software and crowdsourcing are possibly the most captivating applications of IS-enabled open innovation (Whelan et al., 2014). IS can maintain innovative actions by providing the network and tools for idea generation and novel solutions for organizations. Crowdsourcing contests are regarded as a promising and innovative way in the field of open innovation to access a wide spectrum of knowledge and resources online (Karachiwalla & Pinkow, 2021). The concept of a contest in crowdsourcing platforms is to present a task to a group of people where the best-provided solution to the task is selected through a contest and the winner is usually offered a monetary reward (Segev, 2020). In crowdsourcing apart from considering resources and capabilities, it is important to investigate creative and unpredictable processes of engaging the crowd (Palacios, Martinez-Corral, Nisar & Grijalvo, 2016). The growing trend of using contest-based crowdsourcing platforms in recent years has led researchers from different fields such as operations research, computer science, management, artificial intelligence, economics, and information systems to study the structure of platforms as well as the behavior of contestants interacting with platforms (Segev, 2020).

1.1 Problem

Businesses have a rich history of using the untapped potential of the crowd. The ability of crowdsourcing to collect various ideas from people, if leveraged to its full potential, becomes the primary reason for organizations and managers to put crowdsourcing in the first place (Dahlander & Piezunka, 2020). Many companies including BMW, General Mills, and Stanley Black & Decker launch various campaigns, with the purpose of creating new products and R&D projects in particular, to attract experts to participate in such projects (Deloitte, 2016). Previous research in crowdsourcing has argued different aspects related to the participation of workers in crowdsourcing platforms. As a prominent incentive**,** money is one of the reasons for crowd participation (Ikediego et al., 2018; Khare, Good, Leaman, Su & Zhiyong, 2016). However, the purpose behind the design of all contests is not exclusively to offer prizes to crowd workers. The initiatives behind competitive crowdsourcing often try to compensate winning contestants in both financial and non-financial ways (Tauchert, Buxmann & Lambinus, 2020). According to Ikediego, Ilkan, Abubakar, and Victor Bekun (2018), motives can be both intrinsic and extrinsic, yet these motives are not applicable to all crowdsourcing platforms. Crowd workers play a significant role in crowdsourcing since the success of crowdsourcing is highly dependent on their ability to develop new solutions (Karachiwalla & Pinkow, 2021). According to Zhao and Zhu (2012), mass participation greatly impacts the successful initialization and sustainable development of communities. In contrast, low participation among members may hinder building a qualified crowd (Dahlander & Piezunka, 2020). Although prompting more contestants in a competition can help the owner or sponsor of the contest to increase their brand awareness (Chen, Xu & Liu, 2020), the lack of people's engagement and encouragement directly influences the accountability and involvement of contestants (Dahlander & Piezunka, 2020).

There has been a rising trend in crowdsourcing research in the past decade and this topic has gained considerable traction in both academia and industry (Palacios et al., 2016; Karachiwalla & Pinkow, 2021). Contest-based crowdsourcing is one of the important forms of crowdsourcing that can potentially be adopted by many firms for decision-making and problem-solving (Zhao & Zhu, 2012). According to Tauchert, Buxmann, and Lambinus (2020), companies highly value the innovative power of the community of data scientists in proposing solutions for extracting valuable insights from data, and the scarce resources of data scientists can be leveraged by crowdsourcing. As previously mentioned, the level of engagement of crowd workers in crowdsourcing varies from application to application in general (Ikediego et al., 2018). From the contestants' perspective, participating in competitions provides the opportunity to solve real-world problems, hone their skills, and exchange thoughts with other experts in a community. Additionally, contestants' participation and efforts would have influential effects on the outcome results of crowdsourcing (Liang, Wang, Wang & Xue, 2018). It is important to deeply understand the behavior of contestants since it enables crowdsourcing sponsors to use appropriate mechanisms and strategies to build successful crowdsourcing platforms (Wang, Khasraghi & Schneider, 2020). Despite a lot of research having been done in the crowdsourcing area, the number of studies addressing the combination of both crowdsourcing and data science is inadequate. Motivational incentives are generally discussed in previous crowdsourcing studies; however, the lack of research studying these motives from contestants' perspectives is apparent. Hence, this research tends to closely scrutinize the motivating factors of contest-based crowdsourcing, particularly from contestants' perspectives.

1.2 Research Questions

In order to address the identified knowledge problem, the following questions have been formulated:

RQ1: "What motives influence participants' willingness to join contests in crowdsourcing platforms?"

RQ2: "How do contestants weigh extrinsic motivations against intrinsic motivations?"

1.3 Purpose

This research aims to study the effect of motivational factors on the engagement of contestants in crowdsourcing contests. The purpose of the study is twofold. First, we look into how to identify motives that influence the contestant's decision in joining a contest or competition. Second, we consider the importance of these incentives from the contestant's point of view. In addition, this research studies how contestants prioritize motivations over each other and how these motivations work with or against each other. The intention is to contribute knowledge to both the IS and crowdsourcing fields by studying the effects of motivational factors on an individual level.

1.4 Delimitation

The usage of crowdsourcing contests has been growing in the past few years providing a wide range of benefits and alternative solutions that have grabbed the attention of organizations to use them rather than other crowdsourcing with traditional contest settings (Chen, Pavlou, Wu & Yan, 2020; Segev, 2020; Wang, Khasraghi & Schneider, 2020), therefore the study tends to gain a deeper understanding of such incentives in data science crowdsourcing platforms. Among the many types of crowdsourcing forms, this research limits its aim to contest-based crowdsourcing rather than studying the crowdsourcing industry in general. Although the introduction and definition of the overall crowdsourcing are discussed, the purpose is only to describe what exactly crowdsourcing is. Any technological elements regarding crowdsourcing are not discussed in our paper, we emphasize more their personal feelings and the thorough perspective they create. Due to the fact that the research duration is limited, we cannot examine others' personal motivations except for our five respondents, although it might be biased to just investigate such a small group of people. Also, the communication difficulties limit the crowdsourcing platforms we can choose from. Despite the fact that the respondents come from different nationalities, organizations, ages, and experience levels with crowdsourcing contests, Kaggle is the only crowdsourcing contest platform we focus on since it has a large user base and it is globally recognized. We believe that if the length of the study can be expanded and the numbers of respondents can be investigated, our paper would provide more possibilities and value to the research questions.

1.5 Motivation

Growing number of crowdsourcing research in the past decade has made this topic gain considerable traction in both academia and industry (Karachiwalla & Pinkow, 2021). Despite a lot of research done in crowdsourcing, the number of studies addressing the combination of both crowdsourcing and data science is inadequate. As previously mentioned, the participants in crowdsourcing engage differently based on the application or platform that they are interacting with. According to Tauchert, Buxmann, and Lambinus (2020), companies highly value the innovative power of the community of data scientists in proposing solutions for extracting valuable insights from data, and the scarce resources of data scientists can be leveraged by crowdsourcing. Additionally, the contestants' participation would have an influential effect on the results of crowdsourcing. Therefore, the findings of this study would help companies and organizations better understand what influences contestants and how to take these factors into consideration when providing well-designed crowdsourcing systems and competitions within them.

2 Literature Review

This chapter provides a thorough literature review of crowdsourcing including a general description regarding crowdsourcing, development history, and existing challenges, as well as demonstrated types of crowdsourcing, its importance in information systems, and its relationship with open innovation. The following section presents a thematic literature review about motivational factors in crowdsourcing and points out the different nature of the work for readers. This part of the paper introduces the theoretical background of the creation of the thesis and lays a solid foundation for the following research.

2.1 Crowdsourcing

Crowdsourcing is an umbrella term and it has been defined differently by various organizations or individuals, while their understanding and application of it differ. According to Estellés-Arolas and González-Ladrón-de-Guevara (2012), the definition of crowdsourcing can be integrated by analyzing many existing definitions from different sources regarding who forms the crowd, what the crowd has to do, what the initiator gets in return, etc. Hammon and Hippner (2012) define crowdsourcing as the act of outsourcing internal tasks of organizations or assigning organizational tasks externally to a large and heterogeneous mass of potential actors through business relationships. Crowdsourcing also can be interpreted as approaches that harness the diverse potential of a huge number of individuals via an open call for contribution over the web (Geiger & Schader, 2014; Ikediego et al., 2018). Researchers have come up with various definitions of crowdsourcing that state the real functionality of crowdsourcing in the past decade. In a recent study, Ghezzi, Gabelloni, Martini, and Natalicchio (2018), by reviewing crowdsourcing articles published between 2006 and 2015 provide a significant classification of the crowdsourcing definition based on the different perspectives in which the nature of the task, the crowd characteristics, the type of crowd knowledge, the method of communication, the aggregation of contributions, and how closely crowd workers work together can be determinant factors. The crowdsourcing topic and its platforms are still under development, and it is difficult to specify its boundaries and features clearly. However, in general, crowdsourcing is a sort of online participatory activity in which an individual, an institution, a non-profit organization, or a firm offers the voluntary completion of work to a group of people with varying levels of knowledge, heterogeneity, and numbers through a flexible open call (Estellés-Arolas & González-Ladrón-de-Guevara, 2012).

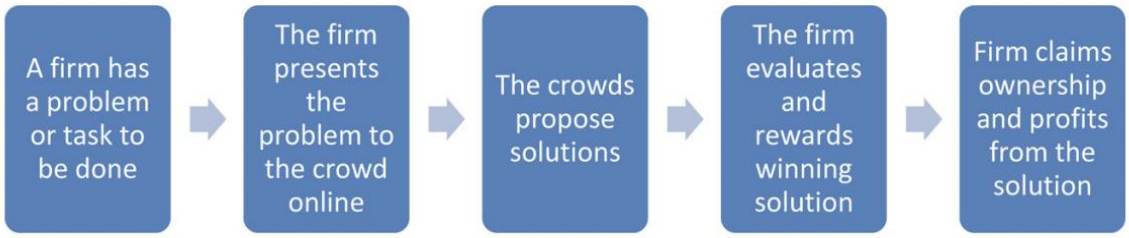

Figure 1: General approach of crowdsourcing (Ikediego et al., 2018, p. 29)

The crowdsourcing model is depicted in Figure 1 (adapted from Ikediego et al., 2018, p.29) above as a visual design and effort. It might not be accurate to recognize it as an absolutely

accurate figure for all types of crowdsourcing, but it intuitively described the basic mechanism of how crowdsourcing works from the beginning to the end, which is also more applicable to contest-based crowdsourcing. Crowdsourcing is progressively gaining traction in the realm of information technology, while outsourcing-oriented businesses are progressively embracing the notion of crowdsourcing. Crowdsourcing is a unique outsourcing strategy in that it involves outsourcing tasks or sub-projects to a group of people who are prepared and ready to take on the challenge (Ikediego et al., 2018). Both crowdsourcing and outsourcing enlist the help of outside resources to do tasks for a company or organization, and these IT problem-solving strategies are fraught with risk. However, the difference between these two strategies is that outsourcing usually has a single area of focus, an inflexible workforce, and higher settled cost, while crowdsourcing tasks can be worldwide and performed by an adaptable workforce with almost no overhead expenses (Ikediego et al., 2018).

The development history of crowdsourcing has made this concept more comprehensive as a unique area. For more than a decade, the word "crowdsourcing" has been in use and gradually coming to the attention of the larger public. It was a new phrase made up of the words "crowd" and "source" that was first coined by Mark Robinson and Jeff Howe in a Wired magazine article in June 2006, and Jeff Howe came up with the official definition. According to Jeff Howe, crowdsourcing is:

> *"An act whereby an organization or institution takes a function or more that was once performed by employees and outsources them to an undefined network of people which is generally in the form of an open call" (Ikediego et al., 2018).*

However, the definition of crowdsourcing is becoming ambiguous since the phrase was created and exploded in activities, which has resulted in the field's evolution being mainly unstructured (Ghezzi et al., 2018). Crowdsourcing is engrained in two major disciplines within the larger subject matter of innovation and management according to a review conducted by Ghezzi et al. (2018), which are open innovation. The online market environment that suits the development of crowdsourcing was emerging, along with the appearance of blogs, wikis, and tag clouds (Mourelatos, 2019). With many new types of resources gathered, crowdsourcing has become more popular and applicable to many industries.

2.1.1 Types of Crowdsourcing

Individuals, businesses, and society as a whole are becoming more interested in creating online problem-solving techniques like crowdsourcing (Ikediego et al., 2018). Crowdsourcing is the combination of efforts from numerous groups of people who are either volunteering or working part-time in the cyber world for socioeconomic output (Ikediego et al., 2018). Businesses and entrepreneurs are already utilizing this hybrid employment model, with platforms such as Amazon Mechanical Turk, 99designs, Hit RECORD, and Design Crowd among them (Ikediego et al., 2018). In the majority of recent studies, the crowdsourcing environment encompasses four distinct dimensions, including the crowdsourcing firm, the crowdsourced task, the crowd, and the system or platform used to connect participants with crowdsourcing organizations (Karachiwalla & Pinkow, 2021). The type of problem or task as the main input of crowdsourcing can fundamentally change the context of crowdsourcing.

Primarily, it is possible to identify crowdsourcing problems into two categories: (i) innovation-type problems, which are a well-structured requirement given to every participant to solve and every seeker selects a single solution for the problem, and (ii) micro-tasks which can be either well-structured or not, and they are mostly derived from a macro-problem broken into more manageable parts (Ghezzi et al., 2018). As the stronghold of crowdsourcing, micro-tasks are mostly repetitive where crowd workers do not require domain-specific knowledge, problem-solving takes a few minutes or days to be completed, and organizations or communication are not necessarily involved in the crowdsourcing process (Ikediego et al., 2018). Unlike micro-tasks, macro-tasks require more time and domain-specific knowledge from expert crowd workers who usually solve parts of a complex and large crowdsourcing project (Ikediego et al., 2018). These projects are non-repetitive and require knowledge, a longer schedule, and the involvement of a specific organization and communication (Ikediego et al., 2018). Considering incentives are being used to engage the crowd, crowdsourcing can be categorized into cognitive piecework, volunteer crowd work, disguised or epiphenomenal, and contest-based crowdsourcing (Schmidt, 2013). As a widely used platform in the cognitive piecework category, Amazon's Mechanical Turk pays each worker that resolves a Human Intelligence Task (HIT) (Schmidt, 2013). Participants in disguised or epiphenomenal crowdsourcing are not even aware of how their workforce is used by something or someone else since their intelligence is spent on proceeding with the process that they are partially involved in (Schmidt, 2013).

The objective behind contest-based crowd task design is to encourage participants to compete against each other and complete the work that they receive (Schmidt, 2013). A crowdsourcing contest platform is a common form of crowdsourcing that holds contests to help solution seekers in the process of finding potential solution providers (Jin, Lee, Ba & Stallaert, 2021). Contest-based crowdsourcing platforms allow individuals to simultaneously collaborate and compete with each other (Wang, Khasraghi & Schneider, 2020). In terms of solution generation, this category of crowdsourcing differs from community-based crowdsourcing. Unlike contest-based, community-based crowdsourcing where volunteer participants donate their workforce, often for gaining a greater value (Schmidt, 2013). Wikipedia is among the most common volunteer crowd work platforms. In crowdsourcing contests, although any user is able to submit solutions to the task, only contestants who have provided a high-quality solution are awarded (Wang, Khasraghi & Schneider, 2020). Further to this, some platforms provide open contests where the submission can be viewed by all members within the competition, while on other platforms, only organizers can view the submissions (Segev, 2020). In some crowdsourcing contest platforms, the number of prizes must be a predetermined set of possible prizes (Segev, 2020). There are also some platforms that allow multiple submissions for the same contest, while others do not allow that (Segev, 2020). Considering communication aspects in crowdsourcing contests, some platforms utilize a feedback system where the contestants can receive feedback from either organizers or other participants in the contest (Segev, 2020). Another distinguishing feature of contest-based platforms is the reputation system that gives the opportunity to the contestant to accrue reputation observable to all other contestants; however, the way that the reputation is computed might differ from one platform to another (Segev, 2020). Crowdsourcing platforms such as TopCoder, Kaggle, and TaskCn are designed for contests to allow more people to provide solutions (Wang, Khasraghi & Schneider, 2020). Kaggle.com is a web-based platform that enables companies to receive help from a wide range of data scientists, with the focus of hosting machine learning competitions organized by companies from different industries (Tauchert, Buxmann & Lambinus, 2020). Kaggle provides contestants with both collaborative

and competitive environments in which users can attend competitions individually or team up and compete against other teams in the competitions (Wang, Khasraghi & Schneider, 2020). Furthermore, it is possible for individuals within a team to communicate and share their knowledge with other contestants (Wang, Khasraghi & Schneider, 2020).

2.1.2 Crowdsourcing in Information Systems

Crowdsourcing can employ information systems as a specific sort of labor system that produces informational goods or services by depending mostly on crowd contributions (Whelan et al., 2014). Information technologies have always been evolving in IS research and practices. This trend can be characterized by IS fashions, which is "a relatively transitory collective belief in IS research and practice, enabled by fashion setters, that a technique or technology leads to rational IS innovation" (Tripathi, Tahmasbi & de Vreede, 2017). According to Baskerville and Myers (2009), the more volume of discourse about a particular fashion is being seen, the higher probability that the discussion to be identified as a fashion. Hence, it can be said that crowdsourcing is an emerging IS fashion (Tripathi, Tahmasbi & de Vreede, 2017). The IS discipline is more prepared than any other study area to give guidance in the crowdsourcing area since its combined focus on IT-user interaction provides crucial knowledge for the creation of an integrated, holistic systems view of the relevant components and their interactions (Geiger et al., 2012).

IS is viewed by the bulk of the IS community as a socio-technical system that incorporates human and machine components. According to Geiger and Schader (2014), the generic function of any information system can be described as the processing of information to provide informational products and services. Crowdsourcing information systems are therefore proposed as a subset of information systems that use the power of people to create informational goods and/or services for internal or external consumers (Geiger et al., 2012; Geiger & Schader, 2014). Like any information system, it is necessary to consider the functionality of crowdsourcing within the organizational context, and some of the most comprehensive characteristics of crowdsourcing information systems in organizations are how they make use of contributions to deliver the desired results (Geiger & Schader, 2014). Before going into the crowdsourcing journey, it is necessary to examine how crowdsourcing fits into the strategic goals of an organization and how the crowdsourcing initiative is anticipated to contribute to these goals (Nevo & Kotlarsky, 2020). To better understand crowdsourcing from the IS perspective, we should distinguish systems based on (i) homogeneous vs. heterogeneous contribution and (ii) emergent and non-emergent value resulting from contribution (Geiger & Schader, 2014). A homogeneous contribution complies with predefined specifications, while a heterogeneous contribution values contributions according to the quality of individuals (Geiger & Schader, 2014). The value of non-emergent systems is derived from the contributions of all or some individuals in isolation, while a system that seeks an emergent value from contribution can only derive this through collective contributions (Geiger & Schader, 2014). Figure 2 (adapted from Geiger et al., 2012, p.6) depicts four combinations of the above-mentioned archetypes in crowdsourcing information systems. Crowdsourcing contests can fit into the category that seeks an emergent value derived directly from heterogeneous contributions where contributions are different and represent complementary solutions to a given problem whether there are proper evaluation criteria or no optimal solutions (Geiger & Schader, 2014).

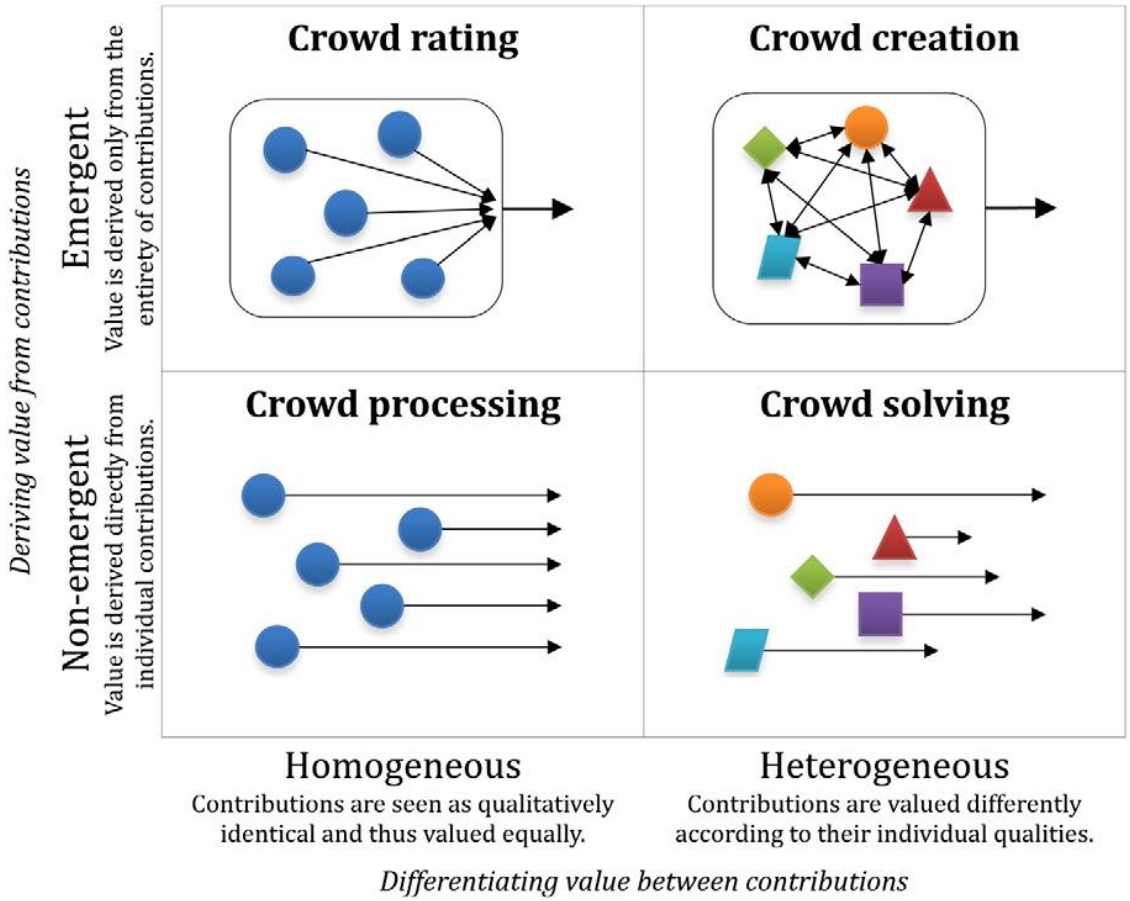

Figure 2: Four types of crowdsourcing from IS perspective (Geiger & Schader, 2014, p. 6)

Providing a collaborative environment with people-centric technologies can be considered as an important virtue of crowdsourcing (Tripathi, Tahmasbi & de Vreede, 2017). A crowdsourcing business model makes a foundation for organizations to access relatively cheap labor and exploit the full potential of crowds dispersed geographically and experimentally (Tripathi, Tahmasbi & de Vreede, 2017). Crowdsourcing has theoretical foundations in a variety of fields, including economics, psychology, organizational behavior, management, and information systems. Although it seems that the crowdsourcing study is still in a developing phase, its core components—problem owners, crowds, and technology—are historically well discussed in IS research (Tripathi, Tahmasbi & de Vreede, 2017). Despite the fact that there is a demanding perspective on crowdsourcing and its conceptualization, it is vital that IS researchers obtain a deeper understanding of crowdsourcing for the sake of assisting in analyzing the social and technological challenges of it (Tripathi, Tahmasbi & de Vreede, 2017).

2.2 Open Innovation and Contests in Crowdsourcing

Open innovation is believed to be an evolving concept over decades since it debuted as new terminology, it had a great impact on research and practice during its first decade at the beginning of the 21st century (West, Salter, Vanhaverbeke & Chesbrough, 2014). The recent definition of open innovation from 2014 in response to growing interest in non-monetary knowledge transfers defines open innovation as a distributed innovation process based on purposefully controlled information flows across organizational boundaries, utilizing both

pecuniary and non-pecuniary processes in accordance with the business model of the firm (Chesbrough & Bogers, 2014). To generate ideas, open innovation employs a mix of internal and external sources, while crowdsourcing refers to the use of outside sources for ideation.

Organizations now have unparalleled access to the "wisdom of the crowd," enabling them to acquire viable solutions to these problems that they care about from possibly thousands of individuals at a cheap cost (Klein & Convertino, 2015). These crowd working systems, on the other hand, confront significant obstacles arising from their own success: they may elicit such high levels of engagement that guiding the crowd in constructive ways and selecting the best of what they have done becomes extremely difficult (Klein & Convertino, 2015). Open innovation platforms were once a promising method to overcome this significant barrier, and it has become more widely used nowadays. A consumer defines an issue they wish to address, and the system provides an online platform that allows thousands of people to submit proposed solutions and score other people's proposed answers (Klein & Convertino, 2015). Open innovation systems also confront significant hurdles in that they may elicit such large levels of engagement that guiding the crowd in productive ways and selecting the best of what they have done becomes extremely challenging. Low signal-to-noise ratios, insular ideation, non-comprehensive coverage, poor assessment, and poor idea filtering are all consequences of this (Klein & Convertino, 2015).

Interconnected with information systems, distributed knowledge management methods, e-commerce marketplaces, and crowdsourcing platforms are all becoming more common as a result of this trend (Cuel, 2021). Figure 3 (adopted from Cuel, 2021, p.793) demonstrated a combination of crowdsourcing and open innovation that resulted in a scaled differentiated advantage. It looks somehow a little complicated, but the general idea is to use an open innovation model to absorb crowdsourced ideas from all kinds of communities and eventually realize the targeted goals, an example organization is Innocentive. The conclusion of the paper showed the evidence that the key benefit of this categorization is that it presents an analysis based on the innovation process, assisting businesses in determining the best crowdsourcing platform to utilize (Cuel, 2021). This model provides an overview of many available options for a firm that wishes to crowdsource part of its creative process by applying crowdsourcing and open innovation at the same time.

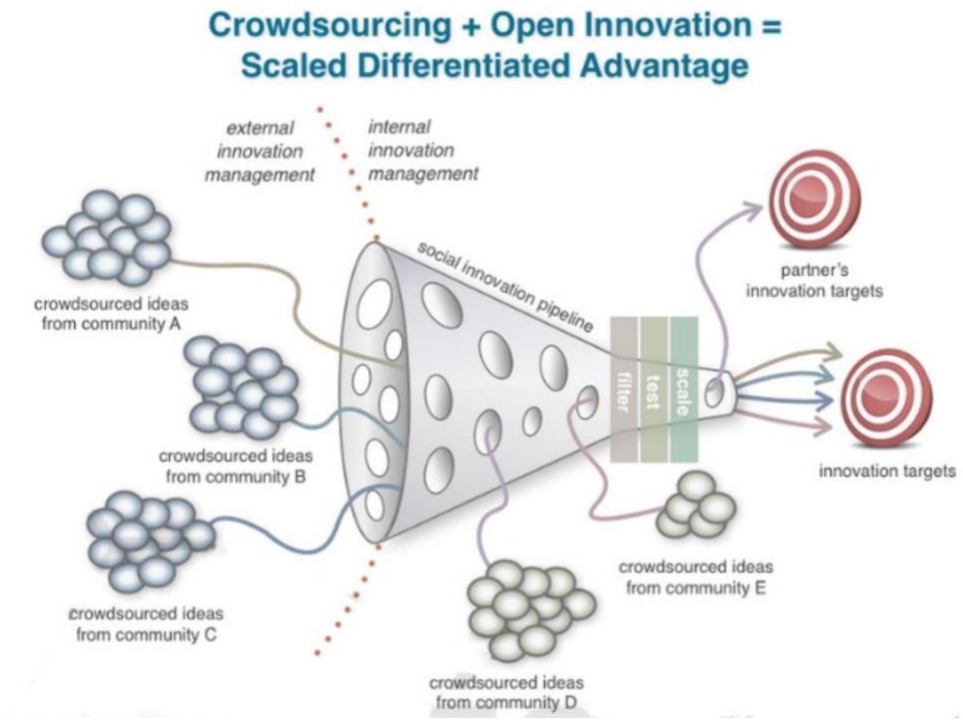

Figure 3: Crowd innovation model (Cuel, 2021, p. 793)

Crowdsourcing, according to Howe, is the application of open-source concepts to different businesses. However, this concept may merit more discussion. To begin with, crowdsourcing is not open in the same way that open source is. An entity that spends funds for ideas or input has ownership of Intellectual Property Rights (IPR) in a crowdsourcing contest, which seems to be more private than an open-source campaign. Second, with open source, the pursuit of the problem and satisfaction in discovering a better solution to the problem is sufficient remuneration, but many crowdsourcing initiatives (e.g., 99Designs, Threadless, and IStockPhoto, among others) need participants to be reimbursed in some way (Zhao & Zhu, 2014). Contest-based crowdsourcing is a very commonly used method. Aside from the prohibitively low hourly wages, the most troubling issue of this environment is the systemic waste of labor and the uncertainty for individuals who volunteer their time as to whether they will ever be compensated (Schmidt, 2013).

Solving crowdsourcing problems is often associated with innovation. When it comes to insufficient capacities and knowledge in the organization, crowdsourcing principles can be adopted for solving problems (Hammon & Hippner, 2012). Hence, the potential of the crowd can be used for the generation and evaluation of ideas (Hammon & Hippner, 2012). For example, Ideastorm.com is a platform developed by Dell that utilizes the capability of crowds in product design and development by collecting innovative ideas (Hammon & Hippner, 2012). In addition, market research tasks can be outsourced to the crowd. For instance, YouTube delivers the evaluation and testing of innovative features within the company's crowdsourcing project Testtube (Hammon & Hippner, 2012). As mentioned previously, crowdsourcing focuses on using external sources, while open innovation combines both internal and external sources to produce results. Thus, knowledge collected by crowdsourcing can be applied to intertwine with the ideas that come from inside the organization, since open innovation produces new ideas nearly without exclusivity or monopoly (Baldwin & von Hippel, 2009), thus constructing a comprehensive outcome.

The crowdsourcing contest is a way of competing for crowdsourcing solutions over certain requirements on a platform. There are several venues for crowdsourcing competitions, as well as numerous criteria that might influence participant behavior. While the limits of authority to open the source of crowdsourced resources are different on various platforms, the primary aspects of the environment, however, are identical to almost all crowdsourcing platforms: a contestant accesses the site, selects a job or contest from a huge number of open projects or competitions, and spends time and effort in an attempt to win the given prize (Segev, 2020). The prize is not always guaranteed in such contests, the organizers sometimes have the right to determine if they are satisfied with the solution and decide to reward how many winners or participants. This characteristic makes contest-based crowdsourcing unique but also has higher uncertainty about the return which might lead to lower job security. One of the challenges in crowdsourcing contests compared to organizational settings is that there is no contract regulated between the owner and the contestant (Liang et al., 2018). Thus, plenty of contestants focus more on gaining reputation and knowledge instead of money. Crowdsourcing contests are also distinguished by a huge and unpredictable number of participants, as well as a high degree of noise in determining the winner (Segev, 2020). A large number of participants are the so-called "crowd" in crowdsourcing, it is precisely where the "source" of the knowledge comes from. Thus, each individual from the crowd has different opinions regarding what the most important motivating factor is for them to take part in the competitions. Investigating these factors helps to identify and increase contestants' enthusiasm and the sustainability of crowdsourcing competitions.

2.3 Crowdsourcing Challenges and Limitations

Despite the fact that crowdsourcing seems to be a solution to the problems of organizations, it may involve challenges leading to failures. Unquestionably, crowdsourcing is not flawless and its limitation may potentially lead to an unmet promise and disillusioned cooperation between crowdsourcing platform sponsors and participants on the level of final labor outcome (Mourelatos, 2019). Specifying the crowd quality with precision has always been challenging since finding all the characteristics that determine the quality of the crowd is difficult (Mourelatos, 2019). The relationship between quality and compensation influences the crowdsourcing outcome (Mourelatos, 2019). Due to the openness of crowdsourcing, the existence of imperfect solutions is inevitable since the general population of participants in crowdsourcing is novices and those who are considered low-quality resources (Ikediego et al., 2018). Moreover, the complex environment of crowdsourcing prevents efficient monitoring of online work; the quality issue is complex and difficult to manage (Mourelatos, 2019). The gap between the ideas and real-life implemented solutions is another challenge in crowdsourcing that causes a low ratio of risk to reward in many cases. This makes participants put less effort when there are a lot of competitors, resulting in low-quality outcomes (Ikediego et al., 2018; Mourelatos, 2019). In terms of contest-based crowdsourcing, aside from the prohibitively low hourly wages, the most troubling issues here are the systemic waste of resources and the uncertainty for individuals who volunteer their time as to whether they will ever be compensated (Schmidt, 2013).

Ethical aspects of crowdsourcing are also widely discussed in previous literature. Crowdsourcing has been seen as a way of draining people's ideas to benefit or promote a single or a limited number of participants (Lobre-Lebraty & Lebraty, 2013). This may have destructive effects on the whole ecosystem. Forcing organizations to cope with massive

populations without proper measures or protections is another ethical flaw that has the potential to harm the environment (Lobre-Lebraty & Lebraty, 2013). A study by Schmidt (2013), explores deeper into some of the ethical concerns of crowdsourcing in general and contest-based crowd design in particular in terms of fair pay. Winners who get paid regardless of their efforts, do not have any insurance, or pension plan and often get far lower than experts (Ikediego et al., 2018). The sustainability of the crowd-working industry will be protected more efficiently if the codes of conduct are comprehensive from within. The wisdom of the crowd is unlimited, maximizing the benefit of crowdsourcing and eliminating most of its shortages should be an essential goal in the future development of collective knowledge. Thus, the optimal overlook is to see the discarded exploitation and underpay for crowd workers, as well as fair worker security and compensation guarantee.

During the process of actual crowdsourcing implementation, more vexatious problems would appear. The issues that arise during the actual implementation of crowdsourcing initiatives are the most visible challenges of crowdsourcing, these include the need for proper project management as well as the risk of losing project control owing to an unclear crowd structure (Hammon & Hippner, 2012). On the other hand, challenges on the workers' side should be taken into account. As previously mentioned, the underprepared solutions and proposals are inevitable in the crowdsourcing industry, so sorting and filtering valid solutions must be done by the firms for achieving more relevant results (Ikediego et al., 2018). Yet it might be one of the most common barriers identified because the majority of people who participate in crowdsourcing are beginners who create low-quality work when compared to specialists in the same subject (Ikediego et al., 2018).

Regarding contest-based crowdsourcing and contestants' behavior, Segev (2020) particularly reviewed related literature and illustrated five aspects of problems that impact the success of the contests in a considerably comprehensive manner. Compared to other types of crowdsourcing, there are special characteristics addressed particularly in crowdsourcing contests. Some of these characteristics are an unknown number of participants, several rounds of evaluations, and the fact that contestants are engaging on a site with a large variety of crowdsourcing competitions to choose from (Segev, 2020). In this sense, five areas of open problems that are worth studying can be summarized as follows (Segev, 2020):

1. Platform: each contest-based crowdsourcing platform has its unique features that attract certain groups of people who value these features. Platforms and researchers alike face a hurdle in figuring out how to efficiently allocate competitors to contests.
2. Competition among contests: There are unique opportunities to observe an economy in which organizers compete for the attention of potential entrants and monitor how candidates select which competitions to enter. The theoretical difficulty is to characterize such an economy and comprehend both the organizers' and participants' conduct.
3. Information disclosure and reputation: In crowdsourcing contests, information is generally revealed through feedback and reputation systems, which practically all such platforms may include. However, what is the role of this reputation and how does it affect contestants' decisions to join contests remains a question. Imagine if a contest is created with a higher-than-average prize and higher requirements, but it might be fuzzy to determine who chooses the format of these contests or how contestants with a good reputation decide whether to enter this or a "normal" competition. These issues are unsolved and require theoretical as well as empirical investigations.

4. Open vs. closed contests: it is usually the contestant's choice whether to submit their competition solutions openly or blindly on various sites. The limited theoretical and empirical findings thus far imply that closed submissions win out over open ones in Segev's literature. As a result, the reason why it is employed in actuality remains a mystery.
5. Contestants: practically all of the publications in Segev's review are concerned with competitor behavior in crowdsourcing contests, but there is still a gap between theoretical and empirical study. Theoretical research has paid practical attention to some aspects that are addressed in empirical studies. Furthermore, the great majority of candidates never receive a reward. So, what drives these contestants and what drives their level of effort are also issues.

2.4 Incentives and Participation in Crowdsourcing

As previously mentioned, attracting individuals and employing them appropriately is a key to successful crowdsourcing (Liang et al., 2018; Pedersen et al., 2013). This section tries to expand the concept behind different personas in crowdsourcing as well as review the influential factors on their enthusiasm for participation in this environment.

2.4.1 People in Crowdsourcing

In crowdsourcing, different types of people, as the entities of the crowdsourcing environment, collaborate with each other and influence the input and outputs of the crowdsourcing process. Therefore, it is worth noting to distinguish between these entities since they can be considered as stakeholders of crowdsourcing practices (Pedersen et al., 2013). There are three types of stakeholders in crowdsourcing: (i) Problem owner or crowdsourcers who to a great extent has control of the crowdsourcing process, including specifying the problem, communicating and crowd requirements, determining the process and governance mechanism, evaluating submissions, and selecting solutions (Pedersen et al., 2013). Problem owners are often governmental agencies, businesses or non-governmental organizations and individuals (Pedersen et al., 2013). (ii) Individual who is the crowdsourcing user and can be considered as a singular form of crowd worker. (iii) Crowd which forms a group of participants who tend to take part in the crowdsourcing process and solve its problems (Pedersen et al., 2013). They often introduce additional issues and concerns, particularly the capability for collaboration between other participants, sharing and developing perceptions, establishing trust between members, and ensuring crowd privacy (Pedersen et al., 2013). According to Stewart, Lubensky and Huerta (2010)**,** the crowd can be classified as supper contributors, contributors and outliers.

2.4.2 Motivations in Crowdsourcing

In the research on crowdsourcing, the focus of studies has slowly transitioned from early descriptive applications and cases of crowdsourcing to studies investigating specific aspects of crowdsourcing such as crowd motivation, metrics, and performance measures, platform design (Nevo & Kotlarsky, 2020). Crowd motivation widely influences the process and

outcome of crowdsourcing. The concept refers to the motivation of the crowd to participate in innovation contests (Karachiwalla & Pinkow, 2021). In the last decade, there are many studies that have investigated the motivational factors in crowdsourcing from different aspects. Incentives are an essential component of crowdsourcing; therefore, a thorough understanding of motivational factors is fundamental to designing incentive mechanisms (Karachiwalla & Pinkow, 2021).

Majchrzak and Malhotra (2013) identified variables that are important for designing participation architectures in innovative crowdsourcing and their focus was particularly on two distinct dimensions. The production is a way to lead the community to conduct its production process where posting new ideas starts a discussion thread followed by the contribution of other participants who add comments on the idea or post their own idea to start a new discussion (Majchrzak & Malhotra, 2013). A survey of human factors in computational systems suggests four major incentive mechanisms that motivate the human workers: payment, altruism, enjoyment, and reputation (Li, Wu, Wang, Cheng, Chen, Zhou & Ding, 2017b). The extent findings from recent research declared that crowdsourcing motives are either extrinsic or intrinsic, and these motives are not applicable to all types of crowdsourcing applications (Ikediego et al., 2018). Motives have been categorized into two general categories, extrinsic and intrinsic, in recent research; however, some studies express them in different terminology as internal and external (Brabham, 2010; Majchrzak & Malhotra, 2013; Kavaliova, Virjee, Maehle & Kleppe, 2016; Morschheuser, Hamari & Koivisto, 2016; Ikediego et al., 2018; Liang et al., 2018; Chen, Xu & Liu, 2020; Karachiwalla & Pinkow, 2021). Participation plays an important role in the success of crowdsourcing, and participant engagement is impacted by both extrinsic and intrinsic motivational factors. Brabham (2010) suggests four primary motivators in crowdsourcing participation: the opportunity to make money, the opportunity to develop skills, the opportunity to take up full-time work, and the love of community.

Extrinsic motivation is a kind of motivation derived from external factors that attract participants to work, such as rewards or recognition from other people (Zheng, Li & Hou, 2011). Money award is a central extrinsic incentive in crowdsourcing that increases the number of solutions and their quality of them (Karachiwalla & Pinkow, 2021). Prior research recognized that apart from payment which is one of the common ways to recruit workers and provide compensation directly, there are other motivating factors that, in terms of mechanism, can be considered as non-monetary incentives influenced by people's inner motivations (Li et al., 2017b). Aside from extrinsic factors, intrinsic personal satisfaction is also important for participants as their ideas are seen by the organization or recognized by the crowd (Majchrzak & Malhotra, 2013). Intrinsic motivations trigger the inner expectation of people that push them to embrace the task which may facilitate the person's engagement in the form of a psychological state (Liang et al., 2018). For instance, a contestant who is a hobbyist is more likely motivated by the recognition from the sponsoring organization than the crowd looking for monetary gain in a contest (Majchrzak & Malhotra, 2013). Figure 4 is a motivation spectrum (adapted from Zhao & Zhu, 2012, p.4) related to the crowdsourcing contest. As described by Zhao and Zhu (2012), it is important to see the motivational factors as a spectrum since the network of people in crowdsourcing is undefined and a crowdsourcing contest is conducted in the form of an open call where the influencing mechanisms may vary across types of motivation. According to (Zhao & Zhu, 2012), receiving rewards or obtaining a better job opportunity, as external drivers, encourage contestants to put much effort into work. Regarding the introjected motivation, contestants tend to increase their sense of

recognition through participation in contests when perceived usefulness received from their community brings a positive impact on their satisfaction. In terms of identified motivation, contestants feel emotional involvement in crowdsourcing projects when they are aligned with the project's objectives. This leads participants to work hard on providing solutions and feedback which in turn improves their sense of glory. With integrated motivation, contestants consider their work as meaningful and significant which may foster a sense of virtual community and this consequently appears in the form of the sense of belonging, obligation, commitment, and loyalty that will bring continuous participation in the long term.

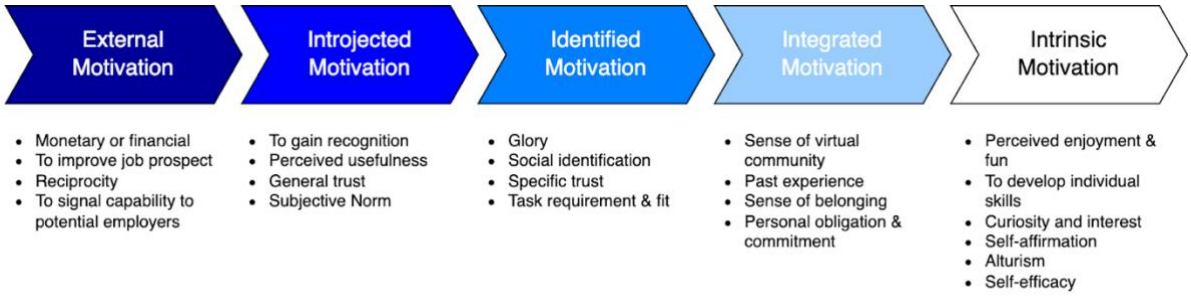

Figure 4: Motivation spectrum in crowdsourcing contests (Zhao & Zhu, 2012, p. 4)

Deng and Joshi (2016), conducted an inductive study for the sake of a comprehensive understanding of motivational factors that collectively drive crowd workers in micro-project crowdsourcing work environments. They state driving factors such as crowd work context, participants' needs, crowdsourcing task characteristics, and digital work control (Deng & Joshi, 2016). Crowd context refers to the work setting characteristics such as workplace flexibility and equipment simplicity (Deng & Joshi, 2016). The crowd worker needs including financial, personal growth, and pro-social needs can be regarded as intrinsic motivational factors (Deng & Joshi, 2016). As much as positive feelings such as appreciation and learning through interaction with experts and mentors in the crowdsourcing environment improve participation, negative feelings would affect the performance and participation of the crowd that should be avoided through transparency and providing a fair and respectful climate (Karachiwalla & Pinkow, 2021). Estellés-Arolas and González-Ladrón-de-Guevara (2012) believe that users would be satisfied with a specific need, such as financial, social recognition, self-esteem, or the development of individual skills, while the crowdsourcer will obtain and use what the user has brought to the venture, which will take various forms depending on the type of activity undertaken.

Task attributes or characteristics have been one of the most important factors affecting the participation motivation of contest solvers (Zheng, Li & Hou, 2011). The characteristics of crowdsourcing tasks rely on the components like (i) job autonomy which is the degree of control that a job provides to a crowd worker on decision making; (ii) variety of tasks which is the diversity of skills of the crowd worker required for the task completion; (iii) task significance that is related to the meaningfulness of requirements; (iv) task clarity which is the degree of clarity of the instructions and procedures for performing a task, and (v) task analyzability and variability which respectively refers to the availability of concrete knowledge regarding the task and the frequency of contingencies when participant engages in a task (Deng & Joshi, 2016; Zheng, Li & Hou, 2011). The nature and complexity of tasks influence the behavior of participants in joining contests as well. For instance, those participants who would like to develop their competence pick high-commitment tasks, whereas those who love communities choose tasks that require interactions between solvers

(Karachiwalla & Pinkow, 2021). When it comes to micro-task crowdsourcing, the degree of digitization of processes and activities could motivate crowd workers since it brings more control over processes as well as enhances operational efficiency (Deng & Joshi, 2016). Task programmability, the automation in payment once the crowd worker receives the task completion approval from the owner, policy standardization, and risk mitigation are some of the examples of this motivational factor that engage participants (Deng & Joshi, 2016). Gamification is one of the most popular developments in the area of incentive design in the information systems field (Morschheuser, Hamari & Koivisto, 2016). Gamification is a common extrinsic reward mechanism that unlike money cannot be spent. The attempt of gamification is first to improve the engagement of participants in a given activity or behavior, and secondly, to increase or change the given behavior (Morschheuser, Hamari & Koivisto, 2016). Points, badges, leader boards, and virtual achievements are some of the gamification techniques often used in crowdsourcing (Morschheuser, Hamari & Koivisto, 2016; Schmidt, 2013). Table 1 and Table 2 show a thematic overview intended to guide our research and make a foundation for structuring our interview guide. Although the majority of studied motivations can be applied to all types of crowdsourcing, the focus is on those that mutually correspond to both contest-based and other types of crowdsourcing as using some of them are not prevalent among data science crowdsourcing platforms. For instance, using digitized work processes such as task programmability, automated payments, standardization, and risk mitigation are constructs that enhance the efficiency and effectiveness of tasks in micro-level crowdsourcing. These practices are however less evident in crowdsourcing contests.

Table 1: Intrinsic motives in crowdsourcing

Category	Motivation	Authors
Related to participants' needs and satisfaction	Love of community/community addiction/building relationships	(Brabham, 2010), (Estellés-Arolas & González-Ladrón-de-Guevara, 2012), (Kavaliova et al., 2016)
	Curiosity	(Kavaliova et al., 2016), (Li et al., 2017)
	Reputation and social recognition	(Zheng, Li & Hou, 2011), (Majchrzak & Malhotra, 2013), (Kavaliova et al., 2016), (Li et al., 2017), (Karachiwalla & Pinkow, 2021)
	Appreciation	(Deng & Joshi, 2016)
	Self-esteem	(Majchrzak & Malhotra, 2013)
	Personal growth and skill improvement	(Estellés-Arolas & González-Ladrón-de-Guevara, 2012), (Kavaliova et al., 2016), (Deng & Joshi, 2016)

Work value outcome	Lifestyle integration: work and life balance	(Deng & Joshi, 2016)
	Feeling independence	(Deng & Joshi, 2016)
	Job security	(Deng & Joshi, 2016)
	Take up full-time job	(Brabham, 2010)
Hedonic outcomes (pleasure of being engaged in crowdsourcing)	Having productive free time	(Estellés-Arolas & González-Ladrón-de-Guevara, 2012), (Deng & Joshi, 2016)
	To experience enjoyment	(Li et al., 2017), (Deng & Joshi, 2016)

Table 2: Extrinsic motives in crowdsourcing

Category	Motivation	Authors
Related to the characteristics of contest or task	Job autonomy	(Deng & Joshi, 2016)
	Task variety	(Deng & Joshi, 2016)
	Task clarity	(Deng & Joshi, 2016)
	Task compensation	(Deng & Joshi, 2016)
Non-monetary	Gamification components (gifts, badges, points and levels, leaderboard, other types of virtual achievements or rewards)	(Kavaliova et al., 2016), (Morschheuser, Hamari & Koivisto, 2016)
	Feedbacks	(Majchrzak & Malhotra, 2013), (Kavaliova et al., 2016),

	Voting / rating	(Chen, Xu & Liu, 2020)
Monetary	Money and bonus	(Brabham, 2010), (Zheng, Li & Hou, 2011), (Estellés-Arolas & González-Ladrón-de-Guevara, 2012), (Majchrzak & Malhotra, 2013), (Kavaliova et al., 2016), (Li et al., 2017), (Karachiwalla & Pinkow, 2021)
Digital work control	The level of automation and programmability of tasks	(Deng & Joshi, 2016)
	Payments automation	(Deng & Joshi, 2016)
	Standardization and risk mitigation	(Deng & Joshi, 2016)

3 Literature Review

This chapter presents an overall description of the research strategy and methodology that is considered in this thesis. It explains the research strategy and why the method has been chosen. Further to this, the approach regarding data collection, data analysis, and an overview of the scientific quality and ethics of the research are all described in this chapter.

3.1 Research Strategy

Most scholars believe that choosing an appropriate research methodology is the most important step in the entire research process (Recker, 2013). Recker (2013) suggests that a way to determine an appropriate research strategy is through understanding the research question and how to answer it. The aim of this study is to identify the factors that influence the contestants' decision to join crowdsourcing contests and evaluate their intention and willingness which are highly dependent on behavioral aspects. Therefore, it is crucial that the adopted research strategy leads us towards the objectives of this research properly.
For this thesis, we adopt qualitative research methods to appropriately employ its techniques to understand the phenomenon in the context of this study. Focusing on specific aspects, this methodology has been developed in social science to help researchers study social and cultural phenomena (Recker, 2013). In contrast to quantitative research methods, the emphasis of qualitative research is on the researcher's analytic and integrative skills and personal knowledge of the social context where data is collected (Bhattacherjee, 2012). That is to say, this method builds a view of studying social reality in the best possible way through subjective interpretations within the social-historical context (Recker, 2013). The qualitative method uses its exploratory lens to thoroughly study a phenomenon that is not fully understood, well researched, and still emerging (Bhattacherjee, 2012; Recker, 2013). The social world of people is full of meanings built upon subjective and shared definitions. As the core idea of interpretivism, it is essential to acknowledge the existence of these meanings, reconstruct them, to understand and avoid distorting them in order to use them as building blocks in theorizing (Goldkuhl, 2012). Bhattacherjee (2012) believes that there are several reasons that make interpretive research advantageous. First, it is well-suited for exploring hidden reasons behind complex, interrelated, or multifaceted social processes where evidence may be biased, inaccurate, or difficult to obtain (Bhattacherjee, 2012). Second, when there is no or insufficient prior theory in order to construct a new theory (Bhattacherjee, 2012). Third, interpretive research is designed for studying context-specific events (Bhattacherjee, 2012). Fourth, through interpretive research interesting and relevant research questions may be posed that help follow-up research (Bhattacherjee, 2012). By leveraging interpretivism, researchers employ an inductive approach that begins with data and tries to derive a theory about the phenomenon from the observed data (Bhattacherjee, 2012).

Qualitative research focuses more on human actions and emotions. It aims at studying behavioral aspects of a phenomenon that is more related to human actions and emotions. Researchers and audiences that look at the world through the perspective of social construction promote qualitative inquiry as a uniquely human type of knowledge that focuses on the potential of people and groups to make meaning (Patton, 2015). In general, three types

of data are used to produce qualitative findings are in-depth, open-ended interviews, direct observations, and written communications (Patton, 2015), while the method used in this paper is the interviews. What is known from previous studies is that the crowdsourcing environment is inherently complex, and its performance to a great extent relies on stakeholders interacting with the platform. In addition, participants' behaviors are instantly changed and not determined by a single motive. Hence, adopting the qualitative method in this research would help us to gain a deeper understanding of the context in terms of the processes, behaviors, and experiences of the contestants. Qualitative research was carried out in the form of interviewing practitioners in the crowdsourcing field to testify to the most significant factors that motivate contestants to join in crowdsourcing competitions. By doing so, the results are generated by interpreting each interviewee's perspective, thus delivering insights and opinions from unique personal aspects.

3.2 Data Collection

3.2.1 Literature Selection

Conducting a literature review was the first step of our study after identifying the boundary of the research. As a demonstration of a researcher's knowledge in a specific field of study, the literature review has a key role to play in providing proof of knowledge, identifying research gaps, delimiting the research problem, and gaining a new perspective on the field of study by avoiding ineffective and irrelevant approaches (Randolph, 2009). From Bhattacherjee's (2012) perspective, a literature review serves three distinct purposes: first, to look thoroughly at the current state of knowledge in the area of inquiry; second, to identify significant authors, theories, and findings in that area; third, to recognize the knowledge gaps in that research area. A comprehensive understanding of the current state of the research problem, existing theories, and methodologies are closely tied to the literature review (Recker, 2013). A literature review additionally provides a framework to bridge previous findings to new ideas and opinions in the research field (Randolph, 2009). Utilizing literature review in this study leads us to identify research problems and gaps in previous works and formulate the research question as well.

Considering the literature review guidelines provided by Randolph (2009), we set preliminary criteria in order to select sources required to be included or excluded in the literature review of the study before the data collection step. The focus of these criteria was on the objectives of this study and mainly on peer-reviewed sources, including original research, theoretical, and review papers, as well as reports from credible journals and publishers. Several queries were considered and applied on academic search engines including GoogleScholar, ScienceDirect, and IEEE Xplore to find the above-mentioned resources. Queries were based on standalone and combined keywords that are listed below.

- "Crowdsourcing" AND ("Contest" OR "Contest Design" OR "Design")
- "Crowdsourcing" AND ("IS" OR "Information Systems")
- "Participation in Crowdsourcing"
- "Crowdsourcing" AND ("Crowd's Engagement" OR "Crowd's Motivation")
- "Crowdsourcing" AND "Motivational Factors"

- "Crowdsourcing" AND ("Open Innovation" OR "Openness")
- "Participation in Crowdsourcing"
- "Crowdsourcing Challenges"
- "Crowdsourcing" AND "Incentives"
- "Quality Contestants" AND "Crowdsourcing"
- "Types of Crowdsourcing"
- "Crowdsourcing" AND "Systematic Literature Review"
- "Participants' Perspectives in Crowdsourcing"

Since crowdsourcing is a multidisciplinary research topic and there are numerous conducted studies that investigate this subject from computer science and engineering perspectives, we filtered them out by taking those research into account that has been published in credible journals in information systems, systems science, information management, and other related fields. To increase the chance of finding sources with higher relevance to this research, a method is used in line with Randolph's recommendation. According to that, a repetitive process needs to be performed to first find the references of the articles, then those that seem relevant are determined and read; next, their references should be reviewed and this process should be followed until a point where no new relevant articles remain (Randolph, 2009).

3.2.2 Interviews and Respondents Selection

A good choice of data collection is important as it improves the credibility of the outcome and the overall quality of the research. Interviewing, observations and documentation are three common techniques of data collection in qualitative research (Recker, 2013). However, interviewing is the most prominent technique and will ensure the depth of the vertical structure of the conversation, when the interactions between interviewers and interviewees have more details and personal ideas. The purpose of interviewing is to allow researchers to enter into the other person's perspective (Patton, 2015). There are as described by Recker (2021) several types of interviews with their specific cases. Descriptive interviews are used as data collection techniques to deliver a rich description of a phenomenon perceived by individuals (Recker, 2013). Exploratory interviews are typically conducted to define questions, purpose new theory constructs, and/or build new theories (Recker, 2013). However, conducting exploratory interviews determines whether presumed relationships and causal links between concepts or constructs occur and are perceived in real-life settings (Recker, 2013). Descriptive interviews are considered the primary data collection method in this study since they help us to create rich data by producing thick descriptions of the studied phenomena.

Depending on the purpose of the study and interview, interviewing can more or less follow structured protocols (Recker, 2013). One of these protocols, used in this study, is the semi-structured nature in which interviewees are being asked about the topic of research followed by a predefined structure or protocol (Recker, 2013). The conversational form of semi-structured interview allows interviewers to ask follow-up questions leading toward bidirectional discussions between interviewers and interviewees about the topic that sometimes unveil sensitive issues faced by individuals (Recker, 2013). As Schultze and Avital (2011) describe, the benefit of interviews is to convey a message to the audience which contains a first-person account of the interviewee's social reality. Another benefit of semi-

structured interviews is providing the opportunity for learning in spite of confirming what is already known as well (Recker, 2013).

Although interviewing is an appropriate approach in qualitative research, it might involve some weaknesses (Patton, 2015). The quality of information collected during interviews is greatly influenced by the interviewer (Patton, 2015). For instance, Recker (2021) mentions reflexibility as one of these challenges during the interview where interviewees tend to respond in a way to satisfy interviewers and what they would like to hear. To alleviate this effect, a pre-interview guide indicating the purpose and criteria of the study was prepared and sent to our respondents in order to provide preliminary information about this study. During the interview, interviewers are often not able to remember the answer of respondents or completely recall it; this, therefore, causes inaccuracy in the data collected (Recker, 2013). To address this challenge, all interviews are recorded and transcribed to increase the accuracy of data as well as consider the interviewers' notes taken during the interviews.

In this study, as the respondents were situated in different parts of the world, we preferred to carry out interviews via video calls on Zoom and Skype. The duration of interviews was set at 30-40 minutes at the latest in order to provide much comfort and convenience for interviewees. Further to this, the interviews were conducted in English. The focus of our study is more on end users in contest-based crowdsourcing platforms rather than other types of stakeholders, we, therefore, decided to choose interviewees from researchers, data scientists, and machine learning engineers who regularly work with such platforms. Both LinkedIn and Kaggle platforms are used to find proper candidates for the interviews. In terms of candidates selection, we considered the following aspects:

- Current and previous positions: we attempted to get in touch with people who are currently data scientists, crowdsourcing consultants, or had at least 2-year previous experience in senior positions because we believe that they would have more thoughts and ideas to share regarding the topic of the study and research questions.
- Participation in contests/competitions: This aspect is considered for our interview selection, meaning that candidates should have either hands-on experience in resolving contest's requirements individually or in a team.

Apart from the LinkedIn profile of our candidates, we also checked their profile on the Kaggle platform and the performance tier that they had been able to achieve. The platform categorizes users based on five expertise—Novice, Contributor, Expert, Master, and Grandmaster—according to their participation in competitions, providing solutions and data, and activities in discussions. We considered contributors, experts, and masters in the process of selecting candidates.

Table 3: Scheduled interviews

Respondent	Role	Profession	Interview Language	Date	Type
Respondent 1	Analytics Lead	Data Engineer	English	April 27th	Zoom
Respondent 2	Student	Freelancer	English	April 29th	Zoom

Respondent 3	Machine Learning Engineer	AI Solution Developer	English	May 4th	Zoom
Respondent 4	Software Engineer	AI Software Developer	English	May 8th	Zoom
Respondent 5	Ph.D. Student and Researcher	Data Scientist	English	April 30th	Skype

3.2.3 Designing the Interview Guide

For the sake of having a smooth and structured process during the interviews, we set three stages to understanding the connections between the concepts we wanted to inspect in detail. The first section of the interview guide starts by confirming that the respondent admits that we could record the interview and whether he/she would like to be anonymous or not. The second part of the interview followed where we ask some general questions to understand to what extent our candidates are familiar with the concept of contests and crowdsourcing platforms. In the third part, we ask more detailed questions regarding the motivational factors and their influence on each other from the interviewee's perspective. Table 4 below illustrates the question numbers and which category they belong to. For example, the questions involving candidates' monetary incentives are question 6 and question 9.a. This categorization helps us quickly and accurately allocate the main idea of each question in the interviews and the coding processes.

Table 4: Interview questions' relation to factors

Category	Questions
Related to participants' needs and satisfaction	7, 7.a, 13, 14, 15
Work value outcome	11, 12, 15
Hedonic outcomes (pleasure of being engaged in crowdsourcing)	17
Related to the characteristics of contest or task	8, 9, 18
Non-monetary	10, 10.a, 16
Monetary	6, 9.a

3.3 Data Analysis

Qualitative research is highly reliant on interpretive analysis and researchers as their perspectives influence what aspects of collected data should or should not be included in the analysis (Walsham, 2006). There are various methods that researchers can use to analyze the qualitative data (Patton, 2015; Recker, 2013). The data analysis technique used in the study is reviewed in this section.

3.3.1 Transcribing

In order to improve the readability and credibility of transcriptions, they were rewritten formally with some parts of emotional context included as well (Bhattacherjee, 2012). The transcription is executed in four steps in this research. First, as soon as each interview was finished, the transcription was conducted. All interviews were transcribed by using Otter software both during the conversation and after the interviews were finished. Otter is an AI-featured web application for real-time transcription and captures the information of conversation in text format by providing controlling features like note-taking, editing, pausing, and rewinding the recording. Secondly, Due to the inability of the software to generate a consistent transcription of some parts of the conversations, we divided transcribed files and recorded calls between the two of us by filling in the parts that were incomplete or misinterpreted. Thirdly, each of the transcribed conversations was cross-checked by another researcher and verified, which enabled us to improve the credibility of our work. Lastly, during the process of cross-checking each of us took notes whenever we found disagreements in the way that the answers were transcribed and rechecked them to reach a mutual agreement.

3.3.2 Coding

Coding has enabled us to find pieces of useful evidence from the interviewees' responses. Coding can be one of the most widely used methods for converting qualitative input into usable information (Recker, 2013). This method is the process of giving tags or labels to portions or chunks of data such as words, phrases, paragraphs, or complete texts as units of meaning (Recker, 2013). In its most basic form, coding is the simple operation of identifying meaning segments in the data and labeling them with a code, which can be defined as "a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute to a portion of language-based or visual data" (Skjott Linneberg & Korsgaard, 2019). The collected data from interviews can be organized and categorized by using codes, which let us find the meanings we are looking for around concepts, themes, or significant ideas. Examining a cohesive section of empirical research and labeling it with a word or brief phrase that describes its substance is the primary activity of coding (Skjott Linneberg & Korsgaard, 2019). Coding can be considered as an important part of qualitative analysis since it minimizes the quantity of empirical data and makes it easier to analyze while also improving the quality of the analysis and conclusions (Skjott Linneberg & Korsgaard, 2019). It is a vital skill that allows for deep immersion in the data as well as transparency in the production and presentation of conclusions, which will benefit many rookie researchers in particular (Skjott Linneberg & Korsgaard, 2019).

Table 5: Abbreviations used for coding

Category	Code	Motivation / Description	Subcode
Extrinsic	EXT	Related to the Characteristics of Competition/Task	EXT-CHAR
		Non-Monetary	EXT-NMON
		Monetary	EXT-MON
Intrinsic	INT	Hedonic Outcomes	INT-HED
		Work Value Outcomes	INT-WVO
		Satisfaction and Needs	INT-SAT
General	MOST	The Most Important and Influential Incentives	-
General	MOTINF	Influence of motivations on each other	-

Table 5 shows the abbreviation used in the coding process. We selected some of the major incentives from both extrinsic and intrinsic categories by developing related subcategories. A code for identifying the degree of importance of incentives is also considered. In order to test the interviewee's opinions regarding the impact of incentives on each other, this study used the software tool "MAXQDA", version 22 as support when extracting and understanding all collected data.

3.4 Research Quality

In conducting scientific research, the quality and ethical aspects of the study should be essentially taken into account since they determine whether the generated results after research are trustable and acceptable in terms of morality (Recker, 2013). It is common to measure the quality of research and the collected data by two main variables, validity and reliability (Bhattacherjee, 2012). These are known as psychometric properties used as measurement scales in social science research and its evaluation process (Bhattacherjee, 2012). As a dependable variable, reliability measures the same construct multiple times to make sure that the result would not change every time considering the assumption that the phenomenon studied is not changing (Bhattacherjee, 2012; Recker, 2013). Bhattacherjee (2012) describes how reliable measures can be created to reduce the impact of researcher subjectivity on data collection techniques and have better results in consequence through using less subjective methods such as questionnaires rather than observations. That said, asking questions that may lead respondents to ambiguity should be avoided, and researchers can improve reliability by simplifying wordings to reduce the risk of respondents' misinterpretation (Bhattacherjee, 2012). As described by Patton (2015), effective interviewing techniques, skillful questioning, and the capacity to establish a good connection with interviewees during the interview are keys to obtaining credible data. Although qualitative research is inherently prone to replicability, the researchers of this study tried to leverage

literature review to broaden their knowledge regarding the research subjects. Furthermore, conducting semi-structured interviews with open-ended questions helped both researchers and respondents to have more flexibility to interpret their ideas.

Research validity is also important since it clarifies whether the data collected adequately represents the construct that it is supposed to measure (Bhattacherjee, 2012). In other words, valid measurement in a scientific study illustrates the essence or content upon which the construct is focused (Recker, 2013). Considering the fact that research validity has different types (Recker, 2013), for more simplicity, we decided to narrow down the scope to internal and external validity. As described by (Seale, 1999), reaching the respondent's credibility ensures the internal validity which is taken into account in this research as most of the respondents either have experience in crowdsourcing or have considerable knowledge about it. In terms of external validity, this study tries to assess the perspective of respondents with different levels of experience but related to the research topic in order to improve the generalizability of the results that will be attained.

3.5 Research Ethics

As a branch of philosophy, the intention behind research ethics is to address questions about morality (Recker, 2013). Bhattacherjee (2012) believes that research ethics is crucial to making a distinction between right and wrong since people and organizations often manipulate the research in unethical ways to engage in activities that are opposed to the norm of scientific conduct. To uphold ethical behavior in research, Recker (2013) suggests four actions including responsibility, accountability, liability and due process. Patton (2015) also stated the importance of ethical aspects in qualitative research. This study uses voluntary participation during the data collection stage which makes room for participants to freely choose whether they want to participate or not (Bhattacherjee, 2012; Recker, 2013). In addition, the confidentiality of respondents is also considered by not stating their names or organizations they work for unless obtaining their permission (Walsham, 2006). In line with (Bhattacherjee, 2012), For those who have not given permission, names are anonymized. In terms of the importance of providing disclosure in qualitative studies, we did not send the entire interview guide to our respondents before interviewing for the sake of reducing the risk of collecting biased answers (Bhattacherjee, 2012). However, a brief overview of the purpose of the study is prepared and sent to interviewees before conducting the interview.

4 Findings

This chapter describes the empirical findings of our study based on the literature reviews and results from the interviews conducted in this study. The section consists of a general perspective on intrinsic and extrinsic motivations and a detailed analysis of each of these categories of motivations. Some parts of the interviews in this chapter refer to specific parts of the conversation that can be found in the appendixes.

4.1 High Level Outlook

As mentioned in the first chapter, the research question of this thesis is about what motives influence participants' willingness to join contests on crowdsourcing platforms. In this subsection, more general results are presented with some examples of how we determined the codes' categorization. The results are gathered by extracting useful information from interviewees' personal opinions and coded with different labels that distinguish the extrinsic and intrinsic motivations as demonstrated below.

In the interview process, respondents were asked about their general impression of crowdsourcing contests and their incentives to join competitions. Table 6 shows the distribution of opinions about general categories of motivations, received from the respondents, the numbers in the table represent the line in which the evidence appeared. Based on collected answers, we found that a majority of the respondents including Respondent 1 (R1), Respondent 3 (R3), and Respondent 5 (R5) are influenced by intrinsic aspects. However, Respondent 2 (R2) and Respondent 4 (R4) regarded the effect of both categories equally.

Table 6: Overview of transcribed data related to the main categories of motivations

Motivation Category	R1	R2	R3	R4	R5
Extrinsic	18	18, 24	12	16	-
Intrinsic	12, 16, 20	14, 38	12, 16	12	16

R1, who is the analytics lead of Klarna and has worked as a data analytics expert in the past 4 years, provides his general impression about crowdsourcing contests:

> *"For me, it was more like a learning process and has some deadlines that I can aim towards, like learning about machine learning or AI and having some real data to do the analysis. So the most important one is that I can get knowledge from it. It's like if I want to learn that particular area, that will motivate me. I don't really care about*

> *prize money or stuff like that. Maybe because I am not that good. So, I probably will not win." (R2:16)*

Another respondent, R4, who is a Competition Expert with more than 2 years of participation experience in data science crowdsourcing contests believes that learning new techniques in AI as well as gaining recognition among members of the community were some reasons why he participated in competitions (R4:12; R4:16). These reasons can be categorized under intrinsic motivations. Similarly, R5 describes that his main motivation to join contests is learning, particularly learning from solutions provided by other contestants (R5:16). Regarding that, R2 mentions:

> *"I think the most important one is to learn something. Another purpose is to get me prepared for the future. Maybe jobs or research. It's like one year ago, I want to seek some opportunities in [...]." (R2:18)*

The above-mentioned respondents also express their feelings about intrinsic motivations indirectly through answering questions in the interview process. For instance, an engaging reason to join a contest is collaborating with other contestants who may have a higher level of expertise which provides the foundation for learning about new solutions and techniques (R1:12; R1:20; R2:14; R2:38). On the other hand, we received answers from other respondents showing the effectiveness of extrinsic factors on contestants' engagement. R4, who has achieved the Master performance tier and has contributed to several contests both in a team and individually mentions that the topics of data science problems presented in the contests influenced him to decide whether to offer a solution or not (R4:16). R3 also mentions:

> *"[...] allows me to participate in different types of competitive competitions or problems like you can play NLP or computer vision or audio, or [...] whatever you can find a relevant competition there and you can just participate in it" (R3:12)*

Apart from the title or topic of the contest, the features of the platform, characteristics of the data provided are mentioned as extrinsic factors. For example, R1 mentions:

> *"Because [...] is quite a good platform where you can take your data, download it, [...], and then it will be evaluated and I will get the result, which is pretty good" (R1:18)*

R2 also states that some platforms are easy to use and they are mainly designed for data science contests where the user does not necessarily need any knowledge other than data science to take preparatory steps before proposing a solution for the contest's problem (R2:24). This way not only high-quality contestants are engaged to participate in competitions but also the beginners are encouraged to apply their problem-solving skills.

4.2 Extrinsic Motivations

This section reflects the results found from the contestants' perspectives in terms of extrinsic motivations. Table 7 illustrates from which interviewee and the number of rows in the transcription the data have been extracted.

Table 7: Overview of transcribed data in extrinsic motivations

Category	Motivation	R1	R2	R3	R4	R5
Extrinsic	Related to the Characteristics of Competition/Task	22, 34	10, 22, 26, 36, 46	12, 44	12	10, 22
	Non-Monetary	26	-	28, 38	30, 32, 38	47
	Monetary	38	-	26	-	26, 44

Among all extrinsic motivations studied from literature, many respondents mention various aspects related to the characteristics of a competition such as the clarity of requirements, the relevance of the topic to the contest's problem, the structure of data, etc., that impact their decision. R2 states the topic of the task as a significant driver that influences his decision to participate in contests (R1:22; R1:34). R2 mentions if the title of the contest is related to his interest, he would like to join (R2:22; R2:36). Some respondents also consider the reputation of the platform itself as a motivating factor (R3:12; R4:12; R2:10; R5:10). However, others found it satisfying that some platforms provide a wide range of competition as well as readable and well-structured data. For example, R2 and R3 mention:

> *"I think there are many different competitions [...], there are four subfields in data science, one is computer vision, one is natural language processing, one is financial data, and one is recommendation system. Kaggle has all these four types and is not monotonous at all." (R2:46)*

> *"Actually, yeah, I believe there is a lot of variety. From time to time some types of competitions become more dominant, like image or NLP competitions becoming more popular compared to others. But overall, I believe [...] the variety of competitions is very wide and very relevant." (R3:44)*

R1 considers the readability of the requirements as he mentions "as long as the problem is formulated that I can understand it easily" (R1:22). Or, R2 mentions that "I think [...], all of the competitions I have joined have clear evaluation criteria. And they will tell you what they will do [...]" (R2:26). In addition, R5 mentions "I joined [...] in a competition, if the competition provides tabular data, it's easier to get started" (R5:22).

Regarding the non-monetary factors, we noticed that using gamification techniques has a positive effect on the decision-making of all respondents. R1 believes that seeing many monetized contests is not what contestants always want (R1:26). He thinks gamification of the process is more attractive to participants since it increases their stickiness to a specific contest or a problem, and encourages them to come back and try to level up their badges, experience,

or any other forms of achievement (R1:26). R3 also mentions that "medals are the priority for me. The second thing I like would be the sweatshirts like the hosts sometimes give winners cool stuff and Kaggle merchandise" (R3:28). Ranking systems in crowdsourcing contests are influential as well. R4 mentions that "I would say that I would definitely want the ranking. Because I need a ranking to progress more on Kaggle itself, like getting the grandmaster or master title, [...] (R4: 30). Among all gamification techniques, he believes leaderboard ranking has a direct impact on the reputation of the contestant as he mentions:

> *"[...], I would say the leaderboard ranking is more important to me. Why? Because if they can get me the ranking, then I can use these competitions to progress myself to a higher level and be more recognizable. And I think most people also care about the ranking. [...], because usually, people want to use it to progress them to the higher category. That's why I think a resume is important for everyone. And I think most people couldn't get the money, so the money is usually just for the top three or top five groups. And that's only a small part of the ranking. So that doesn't appeal to me much, because usually, I am not good enough to have hope for the money for most of the competition, so I want to aim for a higher ranking." (R4:32)*

Furthermore, some respondents assert the effectiveness of upvotes on the solutions that they suggested in a contest (R4:38; R5:47). This feature allows other users to promote a solution that they think perfectly answers the question or problem described in the contest. Receiving feedback from other participants in contests is another effective way that encourages the contestant who is providing the solution to join other contests with similar topics in the future. For instance, R3 mentions:

> *"Yeah, definitely. For example, in one of the competitions, I had never experienced Audio analysis. And our goal is to classify the audio as simple. It was my first experience, I just wanted to see how far I can go. And after the end of the competition, I shared my solution and also received helpful feedback from the community [...] Then in the upcoming audio competitions, I was much more confident. It definitely affected my decision regarding joining." (R3:38)*

The third subcategory of extrinsic motivations regards techniques that crowdsourcers adopt to impact the contestant's decision by offering money or a bonus. Winning money could be one the most important reasons for motivating participants to join competitions. During the assessment of respondents' answers, we identified that R2 and R5 both believe winning a competition with a higher price would engage them to participate in another competition in the future. (R1:38; R5:44). R3 also mentions if he has more than one option he would prefer to win money, as he mentions that "[...] say that you have only two choices, then I would prefer the one with money. So compared to the requirements, maybe money is a little more important" (R3:26). For Respondent 5, gaining money is really important since he believes that when a crowdsourcer offers money in compensation for the solutions they receive from the crowd, it shows how serious the matter is compared to other contests that offer no money (R5:26).

4.3 Intrinsic Motivations

This section reflects a summary of the results found from the contestants' perspectives regarding intrinsic motivations. Table 8 shows the responses collected through interviews as well as the row numbers from which the response has been extracted from the transcriptions.

Table 8: Overview of transcribed data in intrinsic motivations

Category	Motivation	R1	R2	R3	R4	R5
Intrinsic	Satisfaction and Needs	24, 34	14, 18	16, 34	12, 38, 46, 48	16, 40
	Work Value Outcomes	30, 32	-	-	34	36
	Hedonic Outcomes	42	-	42	43	50

Among all intrinsic factors, many respondents noted that gaining satisfaction and personal needs are the main reasons why they join a competition. For instance, R4 mentions:

> *"It depends, I would say. If things are interesting problems that interest me a lot, and many people joined it, and share some discussions and notebooks that I can learn from, then I will join it. [...] But if I can do something in Kaggle, I can provide notebooks or discussion ideas sometimes because I want to contribute to their blank notebooks. If I find something that's helpful to others and does no harm to myself, then I would definitely share the notebook and discussion with them." (R4:36)*

As previously mentioned, for many respondents the reason to join a contest is often learning or improving their skills (R1:24; R1:34; R2:14; R3:16; R4:12; R5:16). Social recognition is another reason that motivates contestants to join a competition since it may help them to gain a reputation among other users in a community or show promotions on their professional resume (R2:18; R4:38). R3 mentions that "[...], it allowed me to find my current job, [...]. And I also included my Kaggle achievement in my LinkedIn profile, I believe it is important" (R3:34). He also believes that joining competitions help individuals in building a personal brand for themselves (R3:46). Similarly, R4 mentions:

> *"If someone wins a competition, they always somehow shared it on the LinkedIn page, [...]. This means that they think this is recognizable by other coworkers or other potential employers which can make them more special and more competitive. So that's why I think Kaggle is a great platform, [...]." (R4:48)*

In contrast to what is mentioned above, R5 believes that the contestant's activities in discussions and the frequency of posts shared may have a higher impact on someone's reputation rather than participation in contests only (R5:40). According to the answers collected from interviews, some respondents would like to join crowdsourcing contests to have productive free time (R1:42; R4:43; R5:50). R3 thinks that attending competitions is sometimes for fun where he states:

> *"There are some competitions, like reinforcement learning competitions, where you are trying to develop an agent that can play games. And sometimes these competitions become like you play with other participants. So, let's say you are controlling an agent who can play football, and you're playing football with the other person. And I think this is fun." (R3:42)*

In the crowdsourcing environment, contestants consider the work value such as job security, lifestyle integration, and job independence in general. During the interview process, we asked for candidates' opinions about these aspects as well. From R1's perspective, contestants typically have low job security (R1:32). In terms of fair payment, R1 believes that "Nobody will give money to people at the bottom 50%. I guess it's a little bit harsh, [...]" (R1:30). R4 also believes that fair payment is not totally considered in the context of crowdsourcing as he mentions:

> *"If one person wants to get the money, they need to spend at least 100 hours on it. Usually, the money price is at most $10,000. When competing with a group, you need to divide the prize among several members, at last, that is not much money per hour. So that's not good pay. [...] Imagine standing from their points, they need to organize the competitions and need to offer a good company environment and provide it on the platform. The total money they offer is quite okay, usually, it's about more than $10,000. It is good from the hosts' perspective. But how much time we prefer to invest is actually just depending on us, and we can use this platform to learn, that is more important." (R4:34)*

In a similar manner, R5 mentions:

> *"I think some companies after 2017, have designed competitions with difficult problem statements and tried to offer lower prizes like $50,000 which often does not worth it based on the difficultness of the problems, and the time that people put on them" (R5:36)*

4.4 Other Influential Findings

In this research, we would like to study the most important factors from contestants' standpoints. Furthermore, to investigate how contestants prefer intrinsic motivations against extrinsic motivations and the other way round. Table 9 indicates the responses we received with regard to these subjects.

Table 9: Overview of transcribed data related to other motivations

Category	Motivation	R1	R2	R3	R4	R5
General	The most important factor	16, 34	14, 36	12, 32	12	16
	Influential incentive	24	-	24	28, 46	24, 38

The most important motivation for many of our respondents is intrinsic. Particularly, learning a new skill or algorithm, and getting familiar with trending solutions proposed by other contestants in crowdsourcing contests is the most effective factor from their point of view (R1:16; R2:14; R5:16). However, for others, the reputation or features of the platform is the main reason why they prefer to join competitions conducted by the platform (R4:12). This has helped some of these individuals to improve their career prospects (R3:12). According to the answers of the respondents, most of them are interested in attending a contest or crowdsourcing project voluntarily without obtaining any monetary compensation (R1:34; R2:36). Considering that, R3 mentions:

> *"Yes, I would like to. Why? Actually, the outcome should be something that could be useful for the platform. For example, I believe Kaggle launched a new feature, I believe recently, where they were hosting community competitions. And those competitions are paid for by the community actually. I don't mind about prizes, but I will do something like that. Something like reviewing competition hosts in Kaggle, which will be a good outcome for the community. If I have an offer like that, I will take that offer and I will do it for the community or for social good." (R3:32)*

Some respondents also show their interest to join such contests unless they do not need to put an unreasonable amount of time into solving problems (R4:46; R5:38). It is worth noting that having access to computational resources is another reason that changes the decision of the participants to join the contest whether it offers rewards or not. R5 mentions that:

> *"[...] If you open a competition and try to read its description, you can get an overall insight of what kind of problem the competition is based on. And if it needs something, for example, a specific expertise, or resources like lots of RAM and possibly GPU or like GPUs to train a reliable model, I prefer not to attain! [...]" (R5:24)*

In addition to that, we found that the characteristics of contests take precedence over winning money for many contestants. R1 mentions that winning money does not matter to him at all and the matter is how precisely a problem is formulated in the contest's requirements (R1:24). R4 likewise asserts that money has not a crucial role to play in crowdsourcing contests (R4:28). However, R3 states that "[...], let's say that you have only two choices, then I would prefer the one with money. So compared to the requirements, maybe money is a little more important." (R3:24).

5 Discussion

In this chapter, we discuss and analyze more of the empirical findings of the research and the literature. The similarities and differences between our findings and the literature are compared.

Considering the empirical findings in the previous chapter, factors that influence the engagement of contestants in crowdsourcing can be divided into two general categories, intrinsic and extrinsic. Before discussing the themes related to each of the general factors in detail, it is important to know that in the crowdsourcing contest, participants can be exposed to various contexts that influence their engagement and decision-making. Engagement is a psychological statement that impacts the contestant's willingness to put full effort into a specific activity or task (Liang et al., 2018).

5.1 Extrinsic Motivations

Extrinsic motivations are considered to be common ways to recruit crowd workers in crowdsourcing generally (Li et al., 2017b). In addition, they are highly regarded as significant drivers in the success of contest design (Zheng, Li & Hou, 2011). Monetary incentive mechanisms have been adopted to attract solvers' interest and attention, which have positive effects on task effort and engagement (Liang et al., 2018). However, from the results of the research, it can be understood that winning money or rewards is not the primary incentive for the majority of contestants for two main reasons. First, only the winner or a small share of participants in a contest can obtain rewards, something that is mentioned as a drawback of crowdsourcing (Kavaliova et al., 2016). Secondly, contestants usually have domain-specific expertise in the contest settings (Ikediego et al., 2018), and they attend competitions with a certain incentive. For those who consider monetary gain, all the effort they put into providing solutions should be well worthwhile. In particular, in data science crowdsourcing, individuals join contests in collaboration with a group, and if the total amount of prizes offered by the crowdsourcers or the owner does not benefit each member, it is very likely that they will give up on joining the contest. Other extrinsic factors like gamification techniques give contestants more flexibility in decision-making about the contest they want to participate in (Kavaliova et al., 2016). According to the findings of the research, contestants are mostly engaged with the quantitative performance measures provided in leaderboards, points, and badges when the monetary rewards of the contest do not look satisfactory. Furthermore, feedback and upvote mechanisms actuate contestants to take part in future competitions.

What is derived from our empirical findings shows that the characteristics of the contest and the platform highly impact the contestant's opinion. Unique attributes of a contest task such as autonomy, variety, readability, clarity, and complexity are mentioned as having significant implications for motivating participation in crowdsourcing contests (Deng & Joshi, 2016; Zheng, Li & Hou, 2011). The results indicate that providing improper datasets by the crowdsourcers or contest owners affects the complexity of the task or procedures that should be carried out by the contestant to solve the contest's problem. More varieties of contests require contestants to employ different skills to provide valid solutions (Zheng, Li & Hou, 2011). This may also positively or negatively influence the participation in contests or the

engagement of contestants to use the platform. For example, for contestants like R2, who have shallow knowledge in various fields, the diversity of contests is engaging. However, more experienced contestants like R3 and R4 prefer to look into contests that are designed based on a specific theme that allows them to assess their skills and abilities in depth. Additionally, how the contest's requirements are rigorously delivered to the contestant is crucial. Designers may often encounter difficulties in describing the purpose and requirements of contests (Zheng, Li & Hou, 2011).

5.2 Intrinsic Motivations

According to Liang et al. (2018), in crowdsourcing contests, tasks are challenging and people usually require a high level of expertise to handle these tasks. The desire to solve the challenge provided in a contest encourages the contestants to develop their skills, which consequently makes them perceive the meaningfulness of participation and engagement (Liang et al., 2018). Skilled respondents are highly motivated by intrinsic factors, according to the result of the study. Learning from new experiences can be considered as an initiating driver which leads them toward improving their skills and becoming familiar with trending solutions or problems in contests. Those who prioritize the learning aspects of participation mostly take the characteristics of contests into consideration rather than the rewards they may achieve. Social recognition and reputation in the community of contestants are a result of the satisfaction that individuals gradually obtain over time. This enhances the contestant's confidence in their competencies, which largely influences their willingness to engage in a certain type of contest or task (Liang et al., 2018). In some literature, gaining a reputation is categorized as an extrinsic motivation (Zheng et al., 2011; Li et al., 2017). However, this factor is regarded as an intrinsic motivation influenced by external factors such as achieving rewards mentioned in other studies (Karachiwalla & Pinkow, 2021). Further to this, some studies consider no specific category for reputation in crowdsourcing contests (Deng & Joshi, 2016; Kavaliova et al., 2016). According to the findings of the research, we consider social recognition and reputation as intrinsic factors based on the inner needs of contestants. However, extrinsic motivations may overwhelm this factor in different contexts. It is worth noting that in data science crowdsourcing platforms reputation of the contestant is not only influenced by activities within the contest but depending on the platform, the contestant might be required to do other activities such as active participation in discussions or providing valid and well-structured datasets accessible to other contestants in the community.

Conclusively, the empirical findings show that a reason that impacts constants to joining competitions is having productive free times that, in line with the literate, can be considered hedonic outcomes (Deng & Joshi, 2016). Having productive time refers to the sense of accomplishment and productivity that a crowdsourcing participant would gain. Also, the satisfaction resulting from experiencing pleasure, such as having fun is described as a hedonic outcome in crowdsourcing (Deng & Joshi, 2016). Since finding a boundary for making a distinction between these two motivations, based on the respondents' answers, is difficult. We would consider both of the mentioned factors as one unique factor. Among other intrinsic motivations, the results show that most of the respondents believe that the job security as a work value outcome in crowdsourcing is low. This is regarded as a challenge of contest-based crowdsourcing (Liang et al., 2018), and the reason is described in the findings section of the study where respondents stated that there is no guarantee that all the contestants in the competition are monetary compensated because in the contest environment the prize will be

given to one or a small number of participants (Segev, 2020). Therefore, we do not regard it as a motivation in contest-based crowdsourcing.

5.3 Coexistence of Motivations

Although intrinsic motivations and extrinsic motivations coexist in various ways in crowdsourcing, the influence of factors on each other relies on the context of crowdsourcing as well as how people behave (Liang et al., 2018). Extrinsic incentives may positively influence the participants' inner interests and have effects on engagement consequently (Liang et al., 2018). The results of the research show that contestants, influenced by external factors, pursue their inner needs in accordance with extrinsic motivations. For instance, gamification mechanisms as extrinsic factors can impact the intrinsic incentives of the contestant. We noticed that achieving a higher score on leaderboards, medals, and badges in crowdsourcing competitions encourages contestants to share these achievements with other contestants for gaining reputation. Additionally, some contestants in this study intend to solve the task as a way to promote their professional status or receive job offers, which is described by Liang et al. (2018) as the benefits of external incentives which make the contestant pay less attention to intrinsic incentives. It could be argued that extrinsic factors have negative impacts on intrinsic motivations as well. For instance, a lack of enough resources or higher complexity of the contest affects the engagement and makes the contestant pay less attention to intrinsic factors such as satisfaction.

6 Conclusion

To restate our aim of doing this research, this thesis investigates the effect of motivational factors on contestants in crowdsourcing contests. The purpose is to look into how to identify motives that influence the contestant's decision to join a contest or competition, and also assess the importance of these incentives from the contestant's perspective. According to the results of the study, research questions are answered as follows:

What motives influence participants' willingness to join contests in crowdsourcing platforms?

In crowdsourcing contests, different reasons influence the contestant's decision to whether to join a contest or not. The results of the research indicate that both intrinsic and extrinsic motivations are involved in the decision-making process. Although extrinsic factors such as monetary rewards directly influence the participation of contestants, the effect of intrinsic motivations on the engagement of contestants is more dominant compared to extrinsic factors. The extrinsic motivation in crowdsourcing contest environments can be divided into different categories such as monetary incentives, non-monetary incentives triggered by applying gamification techniques, feedback, and voting mechanisms. In addition, the attributes and characteristics of a task in contests are recognized as extrinsic motivations that highly impact the participant's decision before joining the contest. Regarding intrinsic motivation, factors that result in a sense of satisfaction are highly influential since they are entwined with the inner needs of the contestants. The responses show skilled contestants mostly tend to participate in competitions for improving their skills or gaining reputation regardless of paying attention to monetary aspects. Furthermore, other intrinsic incentives such as work value and hedonic outcomes are among other drivers which influence contestants' decisions.

How do contestants weigh extrinsic motivations against intrinsic motivations?

Depending on the context of crowdsourcing, extrinsic motivations can hinder or strengthen intrinsic motivations. The coexistence of intrinsic and extrinsic motivations can influence contestants to behave differently. According to the results of the research, extrinsic motivations can positively or negatively affect intrinsic motivations in crowdsourcing contests. Moreover, contestants reflect differently on motivations based on their preferences. Providing improper attributes of a contest including imprecise requirements, and incomplete or biased datasets can negatively influence the intrinsic incentives of contestants even if the contest offers considerable monetary rewards. According to the findings of the study, participants who are influenced by external variables seek their inner needs in line with extrinsic motives.

6.1 Key Findings

Different extrinsic factors impact contestants' decisions to participate in crowdsourcing contests, although money is just a minor one. According to the respondents, non-monetary incentives outweigh monetary rewards. Generally speaking, incentives connected to contest requirements matter more than financial variables, such as the reputation they get from the contests or the elements of the contests' criteria. Satisfaction and needs accounted for the largest proportion of intrinsic motivation, as each respondent was motivated to gain more

knowledge, experience, and social recognition through the competition. Hedonic outcomes were the second-most intrinsic motivator, with respondents feeling somewhat enjoined about making progress in the competitions. On average, work value outcomes were expected to be the lowest, as respondents felt that treating crowdsourcing competitions as jobs would lead to poor job security and pay inequality for all involved. Finally, the most influential factors were identified, with more than half of the respondents highlighting more intrinsic motivators. The majority of respondents stated that money is not a significant element in their minds. Personal growth, such as learning new skills, always outweighs external influences such as compensation.

6.2 Limitations and Feature Research

Despite key findings and outcomes, this paper is not exempt from limitations and weaknesses that were identified during the creation stage. First, the number of respondents is sufficient but not large enough to cover more varieties of their backgrounds as well as more credibility. We feel it might be a defect that there were no female respondents, no crowdsourcing practitioners, and no grandmasters of crowdsourcing contests. The second weakness is time constraints since the entire research is conducted in 2 months approximately. In case having more research time, we would suggest mixed-methods as the research methods since it considers both qualitative and quantitative methods, and enables researcher to collect richer and diverse dataset. We are convinced that if these issues can be overcome or improved, this study will play a greater role in academia.

The applications of crowdsourcing contests are emerging, it is an affordable method for companies to gather information from external voices while they do not need to sign a contract with the workers. These competitions allow the organizers to see more possibilities for problem-solving, as it is often possible to see the problem in its entirety after stepping out of the box. For the contestants, each task on the contest-based crowdsourcing platform they complete helps them build their knowledge system, their reputation, or even their professional experience. Frequent teamwork is beneficial for their further social connections and interpersonal relationships. Our finding that "intrinsic factors motivate contests more than extrinsic factors" provides a contribution for practices in contest's design, as it gives an idea of what possible improvements can be made to attract more active contestants. After all, it isn't easy to retain participants who do not get paid what they want active if it cannot be guaranteed that they will all get more or less what they want. It is important for us, as researchers, to take one step back from the thesis and objectively evaluate where our work might be among the related literature. It is clear that our thesis only makes a small step toward adding value to the contest-based crowdsourcing field, but any great achievement is built up little by little. Although there are no mature conclusions or solid proofs in this direction yet, we believe that each small contribution like our paper will definitely serve as a basis for important research at some point in the future.

Appendix 1 – Interview Guide

Introduction and Background Check

1. Do you mind if we record this interview?
2. Do you wish to be anonymous?
3. What is your background and education?
4. What is your profession? How long have you been in this profession?

General Questions in Crowdsourcing

5. Do you have any preference to use a specific platform? and why?

    5.1. Which performance tier of Kaggle have you achieved?

6. Have you ever joined a competition?

    6.1. What are the motivations for you to join competitions in general and which one do you think is the most important?

Key Questions

7. Have you also participated in a competition that offers no rewards or money?

    7.1. What is the important factor that motivates you to join competitions that offer no money?

8. How does the requirement of competition/task affect your decision to join? Do you like or dislike any kinds of requirements?
9. Which one of these competitions do you prefer to participate in:

    - competition/task that offers a considerable amount of money with vague and unstructured requirements
    - competition/task with well structured and precise requirements but with no monetary compensation

10. Would you join a competition that offers gifts or badges instead of offering money?

    10.1. What type of gamification prizes do you like the most and why? (gifts, badges, bonus, points/levels, leaderboard ranking)

11. Do you think the crowd workers are fairly paid in these competitions? (the contestants who come only for the money)

12. Do you think the workers have high or low job security in such crowdsourcing tasks as a full-time job?

13. Would you voluntarily join a task or group project on crowdsourcing platforms with no prize at all and Why?

14. How much the solutions you provided in a community have helped you to build a reputation for yourself?

15. How much does winning a competition encourage you to join the next/similar competitions in the future?

16. How about rankings on the leaderboard or the number of upvotes? Does it affect your decision as well?

17. Have you ever joined a competition just for fun or to have productive free time?

18. Do you think the competition has a proper variety on Kaggle? How do you think it influences crowd workers?

Appendix 2 – Respondent 1

Organization: Klarna

Interviewee name: Anda Zhang

Occupation: Analysis lead

Date and Time: April 27th, 2022

Duration: 17 minutes

Line / Person	Transcription	Code
1 I	Okay, I'll start with the introduction part. First of all, do you mind if we record this interview?	
2 R1	No, you can record, it's fine.	
3 I	Okay, do you wish to be anonymous?	
4 R1	No, that's okay. We can not be anonymous as well.	
5 I	So about yourself, what are your background and education? Can you introduce yourself a little bit?	
6 R1	Yes. So my name is Anda. I have a master's in applied mathematics. And I have worked with data engineering and analytics for five years.	
7 I	Okay, perfect. What is your profession? And how long have you been in this profession?	
8 R1	So currently, I'm the analytics lead at Klarna and have been there for 11 months. Previously, I worked as a data engineer in another company for three and a half years, almost.	
9 I	Okay, got it. Have you ever joined any data science community or platforms?	
10 R1	By community if you mean like Kaggle and stuff? Yes. And I'm also subscribing to different data communities, like threads or on Reddit and different places.	
11 I	Do you have any preference to use a specific platform that you mentioned and why?	

12 R1	I've used Kaggle before. It's quite easy to get data and has a good platform to get sample data or data for a particular exercise. So I used to use that. Not so much anymore. I choose this because it's more like when I google it, it popped up as the first one, and it's quite famous. It was the most popular one at least at the time when I used it.	EXT
13 I	Have you achieved any performance tier of cargo?	
14 R1	Just a novice, joined a competition once and I was in the middle of the leaderboard.	
15 I	Ok so you have joined the competition before. What motivates you to join competitions in general and which one do you think is the most important?	
16 R1	For me, it was more like a learning process and has some deadlines that I can aim towards, like learning about machine learning or AI and having some real data to do the analysis. So the most important one is that I can get knowledge from it. It's like if I want to learn that particular area, that will motivate me. I don't really care about prize money or stuff like that. Maybe because I am not that good. So I probably will not win. But just learning and also see how others are doing it because I think when it competition ends, you will find different answers and how other teams have done it.	MOST, EXT, INT
17 I	Have you also participated in a competition that offers no rewards or money at all and why?	
18 R1	Yes, I have. And those were the more casual ones. I do it just for learning hard skills. Because Kaggle is quite a good platform where you can take your data, download it, apply some algorithm and then send it up, and then it will be evaluated and I will get the result, which is pretty good.	EXT
19 I	Is it more like growing your skills or finding people in the community, I mean more data scientists?	
20 R1	Yes, more learning my skills and then seeing how others are doing it, it is kind of a good forum to find other people that have more experience than you and how they are doing it.	INT
21 I	Okay, perfect. And now for the competitions, how do the characteristics of the requirements of the competition or tasks affect your decision to join. Do you like or dislike any kinds of requirements?	
22 R1	I haven't joined many competitions, so I don't really care I guess, as long as the problem is formulated that I can understand it	EXT-CHAR

	easily. And if the data is quite good and in an area that I'm interested in, then I will take a look. It is more interest oriented.	
23 I	For the next two following scenarios, which one of these competitions do you prefer to participate in? A, a competition that offers a considerable amount of money with vague and unstructured requirements and B, competition with well structured and precise requirements but no monetary compensation?	
24 R1	B in my case. Because I'm there more to learn, I want to have more formulated questions to solve. Money doesn't matter that much at my stage for I am more of a beginner at learning.	MOTINF, INT-SAT
25 I	Okay. Would you join a competition that offers gifts or badges instead of offering money and why?	
26 R1	Yes, gamification is good. I think it's more like taking a certificate. If I am in a forum that can offer badges and a lot of the community recognize, that is a good thing as well. Not everything needs to be monetized. And I also think it's more it has an effect of stickiness where you can come back and try to level up your badges or experience or achievements.	EXT-NMON
27 I	And what do you prefer a platform that provides you with? I mean, compensation like gifts, or badges or maybe leaderboards? Because these are the techniques for gamification.	
28 R1	Badges maybe. I think Khan Academy is quite good. That there is more based on like, how many videos you watch and then you answer some questions about different topics. So that's like a badge-based thing that one is pretty good.	EXT-NMON
29 I	Do you think the crowd workers are fairly paid in these competitions?	
30 R1	I don't know, actually. I guess it feels like it's quite common that only one winning team will get the money when thousands of team joins because everyone can attend. Nobody will give money to people at the bottom 50%. I guess it's a little bit harsh, maybe not to only give a prize to the person or team that wins, maybe they can give some sort of other compensation for the second or third place?	INT-WVO
31 I	Yes, make sense. Do you think the workers have high or low job security in such crowdsourcing tasks as a full-time job?	
32 R1	I Think this is quite a low job security case since you don't know when the next competition is and if you are going to win, etc.	INT-WVO, INT-SAT

33 I	Would you like to join voluntarily to a task or data science project in general?	
34 R1	Yes. Probably more so if that topic was more related to what I do, or maybe something that I'm interested in. Again, the reason is more like growing skills.	INT-SAT, EXT-CHAR, MOST
35 I	How much the solutions you provided in a community have helped you to build a reputation for yourself?	
36 R1	Not much. I would say I am not that good. I guess the competition I've entered is kind of common. So there was no one to judge my solution to see if it is good or bad because they were more like quite common standard solutions.	INT-SAT
37 I	I got it. And how much does winning a competition encourage you to join the next/similar competitions in the future? Like will a higher prize encourage you to join next time, maybe?	
38 R1	Yes, I haven't been winning any competition but I guess yes. It's like if I need to put quite a lot of time into a competition, I think compensation should be quite a big part of it. But I know that there are people that are doing this, maybe not as a full-time job but, like a half time job, I would think that people have selected this as a source of income they might be keener to attend if there is a higher prize one.	EXT-MON, INT-WVO
39 I	Then how about rankings on the leaderboard or number of upvotes? Does it affect your decision as well?	
40 R1	Yes, I think that will motivate me more. At least if I came up with a very good solution that many of the people use or like, that will be quite cool.	
41 I	Have you ever joined a competition just for fun or to have productive free time?	
42 R1	Yes, just to train my skills.	INT-HED
43 I	Okay, we are coming to the last question. Do you think the competition has a proper variety on Kaggle? How do you think it might influence the crowd of workers?	
44 R1	From what I have seen, there are some variations but mainly because of different use cases in different industries. The methods are not too different in general.	EXT-CHAR
45 I	That was all of our questions, thank you!	

Appendix 3 – Respondent 2

Organization: Kungliga Tekniska högskolan (KTH, Royal Institute of Technology)

Interviewee name: Pengnan Chi (PC)

Occupation: Student, active Kaggle competition user

Date and Time: April 30th, 2022

Duration: 26 minutes

Line / Person	Transcription	Code
1 I	Okay, we are gonna start the interview right now. So I'm gonna start with some introductory questions about yourself. First, do you mind if we record the interview and I use video for transcription? Do you want to be anonymous?	
2 R2	No, I don't mind, and you can use my name.	
3 I	Okay, so what is your background and education?	
4 R2	Now I am reading my master's degree in KTH, and my major is computer science.	
5 I	Okay, computer science. Do you work?.	
6 R2	Nope.	
7 I	No. So your profession is a student in computer science, right? How long have you been in this program?	
8 R2	Since last August. I think it is almost one year.	
9 I	Okay. Second question. Have you ever joined any data science community or web platforms? Like Kaggle? Or other ones?	
10 R2	Yes. Kaggle is one community and I also joined some WeChat groups. But I think Kaggle is more useful.	MOST, EXT-CHAR
11 I	Yeah, any others? Platforms like Kaggle.	
12 R2	I used to play in a Tianchi competition. But I didn't complete that competition. It's quite similar to Kaggle and Tianchi is under Alibaba.	

13 I	Then do you have any preference to use a specific platform and why?	
14 R2	From my experience, Kaggle is the best platform that I use. Because my purpose of taking these competitions is to learn something, like some skills or algorithms. And I think the competitors in Kaggle are really willing to share their codes with others. So I can learn a lot from them.	INT-SAT, MOST
15 I	Okay, so which performance tier of Kaggle have you achieved?	
16 R2	It is the contributor.	
17 I	I get it. So, among the competitions you joined, what are the motivations for you to join competitions in general? And which one do you think is the most important?	
18 R2	I think the most important one is to learn something. Another purpose is to get me prepared for the future. Maybe jobs or research. It's like one year ago, I want to seek some opportunities in FinTech by financial technology, so all of my Kaggle competition was about financial data.	INT-SAT, MOST
19 I	Okay, I get it. So, mainly just gain more knowledge and the for future career use. Have you ever participated in a competition that offers no rewards or money?	
20 R2	I think in Kaggle there are many different parts of the competition. Some are just for knowledge or playground and some for money. And I personally think that the competition for the playground is, is very, very suitable for the beginners. I'm also a starter right now but some of this knowledge is kind of easy for me. So I would like to just join the computation for money or price.	EXT-MON, INT
21 I	So what is the most important factor that motivates you to join competitions that offer no money?	
22 R2	I think that will be some interesting topics with some open source code. For example, if I want to learn some algorithms in the financial field, there are some algorithms for the financial data and it is very very different from algorithms for natural language data. So if the topic is really specific is about financials, there are some good open source codes, I really like to have a look.	EXT-CHAR
23 I	Okay, perfect. So the next question is how do the requirements of the competition affect your decision to join? Do you like or dislike any kinds of requirements in a competition?	
24 R2	I think for Kaggle the requirements are okay. When I do some competitions on Kaggle, I can feel that the focus is on data, the algorithm. But when I do it in Tianchi, it's not only I need to know	EXT-CHAR

	the algorithm, but I also need to know some other things like clouds transform. I think he's quite unfriendly for beginners. It's not like a pure data science competition. You need to do maths and other things apart from data science. That is quite annoying.	
25 I	Okay, I get it. Now let's imagine two scenarios and can you tell me which one of these competitions you prefer to participate in. The first one is the competition that offers a considerable amount of money with vague and unstructured requirements, and another one is a competition with well structured and precise requirements, but no monetary compensation?	
26 R2	I think from my Kaggle experience, all of the competitions I have joined have clear evaluation criteria. And they will tell you what they will do with our final results.	EXT-CHAR
27 I	Ok, let's move on to the next question. Would you join a competition that offers gifts or badges instead of offering money? Like gifts or badges?	
28 R2	If the competition is really interesting to me, I would join. It will be probably always about the competition, not about gifts or money.	EXT-NMON
29 I	So what type of gamification prizes do you like the most? And why? Like gifts, badges, bonuses, points, levels, or leaderboard ranking? Which one do you prefer?	
30 R2	I would prefer some special titles or a higher ranking in the leaderboard for a specific competition.	MOST, EXT-NMON
31 I	Do you think the crowd workers are fairly paid in these competitions? Like for the contestants who come only for the money?	
32 R2	Actually, I didn't think about the equity in the money. I know sometimes only maybe 10 players of 1000 players can get the money and the top players will get most of the money and never consider equities this kind of thing. I think the holder of the combination has the right to decide how much money should give to the competitors.	INT-WVO
33 I	Okay. And the next question, do you think the workers have high or low job security in such crowdsourcing tasks as a full-time job?	
34 R2	You mean that they do nothing but do the competition for a living? I will take a guess, I think it is a little bit risky. Even though I am a Kaggle beginner, I joined Kaggle just one year ago, but I know that the problem is it is quite uncertain to get the money even though your algorithm performs very well. I only play competitions in financial data fields, so as far as I know, the financial data is very,	INT-WVO

	very noisy and therefore it can be hugely influenced by some incidents like COVID-19. So it is quite common that your algorithm will achieve a high score on the public leaderboard while achieving a low score on the private leaderboard. So I think it will be really risky.	
35 I	Would you voluntarily join a task or a group project on crowdsourcing platforms with no prize or at all?	
36 R2	Yes, but only if the conversation is interesting and appealing to me.	INT, EXT-CHAR, MOST
37 I	Okay. How much the solutions you provided in a community have helped you build a reputation for yourself?	
38 R2	I think zero. For this year, I only played the competition and read the discussions and codes from others, some ideas from others are really brilliant. And I don't think my idea is greater than theirs. So I would like not to publish my solution.	INT-SAT
39 I	Okay, I get it. And how much does winning a competition encourage you to join the next or similar competitions in the future?	
40 R2	I think it depends on many factors. Besides the money and the ranking, for me, it takes much time and effort to play in a competition. And I think if I got the time and energy, I will play in the next competition as long as it is interesting to me.	EXT-MON
41 I	And how about rankings on the leaderboard or number of upvotes? Does it affect your decision as well?	
42 R2	Yes, definitely. So for me, I would be really happy to see my ranking get higher in the leaderboard. Sometimes I would spend a lot of time to adjust my model, so that I can have a good score showing on the leaderboard. It is definitely a motivation.	EXT-MON
43 I	And have you ever joined a competition just for fun or productive free time?	
44 R2	Not quite for fun, but partially, yes. Because when I build a model, I'll see my model actually work. It is quite fun for me and I enjoy it.	INT-HED
45 I	Okay, and do you think the competitions have proper variety on Kaggle? How do you think it influences the crowd of workers?	
46 R2	I think there are many different competitions on Kaggle, so, in my idea, there are four subfields in data science, one is computer vision, one is natural language processing, one is financial data and one is	EXT-CHAR

	recommendation system. Kaggle has all these four types and is not monotonous at all.	
47 I	Ok, perfect. That's all of our questions today, thank you for your time and effort.	

Appendix 4 – Respondent 3

Organization: Revinate

Interviewee name: Sinan Çalışır (SÇ)

Occupation: Machine Learning Engineer

Date and Time: May 4th, 2022

Duration: 28 minutes

Line / Person	Transcription	Code
1 I	Hello, Sinan, let's start with some introductory questions. So, first, do you mind if we record this interview?	
2 R3	No problem.	
3 I	Okay, do you wish to be anonymous?	
4 R3	I'm okay with using my name.	
5 I	Okay, thanks. So what are your background and education?	
6 R3	I'm a computer engineer by education, and I graduated almost two years ago.	
7 I	What is your profession? And how long have you been in this profession?	
8 R3	Currently working as a learning engineer in the industry. And it will be again almost three years until July. First one and a half years of my career I was focusing on NLP mostly. And now it's kind of switching into more broad applications of AI or machine learning. I consider myself in the industry of "hospitality plus tech".	
9 I	Okay, I get it. Have you ever joined any data science community or web platform?	

10 R3	I participated in both local and global communities before. I'm not participating in any local content communities now, but before I used to, and now I'm mostly focusing on Kaggle in terms of a community and doing competitions.	
11 I	And do you have any preference to use a specific platform? And why?	
12 R3	I prefer Kaggle because it's globally recognized, and especially to apply to jobs since it is very recognized by the community and also by the companies. Plus, there is a huge learning opportunity, which is my main motivation to participate in the Kaggle community because it allows me to follow the state of the art in applications of machine learning and also it allows me to participate in different types of competitive competitions or problems like you can play NLP or computer vision or audio, or do the analysis whatever, you can find a relevant competition there and you can just participate in it. And if you'd like to, there's something you can learn, or if you'd like to apply a new state of the art approach from the academy, then you can just directly do it.	INT-SAT, EXT-CHAR, MOST
13 I	Perfect. So which performance tier of Kaggle have you achieved?	
14 R3	Currently I am an expert in competitions, notebooks and discussions. I am fighting for the gold, but still need time for that.	
15 I	So have you ever joined the competition? I guess Yes. And what are the motivations for you to join competitions in general, and which one do you think is most important for you?	
16 R3	Actually, there are multiple aspects to that. Because sometimes, since my goal is to advance my rankings there, there is also this learning part and also being able to expose different kinds of problems, so I'm just gonna divide it. First of all, the learning path. This is still my main motivation to participate in little competitions. The first time that I joined the competition, I was mostly doing NLP, and my title was machine learning engineer, but I want to make it more, let's say "correct" because I don't have much experience in other areas of AI other than NLP. So I won't be doing computer vision competitions and audio	INT-SAT, INT-HED, EXT-NMON, MOST

	competitions, and also a couple of similar data competitions. So this is the first part that I wanted to learn about the other topics of AI and then just gain an experience in the platform. And the second motivation is that it was a natural outcome that I became a bit more competitive so that I can have some results here. So, that is why I make it more serious because I want to increase my ranking. That is my second motivation.	
17 I	Okay, thank you. And you think the first one is most important, right? Yes. Correct. So have you ever also participated in a competition that offers no money or rewards?	
18 R3	I did, but it wasn't that serious. Well, actually, the thing is that most of the time, competitions that do not offer any money also do not reward you with medals as well. And since it doesn't gain a lot of attention from the community, the learning opportunity is also low compared to other competitions, which have many prizes.	INT-SAT, EXT-NMON
19 I	So what's the important factor for you to join the competitions like this?	
20 R3	Well, I didn't earn any money, but it's not the main motivation for me. But the thing is that if there is no money or no medals, competition does not give any attention, like compared to other ones. So that does not like giving you a lot of opportunity in terms of learning. So it's not the main motivation for me.	MOST, INT-SAT
21 I	Okay, I get it. So, how do the requirements of the competition or task affect your decision to join? Do you like or dislike any kinds of requirements of any competitions?	
22 R3	Well, It depends. When entering this kind of platform first I would like to know the problem beforehand. Like the NLP competition or a computer competition, if I want to learn something new, my first decision builds on top of that. My first thing is like "okay, I want to learn about object detection and then I just basically stripping out other competitions, but object detection one". And if there is no problem with the competition metric or any problems with the data, I'm also taking that because sometimes it becomes a lottery in the competition, so that at the end of the competition, you learn nothing. But it's just like the leaderboard, it is just random. So, I would also like to look into that. And then if I like them, I will mainly start with learning.	EXT-CHAR, INT-SAT
23 I	Yeah, makes sense. Which one of these competitions do you prefer to participate in? I'll give two scenarios. So first one is a competition that offers a considerable amount of money with vague and unstructured requirements, and the second one is a	

	competition that is well structured with precise requirements but no monetary compensation at all. Which one do you prefer to join?	
24 R3	Well, it depends on what kind of application are we trying to solve, or what kind of problem are we trying. So it depends on the problem, actually, not the money. But like, let's say that you have only two choices, then I would prefer the one with money. So compared to the requirements, maybe money is a little more important.	MOTINF, EXT-MON
25 I	Okay, so would you join a competition that offers gifts or badges instead of offering money?	
26 R3	Yeah, I will. Again, I am obsessed with learning opportunities, so why not?	EXT-NMON
27 I	So if you've ever joined a competition like this, what type of gamification prizes do you like the most? Gamification prizes like gifts, badges, bonus points, levels, and leaderboard board rankings.	
28 R3	The medals are the priority for me. The second thing I like would be the sweatshirts like the hosts sometimes give winners cool stuff and Kaggle merchandise.	EXT-NMON
29 I	So do you think the crowd workers are fairly paid in these competitions? Like the contestants who come only for the money? Maybe just a guess?	
30 R3	Well, I don't know but everyone can have their own preferences. I'm sure that there are people who join for the money of course because they can win the competition by completing a competition, but being in the price zone is a very, very hard thing. Because it requires a lot of both work and also a good amount of resources. Whether they are fairly paid depends on the competition. Some competitions are focused on research, so they don't get fairly paid. But some competitions offer millions of dollars for all the contestants that win the prize, which is pretty well paid for them. So it really depends.	EXT-NMON, EXT-CHAR
31 I	So next question. Would you volunteer to join a task or group project on the crowdsourcing platforms with no prize at all? Why?	
32 R3	Yes, I would like to. Why? Actually, the outcome should be something that could be useful for the platform. For example, I believe Kaggle launched a new feature, I believe recently, where they were hosting community competitions. And those competitions are paid for by the community actually. I don't	INT-SAT, MOST

	mind about prizes, but I will do something like that. Something like reviewing competition hosts in Kaggle, which will be a good outcome for the community. If I will have an offer like that, I will take that offer and I will do it for the community or for social good.	
33 I	And how much the solutions you provided in a community have helped you to build a reputation for yourself?	
34 R3	Actually did a lot, it allowed me to find my current job. So that it always helps because you also receive feedback from the community, like "you could maybe try this one", or "maybe optimize the model a bit more". And I also share it on my professional network, that are guided by better competition, and I learned these things like this, this, and that. Thye can directly use that approach in their own problems, like maybe the modified version of my solution. And I also included my Kaggle Achievement in my Linkedin profile, I believe it is important.	INT-SAT
35 I	So how much does winning a competition encourage you to join the next or similar competitions in the future?	
36 R3	Actually, it will. Winning is a big part of using that platform. Because I will have a solution already works for a similar problem. Like I participate in some NLP competitions and similar NLP competitions before when choosing my next competition. It will be like, "I work in this about this problem before, maybe it's another one". So the next one will be much, much easier, obviously, because you already have experience. It also affects the decision of participating in the competition.	EXT
37 I	How about rankings on the leaderboard or number of upvotes? Did it build your confidence to join the other company competitions as well?	
38 R3	Yeah, definitely. For example, in one of the competitions, I had never experienced Audio analysis. And our goal is to classify the audio as simple. It was my first experience, I just wanted to see how far I can go. And after the end of the competition, I shared my solution and also received helpful feedback from the community and "likes". Then in the upcoming audio competitions, I was much more confident. It definitely affected my decision regarding joining.	EXT-NMON, INT-SAT
39 I	Okay, perfect. And have you ever joined a competition just for fun, or to have some products for free time?	
40 R3	Yes, I did. like, Actually it is also the effect of learning that you don't have to gain anything, but maybe they might help you in	INT-HED

	your current level of expertise and in your current step of the career, and it's fun. Yeah.	
41 I	So you kind of enjoy doing that?	
42 R3	Yes. There are some competitions, like reinforcement learning competitions, where you are trying to develop an agent that can play games. And sometimes these competitions become you play with other participants. So let's say you are controlling an agent who can play football, and you're playing football with the other person. And I think this is fun. Like, you also can watch the games as well in the model. So it's fun to watch. Because let's say your model is less strong compared to others, it makes some silly mistakes and fun to learn from the mistakes.	INT-HED
43 I	So we are coming to the last question. Do you think the competition is on Kaggle has a proper variety that might influence the crowd of workers?	
44 R3	Actually, yeah, I believe there is a lot of variety. From time to time some type of competitions becomes more dominant, like image or NLP competitions becoming more popular compared to others. But overall, I believe that like the variety of competitions is very wide and very relevant.	EXT-CHAR
45 I	Yeah, that's all of our questions. Do you have anything to add in terms of the general incentives and the motivations of the people who join the competitions?	
46 R3	Well, from my personal experience, and also from my friends' experience, It always comes with the learning objective and building a personal brand and reputation in the community life. If I'm a Kaagle expert or a grandmaster, I will use it in my professional area, which I believe is a good thing and also helps a lot. I think both of these two aspects have the most effect on Kaggle users.	INT-SAT
47 I	So, I think most of the people you know maybe come just for practising and gaining some knowledge, not for money, right? But for the grandmasters and masters level people, do you think they care more about money?	
48 R3	But I don't think anyone's overall objective of the community, in terms of like master's programs, I must say, I don't think them. Because let's say there are 3000 participants in the competition and only three teams won the prize, the percentage is extremely low. So I don't think they are all coming for the money. But again, I'm sure some people do, but it does not apply to the whole community.	INT

49 I	If people do it as a full-time job to gain money from the competition, do you think they have high or low job security on doing this?	
50 R3	To be honest I am not really sure about that.	
51 I	Thank you so much for the interview.	

Appendix 5 – Respondent 4

Organization: Google

Interviewee name: Anonymous

Occupation: Software Engineer

Date and Time: May 8th, 2022

Duration: 28 minutes

Line / Person	Transcription	Code
1 I	Let's begin with some introduction questions. So, first of all, do you mind if we record this interview and use the transcriptions of your answers?	
2 R4	No.	
3 I	Okay, do you wish to be anonymous?	
4 R4	Yes, I would like to be anonymous.	
5 I	Okay, no problem. So what is your background and education?	
6 R4	I did my bachelor's degree at Renmin University, China in finance and maths. And I did my master's degree in engineering at Baruch College in New York. And my background, I started my full-time job last year in an investment bank as a researcher and that's basically my background.	
7 I	Okay, perfect. So what is your profession? And how long have you been in this profession?	
8 R4	I would say if we only consider the full-time job, that is one year. Previously I did some internships in the financial industry or asset maintenance that will be probably one year and a half.	
9 I	Okay. So have you ever joined any data science community or web platforms?	
10 R4	The data science community I use only Kaggle now.	
11 I	Only Kaggle? Okay. So do you have any preference to use a specific platform and why? I guess only Kaggle for you now?	

12 R4	I tried different platforms before, but I found Kaggle is the most involved community, they share discussions, and their notebooks so that everyone can learn. And they are quite standard there, I would say at a mature level so that each competition has a standard format. It is easy for users to do one competition and go from the next one to another and don't need to change any submission format or something. And also, it has a greatly recognized. People recognize that when you do something great on Kaggle, they can differentiate from others. And also their problems in the competitions are challenging enough. So that's why I chose it. I noticed some competition on other platforms, but I didn't have a lot of time to play with them. So would say I only use Kaggle now and try to go as far as possible.	INT, INT-SAT, EXT-CHAR, MOST
13 I	So which performance tier of Kaggle have you achieved?	
14 R4	I achieved Master. For Kaggle I started to do it seriously at the beginning of last year. Until now I got two gold medals in competitions, and one silver and two bronze medals. Most of them were about time series data analysis and computer vision related competitions. I did not evolve much about discussion and notebooks Because for me it's a lack of time. I want to focus more on the competition side.	
15 I	Okay, so have you ever joined a competition? I guess yes? So what are the motivations for you to join competitions in general? And which one do you think is most important?	
16 R4	I think one of the problems that interest me the most, for example, the one I participated in I enjoy the most is called gravitational wave detection. And it's related to what I wanted to do before but couldn't. It was about Astrophysics gravitation away from the black hole merch. I've always been quite interesting because it sounds fascinating, sounds like something quite far from us but we can do something to help if possible. So I spent a lot of time on that. In the end, we managed to get to third place among around 2000 teams. In the end, we also talked with the competition host to discuss our solutions there and what are their concerns. And we learned how they think about these questions. I kind of helped them in a way that I can do something better.	INT-SAT, EXT-CHAR, MOST
17 I	So it's more like interest-oriented motivation for you to join competitions.	
18 R4	Yeah, mostly for the past season interest and now what I'm doing is a competition called core, it's a reinforcement learning competition. The reason why I want to do that is, first its power and the second it's related to is what I want to do in future, which is research engineering. So that part can help me to do this on	INT-SAT

	foundations and implement some research papers. It is the best way to learn by doing so, that's why I focus my time on it.	
19 I	Okay, perfect. So have you ever participated in a competition that offers no rewards or money at all?	
20 R4	I think no, I haven't. Except for those intro competitions, which are designed specifically to get yourself familiar with the specific dataset. It was about reinforcement learning, I did it because they have a lot of new solutions, so I can learn a lot from it. But if there is a new competition that does not offer a reward or something, then I probably won't do it. Because not many people will put a serious effort into it. So in this case, I cannot learn much from it. If there is no reward, the competition itself is probably not high enough.	INT-SAT
21 I	Make sense. So how do the requirements of the competition affect your decision to join? Do you like or dislike any kinds of requirements from the competitions?	
22 R4	I think I am good about the requirements, it's mostly about the problem itself, whether it's interesting or not, and whether fits my future goals or not. So for some specific requirements, I don't have anything to say.	EXT-CHAR
23 I	Okay, so overall for the competitions you joined, you think their requirements are quite okay.	
24 R4	Right. By requirements, if you mean deadlines, submission forms or instructions, those I don't care much. But one thing I can say is that if the competition is quite new and interested me a lot, I wouldn't have participated in the first chance in the first 15 days. I will wait for others to pick out the partners and post some solutions that I can refer to so that I can save some time.	
25 I	Okay. Which one of these competitions do you prefer to participate in: a) competition/task that offers a considerable amount of money with vague and unstructured requirements; b) competition/task with well structured and precise requirements but with no monetary compensation?	
26 R4	Actually, money rewards do not affect me much, to be honest. Because usually we work in a team, and the time we put into it compares to the money it offers, usually it's not much. For example, in the competition about the gravitational wave, we had 3000 dollars reward in total, and we have five people in our team. So each one gets 600. And we put 200 hours of it, so every hour we get 3 dollars each, so it was not much. But if that was one	INT, EXT, MOTINF

	million that would be crazy. But if you say a lot of money, you probably need to define how much money it is. If it is one million, then I will say a lot of people will join it, and the competition will be really challenging, right? So in this case, I probably should say that I was there for the out. I would prefer the one with more people joining it. How about how vague or precise that is, you need to define it. So I don't have much preference for now.	
27 I	So this question is more about, comparing requirements and money, which one do you think is more important for you and how much balance will you weigh these two aspects.	
28 R4	Money does not play a role, it's more about the competition question itself. So compare to if its requirement is precise or vague, I must say I will prefer a more precise, more defined way to evaluate. Like certain metrics instead of the human label it and instead of doing a whole project and somewhere you evaluate a group of people to evaluate whether it's good or not and that I don't like it. Because I need to wait a long time to see my performance. Yeah, so I would choose the precise metric.	EXT-CHAR, MOTINF
29 I	So would you join a competition that offers gifts or badges instead of offering money?	
30 R4	I would say that I would definitely want the ranking. Because I need a ranking to progress more on Kaggle itself, like getting the grandmaster or master title, something like that.	EXT-NMON
31 I	So in terms of the gamification prices, which kind of gamification price do you prefer? And like gifts, badges, bonus points, or levels, titles, leaderboard rankings? And which one do you think is the most important and why?	
32 R4	For Kaggle itself, I would say the leaderboard ranking is more important to me. Why? Because if they can get me the ranking, then I can use these competitions to progress myself to a higher level and be more recognizable. And I think most people also care about the ranking. If the competition doesn't provide any ranking, even though you are at the first price and it does not account as a gold medal to your competition record, I wouldn't say many people will join it, because usually, people want to use it to progress them to the higher category. That's why I think a resume is important for everyone. And I think most people couldn't get the money, so the money is usually just for the top three or top five groups. And that's only a small part of the ranking. So that doesn't appeal to me much, because usually, I am not good enough to have hope for the money for most of the competition, so I want to aim for a higher ranking.	EXT-NMON

33 I	Okay, got it. So, do you think the crowd workers are fairly paid in these competitions for the contestants who come only for the money?	
34 R4	Definitely not. If one person wants to get the money they need to spend at least 100 hours on it. Usually, the money price is at most 10,000. When competing with a group, you need to divide the prize among several members, at last, that is not much money per hour. So that's not good pay. Because it is definitely okay for competition hosts, I would say. Imagine standing from their points, they need to organize the competitions and need to offer a good company environment and provide it on the platform. The total money they offer is quite okay, usually, it's about more than $10,000. It is good from the hosts' perspective. But how much time we prefer to invest is actually just depending on us, and we can use this platform to learn, that is more important.	INT-WVO
35 I	Yes. So would you voluntarily join a task or group project on crowdsourcing platforms with no price at all?	
36 R4	It depends, I would say. If things are interesting problems that interest me a lot, and many people joined it, and share some discussions and notebooks that I can learn from, then I will join it. Yeah, but I will say this kind of competition doesn't really exists, to be honest. Because if you can't award much stuff, then not many people will join it, then this isn't an active loop, so I wouldn't join it. And for the crowdsourcing platforms for social benefits, like Wikipedia, I don't think I am expert enough to contribute to it, to be honest. But if I can do something in Kaggle, I can provide notebooks or discussion ideas sometimes because I want to contribute to their blank notebooks. If I find something that's helpful to others and do no harm to myself, then I would definitely share the notebook and discussion with them.	INT-SAT, MOTINF
37 I	Okay, got it. How much the solutions you provided in the community how have helped you to build a reputation for yourself.	
38 R4	In one company I have shared a notebook about some pre-processing steps in a competition. I have also shared in some discussion threads about what I did in the past competitions. Those staffs have some upvotes, and I got the silver medal for that single notebook and discussion. So I think someone paid attention to and learned something from it and gave me thumb ups. But I'm not a huge fan of it or chasing a gold medal from it. I got a reputation from sharing but that is not my main motivation, I think I got more reputation from winning competitions.	EXT-NMON, INT-SAT, MOTINF
39 I	How much does winning a competition encourage you to join the next competition or similar competitions in the future?	

40 R4	Definitely motivates a lot. It gave me the confidence to do similar work better in the future. Because one competition also relates some part of it to other competitions, that may help. I also noticed some people just join every NLP problem, and they are kind of experts on that. So that's obviously what motivates them as well.	INT-SAT
41 I	How about ranking on the leaderboard?	
42 R4	I think this is similar to winning the competitions, right? Then I'll say yes.	INT-SAT
43 I	So have you ever joined a competition just for fun or like having productive free time?	
44 R4	Yes! Two years ago, my girlfriend's class started a competition regarding what she learned, I just participated and tried to see what I can get from their datasets. I enjoyed it.	INT-HED
45 I	Nice! Do you think that the competition has a proper variety on Kaggle?	
46 R4	Yeah, definitely. It attracts a lot of people to the platform from different industries. I enjoyed different competitions, which is good.	EXT-CHAR
47 I	So that was all of the questions for us. Do you have any other points to add in terms of the motivation and incentives of why people join crowdsourcing competitions?	
48 R4	For that platform to do well, it needs to attract people. Even you can see on the LinkedIn page, that if someone wins a competition, they always somehow shared it on the LinkedIn page, right? This means that they think this is recognizable by other coworkers or other potential employers which can make them more special and more competitive. So that's why I think Kaggle is a great platform, for it's recognizable. People think we do Kaggle good, we can also do our job good. So that's one thing I think is very special for a crowdsourcing platform. It's also a special community. If you follow someone that uses Kaggle and you also have a Kaggle badge, in the Linkedin profile and that probably will make you guys connect easier because you'll find that Kaggle is not a big community, I would say, but it's a quite involved community who put hours of contribution to it. So it is easy to discuss ideas or make friends, and share similar experiences on Kaggle.	INT-SAT
49 I	Thank you so much for your answers, that is the end of our interview today!	

Appendix 6 – Respondent 5

Organization: NTNU

Interviewee name: Anonymous

Occupation: PhD student in Computer Science

Date and Time: April 30th, 2022

Duration: 35 minutes

Line / Person	Transcription	Code
1 I	Okay, Let's start the interview. Do you wish to be anonymous for this interview?	
2 R5	Yes.	
3 I	What are your background and education?	
4 R5	I have a bachelor's degree in software engineering. I have also done my master's studies in software engineering.	
5 I	What is your profession now? and how long have you been working in it?	
6 R5	I'm doing a PhD in Computer Science at NTNU university, the Department of Computer Science. And I'm a third-year PhD student.	
7 I	Have you ever joined any data science, data science community or web platform?	
8 R5	Yes. If you mean Kaggle as A data science community, I have been on Kaggle since 2016, Yeah! about the end of 2016.	
9 I	And do you have any preference to use such platforms? And you mentioned that you use Kaggle? Is there any reason that you work with Kaggle, Only?	
10 R5	One reason was that I started working with Kaggle because I started competing in the Kaggle competitions. And also, Kaggle is a kind of, based on my perception, a friendly environment if you want to learn and discuss data science related topics and ideas with other people	EXT-CHAR

11 I	May I know which performance tier of Kaggle Have you achieved?	
12 R5	I'm currently like a competition master but I'm not sure! Yeah, Competition master maybe! but I haven't been active a lot since I started my PhD.	
13 I	Have you ever joined a competition in Kaggle?	
14 R5	Yes. Let me open Kaggle! We joined a competition. BTW, I'm not a competition master! I'm a competition expert. Checking my profile, I have participated in about thirteen competitions by now.	
15 I	I see! What are the motivations for you to join competitions in general? And which one do you think is the most important one for you?	
16 R5	For a beginner, when I started joining, all these machine learning problems were just predictive problems. So you had to predict some kind of measures or values. And my main motivation in the begining was learning. And also seeing how I could solve a problem compared to other people. But the main motivation was learning.	MOST, INT-SAT
17 I	I understood! have you also participated in a competition that offers no rewards or money since you know, most of the competitions on Kaggle offer money?	
18 R5	Yeah, Actually, most of the competitions I joined didn't offer money or any prize!	INT
19 I	And, for these specific competitions, the main motivations for you was again learning or something else?	
20 R5	Mainly, learning I say.	INT-SAT
21 I	How does the requirements of competition affect your decision to join the competition?	
22 R5	One problem that I have with Kaggle competitions and even since 2010 when I joined it is when you are a newbie and want to compete in a competition, if the competition provide tabular data it's easier to get started. However, these days, Kaggle competitions are mostly based on deep neural networks. Another problem that I have myself and my teammates probably, is the lack of resources sometimes. some competitions require a cutting edge neural network to generate good results, and they mostly need appropriate amount of resources! I usually try to avoid these competitions. For example, Google has a yearly competition about identifing objects in a large data set of images.	EXT-CHAR

23 I	So, the main reason for you to whether join competition or not, has always been the data and its structure.	
24 R5	It's not just the structure, but requirements sometimes. if you open the competition and try to read its description, you can get an overall insight into what kind of problem the competition is based on. And if it needs something, for example, specific expertise, or resources like lots of RAM and possibly GPU or like GPUs to train a reliable model, I prefer not to attain! However, these days, many of Kaggle's competitions are dominated by this particular category.	EXT-CHAR
25 I	Which one of these competitions do you prefer the most: a competition or task that offers a considerable amount of money and unstructured requirements? or a competition with a well-structured and precise requirement but with no monetary compensation?	
26 R5	It's kind of a very tough question to answer. Because, based on my experience, when you have a competition with money, it makes things more serious! imagine if the competition offers you like $1,000 and the money will be divided between the three, or sometimes, the top five ones, so it gets very tough to compete! However, it's good to compete in such a situation and provide a solution. But I personally prefer something more casual. I believe, people are less likely to share their ideas when it comes to winning a prize or money. one of the good things about competition is that a lot of people during the last days of the competition, share their ideas and some of these ideas could be really influential	MOTINF, INT, EXT-MON
27 I	have you collaborated with any team in a specific competition?.	
28 R5	Yeah! I have joined four or five competitions with other teams.	
29 I	How was your experience? specifically in terms of working with a team?	
30 R5	It's very good. It's very good! Because people have different perspectives, and it is really helpful.	EXT
31 I	I see. Would you join a competition that has gifts or badges instead of offering money?	
32 R5	I'm not sure if I had any experience like that. But my kind of tentative answer at the moment would be yes.	EXT-NMON
33 I	As you know, bonuses, badges and points can be considered gamification tools or techniques. Which one would you prefer to choose? Gifts, badges bonus, or levels in a leaderboard, Ranking?	

34 R5	I have no clue about it. I've seen these things usually on some platforms like Stack Overflow, Stack Exchange and similar communities. However, they are very small compared to Kaggle communities. I think I'll go for badges.	EXT-NMON
35 I	Do you think crowd workers or data scientists are fairly paid in these competitions in total?	
36 R5	No! actually, I think some companies after 2017, have designed competitions with difficult problem statements and tried to offer lower prizes like 50,000 which often does not worth it based on the difficultness of the problems, and the time that people put on them!	INT-WVO
37 I	Would you voluntarily join a task or a group project on a crowdsourcing platform with no price at all? And why?	
38 R5	It depends! if it's an easy task taking me no effort to do, I would like to join because it'll help me to hone my skills. if not, I would evaluate how much time and effort should I put into it, and how many computational resources solving the problem can take to lead me in becoming a candidate among the top 10% of all winners.	INT, MOTINF
39 I	How much the solution you provided in your work have helped you to build a reputation for yourself?	
40 R5	I don't think they have really helped me to promote my status in the Kaggle community. Based on my experience, people's activity in the Kaggle forum and how you post regularly have a much higher influence on their reputation rather than participating in competitions only.	INT-SAT
41 I	So, in general, you mean, gaining a reputation on such platforms does not only happen based on the solution that you provide, sometimes requires other conditions	
42 R5	No, I think it's about how you interact with people, and how your ideas conversationally attract them.	INT
43 I	How much does winning your competition encourage you to join the next or similar competitions in future?	
44 R5	A lot!	EXT-MON
45 I	Do numbers that you get upvote on your work to encourage you to participate in another or similar tasks again?	
46 R5	Sorry, can you elaborate more?	

47 I	I mean the effect of rankings in the leaderboard or even if you receive any upvotes on your works! Does it encourage you to participate in a similar competition in future?	
48 R5	Yes! I think a lot! on Kaggle you may find some yearly competitions, for example, the one that is published by Google about the NFL Big Data bowl. If I had already joined one of them, and the next one is published with a similar data structure as the previous one, then there would some motivation for me to join.	EXT-NMON, EXT-CHAR
49 I	Have you ever joined a competition just for fun or to have productive free time?	
50 R5	Yes, actually, I joined a competition a few months ago, I think it was about stock market prediction. And the main reason I did it was that I didn't know much about time-series data. So I wanted to expand my knowledge and get a feeling of what type of models other contributors use on these kinds of data for time-series predictions.	INT-HED
51 I	As the last question, do think that competitions on Kaggle have a good variety in terms of the problems that they raise?	
52 R5	I'm not sure! based on my opinion, most of the Kaggle competitions are biased toward deep learning and neural networks, and NLP. And it's possibly true since using such techniques is the hype these days. In general, I think the competition's variety has reduced in the past few years.	EXT-CHAR

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