

Design and Evaluation of Micro-Crowdfunding: Encouraging Sustainable Behavior in Micro-Level Crowdfunding

Mizuki Sakamoto, Tatsuo Nakajima, Yefeng Liu, Alexandrova Todorka

Department of Computer Science and Engineering

Waseda University

{mizuki, tatsuo, yefeng, toty}@dcl.cs.waseda.ac.jp

ABSTRACT

We present the basic concept of *Micro-Crowdfunding* and its prototype system. We also describe its experimental results that show how economic and social factor affect the behavior and attitude of an individual and community. We believe that our study given in this paper would be also useful when designing other social media based on crowdfunding when considering the balance using between the economic and social incentives.

Keywords

Crowdfunding; Local Currency; Virtual Economy;

1. INTRODUCTION

Tragedy of the commons [1] happens because each individual derives a personal benefit from using the resource, while any costs are shared among all the users, leading to inconsiderate use. A common strategy to dealing with the tragedy of commons is to impose a tax on the use of the resource. An environmental tax is widely adopted for covering the cost to maintain the resources. However, for taxpayers it is not clear how the tax is used for maintaining each common resource shared by the people in a community. People need to keep a feeling of contribution to the resource's sustainability to be motivated to pay the necessary cost.

A community-based approach overcomes the issue. In such approach a community member is able to propose a mission for maintaining a common resource and then other members of the community could complete the mission. However, members usually may not have enough time to contribute to a mission. In particular, people who live in urban cities are very busy, and have a lot of things to do. Therefore, they usually forget the importance of the sustainability of common resources. In our surrounding environment, we have a lot of small common resources requiring high cost for keeping their sustainability if government, nonprofit organizations and individual companies take care of them. However, maintaining these resources typically requires missions that can be achieved with small efforts within a person's spare time. In our urban life, we usually have plenty of chances to exploit short spare times.

This paper proposes a new approach, named *Micro-Crowdfunding*, for motivating people in urban cities to participate in achieving sustainable environments. The main characteristics of the approach are as follows. The mission in *Micro-Crowdfunding* can be achieved with people's minimal efforts in their spare time. Besides, it provides the community members some incentives in

terms of economic and social aspect. *Micro-Crowdfunding* includes a mechanics that participants receives some amounts of virtual currency as a reward. This mechanics offers the participants the economic incentive. Also, the cooperation within a community gives them the social incentive.

2. MICRO-CROWDFUNDING CONCEPT

Crowdfunding is a new and emerging way of funding new ideas or projects by borrowing funding from the crowds. In this concept, a person proposes a new project, explains the importance and the target amount of money, and shows what people who fund the project will receive when the mission is completed successfully. When the total amount of funds from people who would like to contribute to the project exceeds the target amount, the project can be started. After the success of the project, each contributor receives some benefits according to his/her fund. The approach is different from the donation idea because contributors will expect some benefits when the supported project succeeds, while the donation idea does not include any return considerations in general. If the benefit offers high scarcity value, it becomes a very high incentive for the contributors. However, the existing crowdfunding platforms like *Kickstarter* require participants to fund real money, and thus only people who have extra money can join it. In addition, it requires much more efforts to execute a project because the scale of a project tends to be big.

In *Micro-Crowdfunding*, we aim to give a chance to everyone who wishes to contribute and take part in making our world better. The project in this service is called a *mission* because it requires only small amount of time to be completed, and that mission tries to achieve the sustainability of a small common resource within a person's spare time with his/her minimum efforts.

Instead of using real money, it adopts special mechanism, called local currency for economics concept. A *local currency* is a currency not backed by a national government, and intended to trade only in a small regional area. As a tool of fiscal localism, local money can raise the awareness in the local economy. One of the most important aspects of the local currency is the possibility to adopt different money models, which cannot be adopted by the legal tender. For example, the *aging money* model [4] has been a popular example of local currency idea. In the aging money concept, the value of the money gradually decreases with the time. Defining a suitable money model is desirable if encouraging people to spend more money is essential. Since our approach relies on the aging money concept, it is natural that people would like to contribute to more missions before the value of the money is degraded and thus fund missions as quick as possible. In order to encourage community members to contribute to a mission, we set the rule that the value does not degrade while a *mission investor* funds his/her money. When a mission is completed, half of the money funded to the mission is returned back as a reward to the *mission investors*. It becomes an incentive and motivates participants to fund more missions. The proposed *Micro-*

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from Permissions@acm.org.
AcademicMindTrek'13, October 01-04 2013, Tampere, Finland.
Copyright 2013 ACM 978-1-4503-1992-8/13/10...\$15.00.

Crowdfunding concept uses virtual money, and all transactions occur electronically.

The environmental tax is the most typical solution to achieving the sustainability of common resources. The money collected as tax can be used to keep the resource's sustainability. However, taxpayers are not aware how the money is spent to contribute to the sustainability. In *Micro-Crowdfundin*, people can explicitly choose which common resource they would like to contribute to. This approach increases the awareness of their contribution since the effect of their contribution can be easily monitored. After the mission that participants are contributing to has been completed, each participant who has funded it receives a completion notification as a feedback. The awareness of their contribution becomes a strong incentive for people to contribute to the sustainability of the common resource.

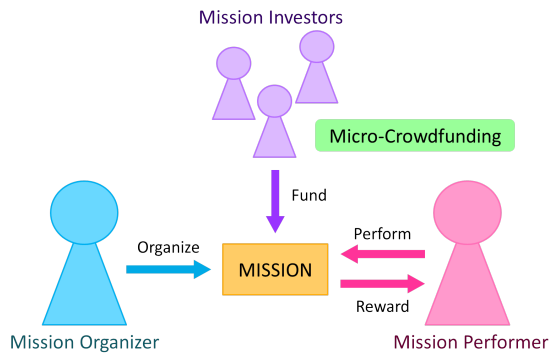


Figure 1. Overview of Micro-Crowdfunding

In *Micro-Crowdfunding* as shown in Figure 1, a member of a community related to a small common resource, called a *mission organizer*, proposes a new mission when he/she is aware an activity to keep the sustainability of the resource has to be done. Typical examples of such common resources are a public sink at a floor of a building or a public shelf used by a university laboratory. The proposal includes the mission's summary specifying the necessary activities and the total amount of money required to achieve the mission. The mission proposal is simply done by touching the common resource with the *mission organizer's* smart phone, and sending a photo showing the resource's current status. In the next step, when some other members, called *mission investors*, receive requests to fund the mission, they decide whether they want to fund the mission or not based on the delivered photo. If some of them would like to fund the mission, then they just click on the requests on their phones to notify that they want to fund the mission. When the total submitted funds exceed the target amount, the mission can be executed by any member, who can access the resource, in his/her spare time. Such member is called a *mission performer*. The mission is usually a very simple task like cleaning up a public sink or putting in order a shelf. After the completion, the *mission performer* takes a photo of the resource to show the mission's completed status, and sends it to the *mission organizer*. Finally, the *mission organizer* verifies the quality of the achievement, and a completion notification of the mission containing a photo of the resource is delivered to all members who have fund the mission.

3. EVALUATION

In this section, we present the experiment with the *Micro-Crowdfunding* prototype system. In the experiment we evaluated how economic factors and social factors affected both the individual and the community. We designed the mission of the

experiment based on the community currency role-playing game based method [2]. Six people (three males and three females) participated in the experiment. After finishing the experiment, participants answered an interview and a questionnaire. In the current experiment the missions were related to giving opinion and suggestions about possible solutions to important social problems. Some examples of such problems were related to global warming issues, aging society problems, discrimination, encouraging women in science and so on.

In the experiment, participants played one of the three roles: *mission organizer*, *mission investor* and *mission performer*. One person was a *mission organizer*, another person was a *mission performer* and the others were *mission investors*. Their roles were changed in each turn. The sequence of activities executed in one turn could be described as follows: (1) The *mission organizer* organizes the mission. (2) *Mission investors* fund the mission proposed by the *mission organizer*. (3) The *mission performer* executes the mission. (4) The *mission organizer* and *mission investors* thank the *mission performer*. (5) The *mission organizer* thanks the *mission investors*. In each turn, participants completed one mission. We decided that a set of the role playing game included six turns and we did a couple of sets of the game.

3.1 The virtual currency concept

All participants were given 1,000 points at the beginning of each set. Participants' currency is increased by executing the mission as *mission performers*, and decreases by funding the mission. In addition, we added extra rules in each set. Extra rules' concepts and objectives are as follows:

Rule 1 - Reward reduction rule: When the *mission performer* receives a reward after executing a mission, the amount of the currency as a reward is the same as the sum of the amounts funded by the *mission investors*. Based on the *reward reduction rule*, a participant can get half of the sum of the fund. We aimed to evaluate the effect of the *reward reduction rule* on participants' motivation, in particular, in case of the *mission performer*. The *reward reduction rule* is more realistic because the administrator of some projects or objects needs to manage the administration cost and a portion of the reward is allotted to that cost in many cases.

Rule 2 -Aging money concept rule: As we mentioned in Section 2, the value of the money gradually decreases with the time. The money decreases if the participants just keep them, while funding leads to no reduction (aging). We expected that this fact would encourage the funding activity of the *mission investors*.

3.2 Economic incentive and a user's motivation

In this section, we consider the relationship between the economic aspect and the participants' motivation. We asked the following questions related to the economic aspect as follows:

Q-E1 Were there any motivation changes for the mission performer in case of the reward reduction rule compared to a case without the reward reduction rule?

Q-E2 Were there any motivation changes in a case of the aging money rule compared to a case the does not adopt the rule?

In Q-E1, four out of six participants answered that the *reward reduction rule* did not affect their motivation but the reason is different for each participant. Some examples for the reason are: "The virtual currency does not affect the real life", "The mission's goals are more important than the amount of the reward", and "I think that the rest of money will be used for realizing of the

sustainable society. It is okay.” On the other hand, other two participants answered that it decreased their motivation. We expect that there will be difference for each participant’s personality as described in [3]. Introducing the *reward reduction rule* will affect the participants for whom collecting virtual currency is important, but it won’t affect the participants for whom the mission’s goals are most important. (However, we believe that the effect of the *reward reduction rule* would be different in a case that there is some relation between the virtual currency and our real life.)

As for Q-E2, the *aging money rule* did not affect the emotion of a few participants. The reason is the same as the first answer to Q-E1’s: “The virtual currency does not affect the real life”, “The mission’s goals are more important than the amount of the reward”. On the other hand, some results about the aging money satisfied our expectations. Some participants said that they wanted to fund as much as possible, which increased the motivation for the *mission performer*. A participant said: “I strongly thought that I should use my currency as soon as possible. In the case that the *aging money rule* is not adopted, I was thinking that it was better to keep my money for the case of more attractive mission.” This comment shows that the *aging money rule* encourages people to use their currency and to participate in the mission. In addition, in case of this rule, participants felt the reality. The reality will be an important factor when designing services by adding virtuality to them using information technology [3].

On the other hand, another participant said: “The *aging money rule* had a bad effect on my motivation because my currency was decreasing in any case.” People felt like “suffering a loss” and it decreased their motivation. The other participant also said: “I will continue a mission whether the goal of the mission is significant or not for me.” Thus, it means that the system should make it attractive that participants enjoy achieving any missions. Furthermore, another problem of the *aging money rule* is that the whole amount of money in the community will decrease. Thus, designing the appropriate aging rate would be a key factor to lead people into the *flow* state.

3.3 Social incentive and a user’s motivation

In this section, we consider the relationship between the social aspect and the participants’ motivation. The following questions related to the social aspect were asked:

Q-S1: In the experiment, you could know how much money others have funded to the mission when you played the role of a mission investor. Did it affect your fund amount?

Q-S2: How would you feel if you were not thanked by others after completing a mission as a mission performer?

Q-S3: How would you feel or how would you behave if you were asked by a stranger to contribute to a mission?

Five out of the six participants answered that other’s fund affected their decision of how much to fund to a mission. A participant said: “I was caring about other’s opinion and it was difficult to behave largely different from others.” He also said “Since there was no anonymity I was more considerable when deciding the fund.” It shows that the social factor will be useful for preventing people from cheating, in particular, among acquaintances. Five people who answered that there were some effects on the amount of their fund to Q-S1 also stated that no thanks would bring bad feelings in Q-S2. For example, they said, “In such a case I won’t be able to continue to execute the mission as a *mission performer*” or “I become anxious about my performance.” It proves that providing others’ responses, as a feedback into the system is an efficient way to motivate the users. Designing a good

communication among participants is also important. Through the experiments, the system encouraged and activated the communication among the participants. We strongly believe that *Micro-Crowdfunding* would be useful to stimulate and activate the communication inside the community in a practical situation.

However, as for Q-S3, the result might be different in a case when the participants are not acquaintances. In the case of a stranger, there are both a positive aspect and a negative aspect. As a positive aspect, it will be easier to ask a stranger to execute a mission for serious problems than to ask an acquaintance. A participant said: “I will be sensitive in the case of asking my acquaintance to complete the mission. I might feel bad due to the mission, for example, in the case that the acquaintance’s performance of executing the mission couldn’t achieve my expected criteria.” On the other hand, as a negative aspect, it might prevent participants from behaving actively when funding. Another participant said “I will become more cautious when I fund because I can’t trust a stranger as the same level as my acquaintances.” If we use the system to activate the community, which includes strangers, it is very important to consider the way the participants could join and participate in the missions easily (ease the hurdle).

After finishing all sets of experiments, the participants answered a questionnaire. They evaluated the following items according to the five-grade evaluation. 5 is the most positive answer (e.g. excellent, very good, strongly agree, I could absolutely, etc...) and 1 is the most negative answer (e.g. very bad, strongly disagree, I couldn’t at all, etc...) These items targeted the participant’s conscious, feeling and emotion.

Q1: Could you share the importance of the problems with the other participants through the experiments?

Q2: Did you feel that other participants’ opinion was useful for you through the experiments?

Q3: Were you glad to be thanked from a mission organizer when you fund to the mission as a mission investor?

Q4: Were you glad to be thanked from a mission organizer and mission investors when you finished executing the mission as a mission performer?

Q1, Q2 and Q4 received high score, over 4.0. The common point among the three questions is related to the social aspect. From the results of Q1, Q2 and Q3, we’re positive that sharing ideas among people would provoke their more considerable and deeper thinking on the problems and could also bring changes in their thinking and emotions. As for Q4, it shows that social feedback from others helps people to participate in the mission and makes them feel appreciated. Happiness is a powerful tool to continue given activities. Focusing on Q3 and Q4, though both Q3 and Q4 are about thanks, the point of Q3 is lower than that of Q4. We suppose that it is caused by the difference of the level of feeling to contribute to the mission between the *mission investor* and the *mission performer*. Designing additional incentives for the *mission investors* is essential. We state the concrete idea about this issue in next section.

3.4 Design Implication

In this section, we summarize the ideas to make *Micro-Crowdfunding* more attractive based on the results of the evaluation as described in the previous subsections. In the experiment, only the *mission performer* can increase his virtual currency. It is essential to make an opportunity for the *mission organizer* and the *mission investors* to get virtual currency as a reward as well. It is better to add the reward system based on the

ability of the participants, irrespective of the rule. For example, the idea is as follows:

The *mission organizer*, who organizes an attractive mission, to which a lot of people fund, can get additional reward.

- The *mission investor* who invests into a practical and useful mission can get additional reward.
- If the mission's collected fund exceeds the required target amount, a part of the excess currency will be returned back to the *mission organizer* and the *mission investors*.
- The *mission investors* can be granted special privileges according to the amount of the paid fund.

In addition, we have to take the social feedback from others into account. In the experiment, we embodied the thanks from others for the *mission investors* and the *mission performer*. However, this mechanism might not be sufficient. We should consider the following idea:

- The *mission organizer*, the *mission investors* and the *mission performer* will be evaluated with the reputation system like the "Like!" button in *Facebook*.
- The *mission organizer* and the *mission investors* can fund based on not only the mission's goals but also the level of the performance of the mission. If the *mission performer* has finished the mission with high quality, he/she could get more virtual currency from the *mission organizer* and the *mission investors*.

Social feedback would lead the participants to realize their social contribution, which will increase their self-esteem. It will be a powerful tool to motivate participants. Besides, we can see the level of reliability of the *mission organizer*, the *mission investors* and the *mission performers* based on the number of other people's "Like!" responses. Finally, we state the design implications of the system overall. It is important to make the system easy for users to participate. If the target task of the mission is too complex, the users are unwilling to participate. The concept of "light-weight" should be kept anytime. However, the user might get bored of too easy missions. Setting the level according to the user's experience lead them to *flow* state. Visualizing the performance and the significance of a mission is also an important factor. Showing no goal or no result makes the user anxious. Explaining appropriate reasons why people need to participate to achieve sustainable society is helpful to raise the users' intrinsic motivation.

4. DISCUSSION

This section presents three issues discussed while designing the current prototype.

The first issue is about the weakness of the benefit for contributing a mission. Of course, a frequent participation in the contribution to a mission would finally achieve the sustainable society due to the increase of the participant's intrinsic motivation. However, it is hard for a participant to feel satisfactory benefit because contributing to the mission looks like a donation, where the donation works based on the person's social incentive. Like traditional *crowdfunding* services, a *mission investor* can expect rewards such as rare items, tickets to attend rare events, or something that cannot be bought with traditional money.

In the current design, when a mission is completed, half of the money funded to the mission is returned back as a reward to the *mission investors*. While a *mission investor* funds his/her money, the value is not degraded, which becomes an incentive and motivates him/her to fund more missions. In this case, the aging

speed of the currency is a critical issue for making *Micro-Crowdfunding* work well and preventing it from currency inflation.

The sustainability issue is essential for everyone, and we need to take into account how we contribute to it in our daily life. In typical approaches, the social incentive is widely adopted to encourage people to act more eco-friendly. However, there are personalities for which the social incentive does not work well [3]. This means that the approach based on the social incentive works well for people who like to cooperate with others or who like to compete with others. On the other hand, the economic incentive usually works well for all personalities. Designing incentives that work well for all personalities is an important research topic when developing social mechanism for everyone.

The current design allows that any members in a community can propose new missions, and decide the price to complete the missions. This approach enables new missions to be initiated anytime anyone finds new tasks that are necessary to be done for keeping the sustainability of a common resource. A problem of this approach is the fact that there might be nobody willing to complete the mission. In an alternative way, the person who would like to complete a mission could propose it by him/herself. However, in such case, a verification of the quality of the mission achievement is needed, but it is a challenging issue to motivate a person to verify a mission. While designing the current prototype, we decided that the former approach is desirable because a person proposes a new mission with rational and objective thinking, because he/she considers that the mission is necessary for keeping the sustainability of the common resource not for earning money for him/herself.

5. CONCLUSION

A problem of the current approach is the possibility that no one might be willing to maintain some common resources. Also, an infrastructure maintained by the tax-based approach is still necessary. For example, collecting and disposing garbage is not easy to be solved only by the community-based approach. However, the insufficiency of tax comes from the cost to manage the sustainability of all common resources. It is an interesting problem to consider how to encourage people to contribute to the sustainability of unattractive common resources for complementing the tax-based approach with *Micro-Crowdfunding*.

The national deficit in many developed countries is a very serious problem. However, increasing the tax may not be a good solution to it because this may lead to a reduction of the economic activities. Our approach is a first step toward this issue, realized by increasing the awareness of people's contribution to the sustainability of each small common resource.

REFERENCES

- [1] G. Hardin, "The tragedy of the commons", Vol. 162, pp.1243–1248. 1968.
- [2] J. Powell, "The Community Currency Role Play", <http://www.complementarycurrency.org/ccLibrary/asia/thailand/ccroleplay.html>
- [3] M. Sakamoto, et. al., "Analyzing the Effects of Virtualizing and Augmenting Trading Card Game based on the Player's Personality", In Proceedings of ACHI 2013.
- [4] G. Silvio, "The Natural economic order", Revised edition. London: Peter Owen, 1958.