

The Potential of Crowdsourcing to Advance the SDGs by Fostering Local and Global Collaboration

Yulistina Riyadi, Dikara Alkarisyah, Deepakshi Rawat

Pulse Lab Jakarta

yulistina.riyadi@un.or.id, dikara.alkarisyah@un.or.id, deepakshi.rawat@un.or.id

Abstract

Technology has radically shifted human behavior, bringing interconnectedness among people in a way that has never been imagined before. It offers the potential to contribute to cheaper and faster collective problem-solving, in particular, to solve big and laborious tasks that are difficult to execute by a small number of people. This collective action, namely crowdsourcing, has been implemented in many areas such as supporting research activities, public administration, as well as funding social projects. The potential of crowdsourcing can also be leveraged in achieving the Sustainable Development Goals (SDGs). The main objective of this paper is to identify the prospective impact of crowdsourcing for the SDGs. We have identified 209 crowdsourcing projects across the globe that are closely related to the development sector. We argue that crowdsourcing is a potential tool to monitor and support the SDGs.

Keywords— sustainable development goals; crowdsourcing; generating data; crowdfunding; service delivery; participatory governance; human computation

1 Introduction

In 2015, the United Nations officially launched the Sustainable Development Goals (SDGs). A blueprint for global development, the SDGs define 17 goals comprising 169 targets and approximately 232 indicators. This set of interconnected goals address the challenges the world faces, including those related to poverty, inequality, climate, environmental degradation, prosperity, and peace and justice. However, given the vast scope of the SDGs, it is often challenging to fully realise these aims with the limited resources that governments and development agencies have at their disposal (Stibbe et al., 2018).

A key method to address this challenge, is to optimise knowledge and resources amongst various stakeholders through partnerships, especially in the form of crowdsourcing. Due to the multi faceted and flexible nature of the method, crowdsourcing lacks a uniform definition, with various experts providing different definitions of the term. For example, Wazny defines crowdsourcing as a type of participatory online activity in which a group of people combine

their efforts and wisdom for problem solving (Wazny, 2017). Crowdsourcing can also be seen as a technique that uses social engagement in order to help a group of people to achieve a significant and an impactful goal (Holley, 2010) (Budzise-Weaver et al., 2012).

Across various sectors and societies, crowdsourcing is increasingly helping to generate new insights, to restructure finance generation and to deliver what would normally be considered public services. Using such collaborative approaches to achieve the SDGs have numerous advantages. For one, crowdsourcing has the ability to collect information rapidly, inexpensively, and accurately which can be used to increase the scale of impact by coordinating action and sharing common resources (Darian). For example, according to the United Nations Office for Disaster Risk Reduction (Izumi et al., 2019), crowdsourcing can be used to help collect large amounts of data in near real time and lower cost of disaster relief operations. Previous research has also showed the benefits of the crowd's ability to observe and perform risk assessment exercises (Soden, 2017). Yoo and Choe explained that the crowds can support a funding mechanism, namely crowdfunding, which can become a useful tool to strengthen relations between two actors, such as producers and consumers (Yoo and Choe, 2014). Tanja in her research believed that crowdsourcing can also support transparent governance by involving citizen participants (Aitamurto, 2012). Rouges et.al, in their research, highlighted that crowdsourcing can help cost efficiency within delivery service and to provide services in areas beyond the reach of the public sector (Rougès and Montreuil, 2014).

For the purpose of our research, we look at the prospective impact of crowdsourcing through the lens of its current and potential contributions to achieving the Sustainable Development Goals, gleaning examples from journals, publications, articles, and case studies, and constructing a database on crowdsourcing for the SDGs.

2 Methodology

In this section, we aim to give an overview of the data collection and project classification processes we employed to build our database.

2.1 An Overview

We began the selection of project collection by citing information from journals, publications, articles and case studies related to crowdsourcing and SDGs. We utilized a search engine to find relevant information on crowdsourcing and information related to the development sector in English, more specifically centered on the SDGs indicators and their targets. Some samples of keywords that we used were “crowdsourcing for development”, “crowdsourcing AND (each goal of the SDGs or type of indicators or targets)”. We also built our search method from existing project lists or databases, where we searched for more information from the journals or articles that mention information on crowdsourcing projects. We categorized the information about journals, publications, articles, and case studies by examining various data collection techniques. As crowdsourcing is still a relatively new research field, its definition, scope and typologies are still under development (Ikediogo et al., 2018). Therefore, for this research, we build our own classification system by referring to Dutil (2015) and Brabham (2013). To categorize the projects, we examine their similarity in terms of performing specific tasks and their outputs.

Dutil’s classifications are (1) crowd-contest or open call; (2) macro-tasking which include generating data, knowledge and information as well as participatory governance; and (3) crowdfunding (Dutil, 2015).

Brabham’s classifications are (1) knowledge discovery management; (2) broadcast search; (3) peer-vetted creative production, (4) distributed human intelligence tasking (Brabham, 2013).

Based on our crowdsourcing data collection, we pick classifications from both authors that are relevant to our data collection of 209 crowdsourcing projects. We also create one classification based on the projects we have, namely, delivering services. Therefore, the five classifications that we have are (1) generating data, information and knowledge; (2) generating finance for social causes or crowdfunding; (3) delivering services; (4) distributed human intelligence or human computation, which is a term used by Salganik (2018); and (5) and participatory governance. We split Dutil’s second classification (macro-tasking which include generating data, knowledge and information as well as participatory governance) into two distinct categories as in the context of the SDGs (SDG 16), participatory governance becomes an area of importance as well as a field which is highly relevant to crowdsourcing practices (Fischer, 2012).

2.2 Classification Methodology

We follow Rouges and Montreuil (2014)’s four step methodology to arrive at our classification:

1. Primary data collection for each project was based on a public document review of articles, various institutions’ official websites, blogs, news reviews, among others.
2. A typology was built to differentiate the output, participatory action and overall theme of each project. The

typology then led to the emergence of patterns, which aided the further compartmentalisation and analysis of the projects and their themes.

3. Corresponding SDGs were identified for each project.
4. Literature from other research was used to compare and assess the analysis.

2.2.1 Generating data, information and knowledge

Projects are categorised into this particular category if participants have collectively found data or information, and shared knowledge (Dutil, 2015). As open calls or crowdcontests are predominantly used to collect ideas and create solutions, we also include open calls under this classification. Out of the 209 projects in our database, 146 projects were classified under this category.

2.2.2 Crowdfunding

For the purpose of our database, we focus on two crowdfunding categories. First, equity-based crowdfunding, which is more directly to support social enterprise and for financing social projects. Second, donation-based and reward-based crowdfunding to organize non-profit social projects. Donation-based crowdfunding, as the name suggests, depends on freewill contribution to projects for public good (hyonsu). In our database, there are 17 projects linked with this classification.

2.2.3 Delivering services

Projects that are centered around service model that enable participants to deploy services are grouped under this classification (Rougès and Montreuil, 2014). Within our database, there are 9 projects under this category.

2.2.4 Participatory governance

Participatory governance requires citizens to engage in governance processes of the state. An effective way to meaningfully engage citizens in addressing challenges related to government’s performance and effectiveness is through crowdsourcing (Bott and Young, 2012). Our database has 15 projects falling under this category.

2.2.5 Human computation

Some projects require participants to analyze large amounts of information and perform repetitive tasks that usually do not require domain-specific knowledge (Brabham, 2013) (Ikediogo et al., 2018). We have compiled 22 projects in this category.

Sustainable Development Goals

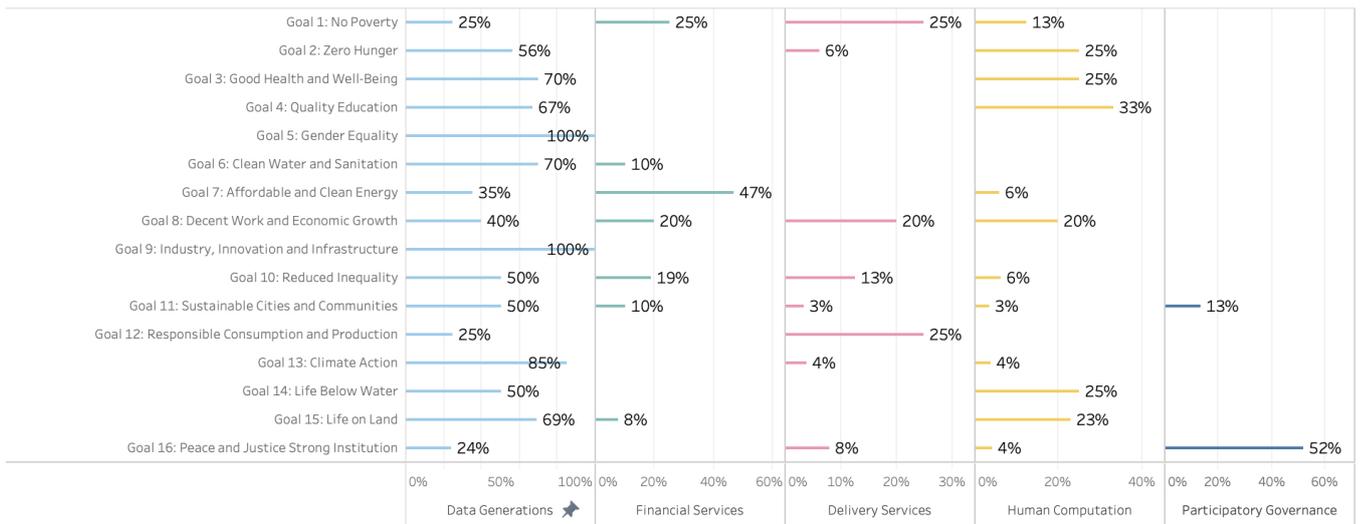


Figure 1: The percentage of crowdsourcing projects based on classification for each SDG

3 Exploring Crowdsourcing for the Sustainable Development Goals

Figure 1 maps each SDG to the five categories mentioned above. We exclude SDG 17 (Partnership for the Goals) from the analysis as crowdsourcing itself is a form of partnership or collaboration. The section below presents an in-depth analysis of each of the five classifications along with supporting case studies.

3.1 Generating data, information and knowledge

Certain problems require data gaps to be filled in order to reach effective solutions. In such cases, collecting information from the masses can aid projects in generating information maps. For example, with the help of local or on-ground volunteers, events or local conditions can be geo-mapped (Heipke, 2010). The role of data collection and geo-mapping might be significant in the event of a disaster (Poblet et al., 2014) (Smith, 1997). In the aftermath of a disaster, near real-time information pertaining to the situation on the ground is often limited. Crowdsourcing has proven to be an efficient approach to help NGOs and government in quickly generating near real-time information to support the disaster relief efforts such as aid distribution and mapping the worst hit areas (Okolloh, 2009) and (Zook et al., 2010). Within our database, most of the projects fall under this category. With respect to the SDGs, although the projects have aims in line with a wide range of SDGs, it was Goal 11 (Sustainable Cities and Communities) that was used most frequently and benefited the most from adopting this crowdsourcing category, particularly for disaster management related projects.

3.1.1 Related Projects

A project called Katrina PeopleFinder was set up in 2005 to collect information about the safety of people affected by Hurricane Katrina (Laituri and Kodrich, 2008). It was a volunteer effort to build online database as an immediate response to help find missing people (melinda 2008).

Another project under this category is Translator Gator by Pulse Lab Jakarta which crowdsourced translations of disaster-related keywords in 29 languages used across the ten ASEAN member states and Sri Lanka ¹. The translations were used as keywords to extract disaster-related information from social media, as there are no readily available disaster-related keywords in regional languages. By having these translations, non-English speakers can be better 'heard' by social researchers and disaster responders. Building on the insights the research team uncovered during the first phase of Translator Gator, Pulse Lab Jakarta launched Translator Gator 2 in 2017. The long-term vision for both phases of Translator Gator was to use the crowdsourced taxonomies for computational social research initiatives, not only to better understand the responses of affected populations, but also to better communicate with them through various channels. Translator Gator can also be classified under human computation as the tasks given to participants consisted of translation, evaluation of previously inputted translations, suggestion of alternative synonyms, and classification of words and phrases ².

3.2 Generating finance for social causes

Financing the 2030 Sustainable Development Agenda has been a key challenge since its adoption in 2015. There is an urgent need to identify alternative sources for financing

¹ <https://www.unglobalpulse.org/news/phase-2-translator-gator-wraps>

² <https://www.unglobalpulse.org/blog/translator-gator-language-game-research>

the SDGs considering the budget constraints of various government. Crowdfunding becomes a viable option for social enterprises that require funds for endeavours that support social causes or the pursuit of new business opportunities (Kim and De Moor, 2017). Potential individuals, corporations, foundations, or governments who are looking to raise funds are linked with funders through an open platform (Belleflamme et al., 2016). Our data collection showed that SDG 11 (Sustainable Cities and Communities), dominated the crowdfunding projects. However, crowdfunding was also used in promoting other goals, particularly raising funds for social innovation projects that simultaneously address multiple SDGs.

3.2.1 Related Projects

Crowdsourcing platforms can help further projects in line with the SDGs by connecting people in search of funding with people who are willing to channel their funds for a social cause. One example is the Canada Culture Endowment Fund (originally Canadian Arts and Heritage Sustainability Program) which provides support to arts organisations through the matching of private donations to art projects through foundations and organisations on the basis of a proportional formula. Another example is Kitabisa.com, a crowdfunding website that facilitates raising funds for various philanthropic causes in Indonesia such as medical expenses, education, emergency, animals, and other social purposes. The concept is similar with GoFundMe³, one of the most popular donation-based crowdfunding websites in the world. iGrow and Gandengtangan, are also instances of crowdfunding platforms where farmers can meet potential investors. These platforms help farmers, who are otherwise unable to get loans from traditional financial institutions such as banks.

3.3 Delivering services

Lack of resources or manpower might lead to gaps in the state's welfare policies which crowdsourcing efforts could fill. Crowdsourcing service delivery can be a means to provide services in areas beyond the reach of the public sector. Crowdsourcing delivery also exploits the potential of geolocalization, mobile apps and the social trend of sharing and collaboration (Rifkin, 2014). Several start-ups also have utilised this model and have attracted investment (Rougès and Montreuil, 2014). Based on our data collection, this category had the least number of SDG related projects. Our research showcased that crowdsourcing delivery services is more attractive for commercial purposes. The nine projects under this category in our database are linked to Goal 1 (No Poverty), Goal 2 (Zero Hunger), Goal 8 (Decent Work and Economic Growth), Goal 10 (Reduced Inequality), Goal 11 (Sustainable Cities and Communities), Goal 12 (Responsible Consumption and Production), Goal 13 (Climate Action) and Goal 16 (Peace and Justice Strong Institution).

³<https://www.gofundme.com/start>

3.3.1 Related Projects

Casserole⁴ is a community project to connect people who would like to cook an extra plate of food as part of their daily routine for elderly people who are unable to cook for themselves. It is a creative way of delivering support to the elderly, while at the same time encouraging social inclusion. Another project is Be My Eyes⁵, which supports people with visual impairments in navigating their environment via connections to volunteers. Through live video calls, volunteers provide services such as checking expiry dates, distinguishing colors, reading instructions and navigating new surroundings. Be My Eyes has 2,146,557 volunteers and 130,505 blind and low-vision users that belonging to more than 150 countries and communicating in over 180 languages⁶.

3.4 Participatory Governance

Most of the crowdsourcing projects of this classification are centered on government budgeting, strategy and law-making process that help governments in framing national policies (Aitamurto, 2012). Crowdsourcing for participatory governance can be used to implement open government initiatives as involving citizens in the political process is one of the core principles of transparent governance. Our research showed that most of the crowdsourcing projects falling in this category are led by governments. However, there were also projects in which citizens were involved in participatory governance efforts such as improving neighborhood conditions, participating in policy related discussions, lending their voice to marginalised groups, among others (Gustafson and Hertting, 2017). Our data collection showed that participatory governance projects mostly cater to Goal 16 (Peace and Justice Strong Institutions) and Goal 11 (Sustainable Cities and Communities).

3.4.1 Related Projects

The local government in Chicago, United States, conducted a budget preparation exercise through crowdsourcing. The activity was supported by the Mayor with a view to implementing transparency (Tanja) in the local government. To achieve the goal, the city needed citizen participation to give feedback and opinions on budget allocation priorities and whether certain budget cuts were needed. In the beginning, the city created a platform to accommodate the citizens' ideas. After the submission of ideas, the city government reviewed all the submitted comments, the progress of which the citizens were also able to follow. Citizens could also submit their ideas through social media platforms such as Twitter, Youtube and Facebook by using the hashtag *AskChicago* (Aitamurto, 2012). This crowdsourcing model for budget preparation was also replicated in other areas such as Cook County.

⁴<https://casseroleclub.com/>

⁵ <https://www.bemyeyes.com/>

⁶ <https://www.bemyeyes.com/>

3.5 Human Computation

Many research institutions employ human intelligence or distributed-human-intelligence (Brabham, 2013) (Salganik, 2018) to help them quickly sort and label data from large datasets. Projects belonging to this category are characterised by a major task, broken down into smaller tasks which are often easy for humans to execute, but challenging for computers (Salganik, 2018). Prior to carrying out the tasks defined by a particular project, participants are recommended to undergo a training module in order to understand the basic theory as well as the methods involved for the particular project. The training is an essential part of the project as not all the volunteers are familiar with the problem or data at hand. Since human computation crowdsourcing projects are deemed to be not very intellectually stimulating, many a time, project owners have faced challenges in retaining a sufficient number of volunteers to consistently complete tasks (Taeihagh, 2017).

To overcome this challenge, offering incentives such as monetary compensation, merchandise, and other benefits can motivate participants to consistently complete tasks (Brabham, 2013). Based on our data collection, human computation projects for SDGs mostly center around Goal 3 (Good Health and Well-Being). Human computation also can support the education particularly for students who are targeted as participants. Providing incentives to participants can also benefit Goal 8 (Decent Work and Economic Growth) and Goal 10 (Reduced Inequalities) (Ipeiritos and Paritosh, 2011). We can take Amazon Mechanical Turk and Appen as examples since both platforms have various microtasking projects for participants. However, to better optimise the aggregate findings from human computation projects, our analysis showed that more efficient and accurate error detection methods need to be developed (Linares et al., 2019).

3.5.1 Related Projects

Galaxy Zoo is a project that invites people with or without an astronomy background to classify galaxies based on their morphology. This was a task that needs human support as existing algorithmic methods for classification were still lacking (Salganik, 2018). The project successfully attracted 100,000 volunteers who processed over 40 million classifications. Before the classification exercise, the volunteers underwent a simple training module in astronomy which took only a few minutes to complete (Salganik, 2018). Upon completion of the classifications, the project owner also needed to validate the results by repeatedly classifying the same galaxy, removing systematic bias and combining the individual classifications to produce a consensus classification. The final analysis showed that about 80% of the galaxies were classified correctly (Salganik, 2018).

Although crowdsourcing is by no measure a new concept, it has only recently gained momentum in various research fields. (Estellés-Arolas et al., 2015). This research is one of the first studies to look at how crowdsourcing can contribute towards the promotion of the SDGs, especially

through data collection and classification exercises. We have suggested five classifications that can map various crowdsourcing projects to the SDGs. Looking at the projects in our database, it is the '*Generating data, information and knowledge*' category with the most SDG-related projects. Due to the diverse nature of the SDGs, their application in crowdsourcing also vary from one goal to the other. Furthermore, the interconnectedness of the Goals also allow a single project to target multiple SDGs.

Based on our findings, the classification or typology is useful for revealing the various ability of crowds possess and the many ways they can work together (Brussee et al., 2013) as well as to provide information on the advantages of crowdsourcing for SDGs.

A limitation of this research is its sole dependence on literature reviews. The research team did not conduct any interviews with the project owners of each typology or first-hand information. There are also limited research papers and articles that link crowdsourcing to the SDGs.

It is also important to highlight that crowdsourcing is not a silver bullet for all development challenges and cannot stand alone in solving social problems. However, it can complement other strategies by providing new insights and ideas for solving problems as well as developing new product prototypes, and having deeper engagements with citizens. Also, despite its benefits, it is important to note that crowdsourcing requires prerequisite factors, such as connectivity, ownership of gadgets, and technological literacy to get involved. With respect to the SDGs, crowdsourcing can aid in policy and programme design, and ensure effective delivery; it is part of the solution, but not the full solution itself.

For future studies, we aim to explore how crowdsourcing classifications can be addressed how can benefit policy making process and government activities. The research also can be detailed for each classification to see each classification's role at the policy design stage by considering current trends.

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