

Controlling information asymmetry in equity crowdfunding

By Omid TORABI ^{a†} & Abbas MIRAKHOR ^b

Abstract. Crowdfunding is a fast developing method of projects finance mobilization. However, weakness of trust and the associated problem of information asymmetry constrain risk sharing investments as well as equity crowdfunding. Reputation mechanism is one of the newest ways to address asymmetric information issue in web-based social networks. A reputational mechanism has been designed and named “Fame” in this paper specifically for equity crowdfunding systems to eliminate moral hazard and reduce asymmetric information. The term “Fame” is meant to capture the qualitative aspects of reputation such as trustworthiness, credibility, reliability of every individual member of an equity crowdfunding system. Fame¹ is systematic, countable and computable (implicit and explicit) reputation monitoring mechanism. A game theory approach is employed using two different games: “without Fame” and “with Fame” games, to show that a “with Fame” crowdfunding game leads to better results. Moreover, net aggregate surplus in “with Fame” crowdfunding is larger than “without Fame” crowdfunding system.

Keywords. Crowdfunding, Equity crowdfunding, Reputation mechanism, Mechanism of fame, Information asymmetry, Risk sharing.

JEL. C70, D82, D85, D91, G23.

1. Introduction

Crowdfunding is defined as an investment conducted by a group of individuals (crowd), instead of the traditional financial intermediaries. Crowdfunding is taking place because of direct communication between entrepreneurs and investors using an internet platform (Schwienbacher & Larralde, 2010). In crowdfunding, each individual in the crowd provides a small amount instead of large amounts provided by a small group of experienced investors (Voorbraak, 2011). Crowdfunding has the potential to increase entrepreneurship by expanding the pool of investors from whom funds can be raised beyond the traditional loop of owners, relatives and venture capitalists (Ordanini *et al.*, 2011). Beside other benefits, this method of mobilizing finance has the potential to accelerate and expand efforts at financial inclusion.

Equity-based crowd funding

Equity-based crowdfunding is a new and different method of Fintech to encourage investment in the real sector of economy to increase employment and income. This type of crowdfunding involves an inexpensive way of issuance of shares through the internet, where investors can acquire stock in corporations for a small amount of money, with a claim over the company’s future cash flow. It has

^{a†} International Centre for Education in Islamic Finance (INCEIF), Kuala Lumpur, Malaysia.

☎. +9123498421

✉. otorabi@yahoo.com

^b International Centre for Education in Islamic Finance (INCEIF), Kuala Lumpur, Malaysia.

☎. +17194696444

✉. abbas@mirakhor.com

¹ Fame here is meant to relay the sense of words such as “shohrah,” “thiqaha,” and “som’ah” used in Muslim societies to indicate the reliability, trustworthiness, and credibility of an individual.

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proved to be a viable form of corporate finance, enabling companies to access funding for projects that have failed to mobilize funds from angel investors, government resources, friends or families (Ahlers *et al.*, 2012). Crowd investing facilitates the financing of corporate growth and innovation.

Information Asymmetry

There are two types of crowdfunding; debt and equity. Here-to-fore, the former has dominated the latter due to specific and sensitive risks associated with equity crowdfunding. The main risks are fraud (the money is not used for the declared purpose), loss due to project failure and liquidity constrain as the most important drivers of moral hazard and operational risks with information asymmetry. Information asymmetry arises when one party in a transaction has more or superior information than the other party (Myers & Majluf, 1984). Asymmetric information in financial markets includes *adverse selection and moral hazard*, both of which lead to increased *monitoring costs* Ricardo N. Bebczuk (2003).

A broad range of categories in market design have been deployed in crowdfunding and other online market settings in an attempt at reducing information-related market failures. These are signalling, screening, rules and regulations, collateral and guarantees, due diligence, and enhanced reputation monitoring (called “Fame” in this paper).

Reputation mechanism

One of the newest ways of solving the problem of information asymmetry is reputation mechanism. The primary objective of a reputation mechanisms is to enable efficient transactions in communities where cooperation is compromised by post-contractual opportunism or information asymmetries. If the community follows a norm by punishing traders with adverse track record of behaviour, by refusing to deal with them, and if the present value of punishment exceeds the gains from cheating, then the threat of public revelation of a trader’s cheating behaviour in the current round provides rational traders with sufficient incentives to cooperate (Dellarocas, 2015).

A reputation monitoring mechanism has been designed in this paper specifically for equity crowdfunding system to reduce asymmetric information. The role of reputation is important as a mechanism for establishing trust to address the risk of fraud in online transactions. While there are various mechanisms to deal with fraud, reputation is one of the best and more effective candidates.

Fame

The enhanced reputation mechanism designed and presented in this paper is called “Fame”. “Fame” refers to the credibility of every individual who is a member of a crowdfunding system. Fame is systematic, countable and computable (implicit and explicit) reputation, a clear signal to other members of the social network of crowdfunding. This credibility is formed for all users of the system based on *their banking (financial) credit, social credit, participation (activities) history*, and track record of their *success in previous transactions*. Fame has been innovated in order to represent and monitor the reputation of the users in the social network of crowdfunding system. As a result, “Fame” is the reference framework for individuals’ decisions in the fields of investment, loan payment, being a third-part guarantor of others, and any other transaction in the system. The credibility points assigned to each financial transaction will be determined through the policies and procedures of the crowdfunding system set by the owners and policy makers within the credit-scoring framework. Fame is the outcome of this credit-scoring process and is consequently, influenced by each transaction of every single user.

In this research “Fame” is a general function of four parameters:

$$fame = f(\text{banking credit}, \text{social credit}, \text{participation}, \text{success})$$

As is demonstrated in following sections of this paper, “Fame” can be designed as optimal reputation mechanism for equity crowdfunding. For this purpose we use

mechanism design theory. Mechanism design is a field in economics and game theory that employs an engineering approach for designing economic mechanisms, or incentives structures, toward desired objectives in strategic settings in which players act rationally. Since the approach starts at the end of the game, then goes backwards, it is sometimes known as reverse game theory.

2. Mechanism design

The mechanism employed in this paper is a *Vickrey–Clarke–Groves mechanism (VCG)*. Bidders offer bids based on their valuations of the elements of the transaction, without knowing the bids of other people taking part in the auction. The auction system arranges the items in an acceptable manner: it charges each person the damage they cause to other bidders. Moreover, it provides bidders with an incentive to bid their true valuations, by ensuring that the best strategy for each bidder is to bid their true valuations of the items. It is a generalization of a Vickrey auction for multiple items. In this paper, the mechanism is designed in normal situation (without “Fame”) firstly. In the following, the mechanism of crowdfunding including “Fame” is designed. The results of two mechanisms (with “Fame” and without “Fame”) are then compared.

Utility function of entrepreneur and funder with “Fame” and without “Fame”

As mentioned, there are two types of players in the system: entrepreneurs (principals) and funders (agents). Payoff of funders and entrepreneurs in the mechanism is the utility of the project. The main assumptions for both models are as follows:

- The number of potential funders and entrepreneurs in the equity crowdfunding system are theoretically unlimited, and there is no limitation in the number and share of funders to fund a project.

$$N = \{1, 2, 3, \dots, n\} \quad (1)$$

N= number of funders in crowd funding system

- The entrepreneur presents his/her project in the system in three parts:
 - 1- The details of the project including the nature of project, the timeline, the business plan of project and most importantly the expected return of project including forecasting direct yield, indirect awards and so on.
 - 2- The minimum pledge level of each funder to participate in the project (p)
 - 3- The target level of investment which is needed (T); target level is equal to the cost of running the project.
- There are two probabilities for the project, represented by K; if K=1, project starts with a probability.

If K=0 project does not start, with probability of $(1 - \alpha)$

$$K = \{1, 0\} \quad (2)$$

K= social choice function

$$Project = \begin{cases} K = 1, & P = \alpha \\ K = 0, & P = (1 - \alpha) \end{cases} \quad (3)$$

- Starting the project (K=1) the entrepreneur needs to collect the funds for the project to target level (T). If n_1 funders contribute unit of funds in a project, the necessary condition to start is equation (4).

$$n_1 \cdot t \geq T \quad (4)$$

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T is the minimum amount that the entrepreneur needs to begin the project but if the collective funds are more than T, the entrepreneur has the opportunity to use this extra amount to improve the quality of the project. Therefore, if the mobilized fund for the project is more than T, the quality of project can be better than the primary standard assumption.

- Some funders from an infinite number of funders agree to take part in the project. We assume probability of this participation is Binomially Distributed as in (5):

$$\rho(n_1: \text{if } k = 1) = \binom{N}{n_1} \alpha^{n_1} (1 - \alpha)^{N-n_1} \quad (5)$$

ρ = the probability of n funder that agree for the project to start.

- The mechanism is a weak balance as $\sum_{i=1}^{n_1} t_i < 0$; sum of payoff is not positive. In addition, the source of payment is payments of funders and there is no other external source of funds. This is our assumption of Mechanism Efficiency.

- The way to understand the types of players in this mechanism is direct. Utility function of player i is a function of his/her subjective value of the project and his/her contribution to the project.

- To make our equation simpler, it is assumed that the strategy of each player is not influenced by other players; meaning that each player has a dominant strategy.

- All players are rational and they have individual rationality; meaning that negative utility is non-permissible.

- The result of the mechanism should prepare the situation in which at least one player improves his/her status. These assumptions should allow search for Pareto optimal equilibrium.

3. Mechanism of crowdfunding without fame

To design the mechanism of our crowdfunding system, we use VCG mechanism. As mentioned, there are two types of players in the system: entrepreneurs (principals) and funders (agents). Payoff of funders in the mechanism is specified by their utility of the project. This utility function is a function of K which is *social choice function*, value of the project for each funder and the cost of funding for each funder are described by equation (6),

$$u_i = U(K, v_i, t_i) \quad (6)$$

Subjective value of each funder is a function of his/her type² and the payoff of project. Payoff can be an equity/goods which will be developed during the project or a share in ownership of the project or a share of ownership of the end product of the project. Equation (7)

$$v_i = v(\theta_i, z) \quad (7)$$

θ = type of funders

z = the final production after running the project

So, the utility function of each funder is as equation (8)

$$u_i = K(v_i - t_i) \quad (8)$$

² Players have specific preferences which are actually their private information and is named by "type" here.

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Therefore, payoff of all funders is the sum of utilities of all participant funders as inequation (9):

$$\sum_{i=1}^{n_1} u_i = K \cdot \rho \cdot N \cdot \sum_{i=1}^{n_1} (v_i - t_i) \quad (9)$$

Since we assumed individual rationality, the utility function of players should not be negative. So, we have equation (10):

$$u_i > 0 \xrightarrow{\text{yields}} \sum_{i=1}^{n_1} u_i > 0 \xrightarrow{\text{yields}} v_i > t_i \xrightarrow{\text{yields}} K = 1 \quad (10)$$

$K=1$ means the utility of this project for that funder is positive ($v_i > t_i$) because his/her preference is positive payoff. Accordingly, if $u_i > 0$ then aggregate of u_i is also larger than zero, implying that the collective utility function of all funders is positive. The explanation is that when a project is funded, it can be shown that subjective value³ of each funder is more than cost of funding for that funder, and accumulative utility of the group of funders increases. Therefore, funders vote positively on this project and the minimum target of funds for this project can be mobilized.

On the other side of the game, there exists an entrepreneur whose purpose is to maximize the profit of the project (value maximization)

$$\pi = TR - TC \quad (11)$$

π = Profit of entrepreneur TR= total revenue TC= total cost

The return of the project for entrepreneur is from funds which can be equal or more than target level of project. TC is the announced target amount of funds which is needed for project to start.

$$TR(T) \geq TC \quad (12)$$

If returns to the project (sum of the funds) are equal to the cost of project, net profit of project for entrepreneur is zero. If funds are more than T, net profit will be positive.

$$\pi = K \cdot N \cdot \rho \cdot \sum_{i=1}^{n_1} t_i - TC \quad (13)$$

$$\pi = \begin{cases} \pi = 0, & \text{if } K \cdot N \cdot \rho \cdot \sum_{i=1}^{n_1} t_i = TC \\ \pi > 0, & \text{if } K \cdot N \cdot \rho \cdot \sum_{i=1}^{n_1} t_i > TC \end{cases} \quad (14)$$

If the payoff of entrepreneur is equal to zero, the probability of cheating in the project increases. Therefore, there is the risk of cheating or fraud with this “without fame” mechanism.

4. Mechanism of crowdfunding with “fame”

In this mechanism again the players are funders and entrepreneurs. The payoff of the funders is their utility of the projects. All players are rational with positive utility.

$$u_i = U(K, v_i, t_i) \quad (15)$$

The subjective value of funders in this mechanism is a function of funder types, final payoff, and the “Fame” of the project. Since the “Fame” of the project can be

³The subjective value advances the idea that the value of a good is determined by the importance that an acting individual places on a good for the achievement of his desired ends.

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considered as a function of the “Fame” of the entrepreneur, subjective value is a function of entrepreneur’s “Fame” as inequation (16),

$$\hat{v} = v(\theta_i, Z_i, fame) \quad (16)$$

As “Fame” can be positive, zero or negative, we have equation (17)

$$\hat{v}_i = v_i + f(fame) \begin{cases} a) & \text{if } f(fame) = 0 & \xrightarrow{\text{then}} & \hat{v}_i = v_i \\ b) & \text{if } f(fame) < 0 & \xrightarrow{\text{then}} & \hat{v}_i < v_i \\ c) & \text{if } f(fame) > 0 & \xrightarrow{\text{then}} & \hat{v}_i > v_i \end{cases} \quad (17)$$

A) In time t1, entrepreneur enters crowdfunding system but he/she does not have any “Fame” yet. In such circumstances, the funders' reaction is identical to those in the crowdfunding mechanism without “Fame”. Hence, payoff and Aggregate Net Surplus are completely like “no Fame” crowdfunding system. However, the difference lies in the entrepreneur's tendency to collect “Fame” for himself/herself for the future. As a result, these types of entrepreneurs typically provide better payoffs in their proposal and are also intent on succeeding in projects they undertake in order to collect good feedbacks and enhance their “Fame”. However, funders usually do not trust newcomers. Thus, newcomers have to start from small projects to collect “Fame” in the system. Still, there is another alternative for newcomers to enhance their “Fame” by bringing banking or social credit from outside of the system. It can be expected that with “Fame” crowdfunding systems, the risk of cheating, fraud and failure decreases even for newcomers simply because they would be more cautious about their “Fame”. Therefore, the outcome of new projects can be more successful with such mechanism.

B) If the “Fame” of any entrepreneur is negative, it is an obvious signal to all players in the system to be alert to potential moral hazard and fraud risks. An entrepreneur with negative “Fame” can be defined as a person who has a poor or unsuccessful track record of activities. Funders can read details of the history of entrepreneur to know the reasons for their poor “Fame”. The infamous entrepreneur might have cheated or defrauded or had some failure with implementation of earlier projects thereby indicating that he is not to be entrusted with the funds of a project. Another reason to avoid partnership with an infamous entrepreneur is the negative impact of a failed project on funders' “Fame”. If a funder funds an unsuccessful project, his/her “Fame” will decrease accordingly. Hence, very few funders are interested in investing in a project with an infamous entrepreneur. Hence the number of failed projects and infamous entrepreneurs will decrease in the system.

C) Third and the most probable case is one in which entrepreneurs have positive “Fame”. Greater “Fame” signifies better history of activities, success in previous projects, and more social credit, all of which contribute to attracting funders to fund famous entrepreneurs' projects. Funders can predict a successful project with less risk from a highly positive “Fame”. In addition, the entrepreneur does his/her best to complete the project. Success in the project can enhance the “Fame” of both the entrepreneur and the funders. Indeed, in synergy, they help each other to sufficiently fund and efficiently manage the project. Funders in this situation are looking for famous entrepreneurs with highest return. An example is ebay.com or booking.com where users usually look for hotels with best feedbacks and lower prices.

Subjective value of the funders is a function of payoff and “Fame”. Therefore, the total payoff for a funder in a successful project is more than “no Fame” investment.

$$\frac{\partial \hat{v}_i}{\partial fame} > 0 \quad (18)$$

The utility function of the entrepreneur is also a function of income/cost as well as additional “Fame” of the project. If he/she can succeed in the project, there is gain in terms of additional “Fame”.

$$\pi = \pi(TR, TC, \Delta fame) \quad (20)$$

$$\Delta fame = fame_a - fame_b \quad (21)$$

Therefore, the “Fame” of the project impacts crowdfunding mechanism in two parts:

1. Utility function of funders are impacted by “Fame”, so valuation of a project by funders is different as equation (22) and (23)

$$\hat{v}_i = v(\theta_i, z, f(fame)) \quad (22)$$

$$\hat{v}_i = v_i + f(fame) \quad (23)$$

So, the utility function is represented by equation (24):

$$\hat{u}_i = K(\hat{v}_i, t_i) \quad (24)$$

Funding in a crowdfunding system is by crowd of funders so sum of the utilities is as below:

$$\sum_{i=1}^{n_1} \hat{u}_i = K.N.\rho.\sum_{i=1}^{n_1} (\hat{v}_i - t_i) \quad (25)$$

$$\sum_{i=1}^{n_1} \hat{u}_i = K.N.\rho.\sum_{i=1}^{n_1} (v_i + f(fame) - t_i) \quad (26)$$

$$\sum_{i=1}^{n_1} \hat{u}_i = \sum_{i=1}^{n_1} u_i + K.N.\rho.\sum_{i=1}^{n_1} f(fame) \quad (27)$$

Projects with zero “Fame” or negative “Fame” are rare. Moreover, the negative “Fame” could result in a negative utility function in equation (27).

We assume a positive “Fame” for designing the mechanism, that is: $f(fame) > 0$. Therefore, “Fame” has a positive impact on the utility function, $\sum_{i=1}^{n_1} \hat{u}_i > \sum_{i=1}^{n_1} u_i$. Thus, the payoff of funders in a “with-Fame crowdfunding” system is higher than in the conventional system.

2. As mentioned, entrepreneurs know about the impact of their behavior on their “Fame” as the history of their “Fame” is available to all funders in the system. As a result, even one failure can be troublesome for a famous entrepreneur and thus potentially reduce the amount of funding for his/her future projects. Therefore, a high effort and energy by entrepreneur to succeed would be expected. Payoff is “Fame” + income – costs, as below:

$$\hat{\pi} = TR - TC \quad (28)$$

$$\hat{\pi} = K.N.\rho.\sum_{i=1}^{n_1} t_i - TC + \Delta fame \quad (29)$$

$$\hat{\pi} = \pi + \Delta fame \quad (30)$$

An entrepreneur tries to achieve success in order to increase his/her “Fame”. This implies that, in a deficit situation, he/she prefers to invest by himself/herself or rather try harder with more energy to succeed. Generally, we can assume that a famous player selects the strategy of success. So, we can predict that equation (31) is always positive.

$$\pi = \begin{cases} \pi > 0, & \text{if } K.N.\rho.\sum_{i=1}^{n_1} t_i < TC \quad \text{because : } \Delta fame > 0 \\ \pi > 0, & \text{if } K.N.\rho.\sum_{i=1}^{n_1} t_i > TC \quad \text{because : } \Delta fame > 0 \end{cases} \quad (31)$$

The result is presented in the following Table 1:

Table 1. Comparison of the Fame Crowdfunding Pay-off & Crowdfunding

	Funders pay-off	Entrepreneur pay-off	Net aggregate surplus
Crowdfunding	$\sum_{i=1}^{n_1} u_i = K.N.\rho. \sum_{i=1}^{n_1} (v_i - t_i)$	$\tau = K.N.\rho. \sum_{i=1}^{n_1} t_i - TC$	$S = \rho.n_1. \left[t(1-n) + \sum_{i=1}^{n_1} v_i \right] - TC$
Crowdfunding with "Fame"	$\sum_{i=1}^{n_1} \hat{u}_i = \sum_{i=1}^{n_1} u_i + K.N.\rho. \sum_{i=1}^{n_1} f(fame)$	$\hat{\pi} = \pi + \Delta fame$	$\hat{S} = S + \Delta fame + K.N.\rho. \sum_{i=1}^{n_1} f(fame)$
Result	$\sum_{i=1}^{n_1} \hat{u}_i > \sum_{i=1}^{n_1} u_i$	$\hat{\pi} > \pi$	$\hat{S} > S$
Comparison	Crowdfunding with "Fame" payoff > crowdfunding without fame payoff		

It can be seen that the mechanism of crowdfunding with "Fame" produces a better result compared to "no Fame" mechanism for players on both sides of transaction. Some of the reasons are:

- The utility of players in "Fame" crowdfunding system is higher than one without "Fame". Therefore, the motivation of players to enter this system is stronger and hence the funding will be larger in this system.
- As there is history and track record in the system, the risk of cheating, frauds, moral hazards, hence the probability of failure will be lower in the system.
- There is clear signaling in this mechanism for players which is both demonstrable and performance-based. As a result, information asymmetry decreases in this system.
- Entrepreneurs try harder to succeed in their project in order to gain more "Fame". This implies that even in cases where funds fall short of what is needed, entrepreneurs may devise ways and means of finishing the project successfully to avoid damage to their "Fame". It can be generally stated that success would be the dominant strategy of the entrepreneurs.
- Success in the project can enhance "Fame" for both entrepreneur and funders. Indeed, both help each other to sufficiently fund by and efficiently manage the project.

Aggregate net surplus

Aggregate Net Surplus (ANS) is the aggregate of payoff for all players in the mechanism. Technically, it is the aggregate of profit of all stakeholders in a mechanism. In the present study, the stakeholders of a crowdfunding mechanism are assumed to be funders and entrepreneurs.

The Pareto optimality condition is satisfied only if the ANS of the mechanism can be maximized. Equations of ANS in the crowdfunding system encompasses three parts: ANS of a "Fameless" crowdfunding system, changes in the "Fame" of funders and the "Fame" function of entrepreneur as in equation (32)

$$\hat{S} = S + \Delta fame + K.N.\rho. \sum_{i=1}^{n_1} f(fame) \tag{32}$$

ANS in the "Fame" system is higher than the one without "Fame".

$$\hat{S} \geq S \longrightarrow \begin{cases} \text{if } f(fame) > 0, & \hat{S} > S \\ \text{if } f(fame) = 0, & \hat{S} > S \end{cases} \tag{33}$$

if f(fame) = 0 but project is succesful
→ Δfame > 0 as entrepreneur collects succesful feedback

5. Summary of the result

This paper has attempted to demonstrate that a reputation monitoring mechanism can provide a key to reducing information asymmetry. Implementation of

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reputation monitoring is difficult in a real market as there are technical needs like credit scoring platform, reputation indexes, and comprehensive solution to include all users. Crowdfunding is a web 2.0-based platform, which is actually a closed system. Therefore, the implementation of a reputation monitoring mechanism at the heart of this system is appropriate (as it can be seen in ebay.com and booking.com). We introduce our reputation index as Fame to make it more comprehensive. "Fame" is a function of users' banking (financial) credit, social credit, participation (activities) history, and their success in previous transactions.

As can be seen in this research, the result of utility function for both funders and entrepreneurs is improved in a with-"Fame" mechanism.

As for entrepreneur:

$$\hat{\pi} = \pi + \Delta fame$$

And for funder:

$$\sum_{i=1}^{n_1} \hat{u}_i = \sum_{i=1}^{n_1} u_i + K.N.\rho \cdot \sum_{i=1}^{n_1} f(fame)$$

Therefore:

$$\hat{\pi} > \pi \quad \text{And} \quad \sum_{i=1}^{n_1} \hat{u}_i > \sum_{i=1}^{n_1} u_i$$

Furthermore, aggregate net surplus in this research represents the aggregate of pay-offs of all stakeholders in a community and, as can be seen below, aggregate net surplus increase of all users shows manifold increases in the system.

$$S = \rho \cdot n_1 \cdot \left[t(1 - n) + \sum_{i=1}^{n_1} v_i \right] - TC$$

and

$$\hat{S} = S + \Delta fame + K.N.\rho \cdot \sum_{i=1}^{n_1} f(fame)$$

But $\hat{S} > S$ so

Aggregate Crowdfunding with-Fame

payoff $>$ aggregate crowdfunding without – Fame payoff.

Therefore, mathematically, the tendency of community to collaborate in with-Fame crowdfunding system rises as compared with without-Fame system.

6. Implementation

Implementation of reputation mechanism in a social network is not difficult. There are many popular websites that have used the concept of reputation in their platform like Google, eBay, Booking.com, TripAdvisor. However, the reputation mechanism could be based on explicit feedbacks or implicit analysis. One of the main differences of our findings in this research with other recent innovations and implemented websites is the importance of defining a reputation index ("Fame" index) for all users of a social network to make the reputation countable and systematically useable. For example, as can be seen in eBay; buyers usually provide feedbacks for sellers. The identity of buyers and their reputation is not clear. In case of booking.com, also the identity and reputation of the guests who rate the hotels are not known.

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Generally, in a social network and especially in a crowdfunding platform, defining “Fame” for every user (funders and entrepreneurs) automatically increases the significance and comprehensiveness of “Fame” in the community. In this case, all users will be sensitive to the consequence of all their activities, even those who vote or blog in a social network. Consequently, it can be an effective reputation mechanism in a community by means of universality and reach. “Fame” not only decreases the information asymmetry but also, if “Fame” mechanism can properly be implemented in a social network, it can be shown mathematically that aggregate net surplus will be increased in the community.

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