

# Evaluating the Effect of Rewards on the Level of Participation in Communities of Practice at UNDP

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## ABSTRACT

The purpose of this research is to investigate the effects of rewards on the participation and how rewards affect the networking behavior in communities of practice (CoP), in order to explore if rewards can help to foster the growth of CoPs. Four communities of practice, of which one was administered rewards to, were compared from November 2010 to January 2012. The timeframe consisted of a five month reward period. At the end of the period rewards were given to the members contributing most to the community. A comparative analysis of four communities was performed, as well as a social network analysis for the one community rewards were given to. The result showed that the rewards had no significant effect on the participation in the community, neither in contributing more content nor in the networking behavior of the members.

*Keywords: Communities of Practice, Knowledge Sharing, Participation, Rewards*

## บทนำ

งานวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาผลกระทบของรางวัลต่อการมีส่วนร่วม และรางวัลส่งผลกระทบต่อพฤติกรรมการเชื่อมโยงเครือข่ายในชุมชนนักปฏิบัติอย่างไร เพื่อที่จะสำรวจว่ารางวัลสามารถส่งเสริมให้เกิดการเติบโตของชุมชนนักปฏิบัติได้หรือไม่ ชุมชนนักปฏิบัติทั้งหมด 4 ชุมชนถูกนำมาเปรียบเทียบตั้งแต่เดือนพฤศจิกายน 2553 ถึงเดือนมกราคม 2555 ซึ่งหนึ่งในนั้นถูกกำหนดให้เป็นชุมชนที่มีการจัดการให้รางวัล โดยเก็บคะแนนเป็นระยะเวลา 5 เดือน เมื่อสิ้นสุดช่วงเวลาการเก็บคะแนน รางวัลได้ถูกมอบให้แก่สมาชิกที่มีส่วนร่วมในชุมชนมากที่สุด งานวิจัยนี้ได้วิเคราะห์เปรียบเทียบชุมชนทั้งสี่ชุมชน และวิเคราะห์เครือข่ายทางสังคมของชุมชนที่มีการจัดการให้รางวัล ผลการวิจัย พบว่า รางวัลส่งผลกระทบต่อการมีส่วนร่วมในชุมชน ทั้งในด้านการมีส่วนร่วมทำให้เนื้อหาเพิ่มขึ้นและพฤติกรรมการเชื่อมโยงเครือข่ายของสมาชิก อย่างไม่มีนัยสำคัญ

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## INTRODUCTION

Organizations include a wide array of topics, problems, or domains, which don't have to be necessarily mastered by all organizational members. CoPs can tap into this problem. Companies have tried to facilitate the creation of CoPs to increase knowledge sharing; they have tried to align them with organizational needs and strategies, and have tried to increase innovational output and value creation (Wenger, McDermott et al. 2002). These tasks are rather difficult due to the organic nature of CoPs. One management tool to increase motivation seems to be rewarding community contribution. In this study the motivation through rewards to foster contribution to the community is examined.

At the end of 2010 the United Nations Development Programmed (UNDP) has introduced a social media-based extranet, called 'Teamworks', as part of implementing its Knowledge Management Strategy. It is designed as a social networking platform with blogs, micro blogs, social bookmarking, wikis and space collaboration functions to connect all 8000 UNDP staff members globally, plus the counterparts and colleagues from UN organizations, NGOs and governments they are engaging with. UNDP's online communities of practice (operated so far through e-mail) which had been in existence in the organization for over 10 years are now also moving to Teamworks. The objective of the reward is to increase the overall participation in the community of practice and subsequently the value creation of the communities. The reward scheme at UNDP is running on a yearly basis and is rewarding top contributors with different, high value prizes.

The study aims to understand the effects of rewards on participation within a community of practice and the effects of rewards on the networking behavior in the community. The research results

should help in understanding the effects of reward schemes on knowledge sharing in general and in virtual communities of practice in particular. From a practical perspective the results should assist managers in implementing effective reward schemes to increase participation, at least in terms of quantity of knowledge sharing.

The concept of communities of practice has been discussed extensively in the literature for example by Wenger (1998), Wenger and Snyder (2000), Brown and Duguid (1991). Therefore the literature review will omit discussion the core concepts of CoPs and instead focus on rewards as motivators for participation in communities of practice.

## LITERATURE REVIEW

### Participation in communities of practice

Participation can be broadly divided in knowledge sharing and the search for knowledge (Ardichvili, Page, & Wentling, 2003; He & Wei, 2009). In virtual communities participation can serve as a term that represents the interaction of people with other community members and the community content. This allows for complex social interactions that can involve content and people, or omit content. Content can be text, images, and any object or combination of objects useable in the virtual world. Content can reflect opinions, be information, expressions and so forth. Examples of content are forum post, event invitation, picture galleries, articles, blogs, comments, status updates, or files. Content can be shared, maintained, "get" and enjoyed (Arrasvuori, Lehtikoinen, Ollila, & Uusitalo, 2008).

The main benefit from communities of practice is knowledge sharing and the promise of innovation steaming from it. Knowledge sharing can be defined as "the provision of task information and know-how

to help others and to collaborate with others to solve problems, develop new ideas, or implement policies or procedures” (Wang & Noe, 2010, p. 119). The search for knowledge on the other hand includes looking for sources or asking for help and information within the community. Because both, knowledge sharing and searching for knowledge can have overlapping features the term participation is applied here. In a virtual community of practice, defined as “a technological-supported cyberspace, centered upon communication and interaction of participants, resulting in a relationship being built up” (F.-r. Lin, Lin, & Huang, 2008, p. 743), participation can be defined as every form of engaging with the community. This can include creating content to share knowledge as well as searching for knowledge or consuming available content. In the community content is created by its members and can for example include polls, articles, blogs, bookmarks, events, files, forum posts or threats, galleries, status updates or wiki entries.

#### **Motivation to participate in the community**

Research has shown that the willingness to share knowledge can be influenced by various factors, such as information technology, altruistic and conformist considerations, extrinsic motivators, like economic rewards, intrinsic motivation, which is means being motivated by the pleasure and satisfaction from a specific activity (Barabási & Albert, 1999, p. 137), organizational climate, the ease of sharing, management involvement, among other reasons (Ardichvili et al., 2003; Jeon, Kim, & Koh, 2011; M.-J. J. Lin, Hung, & Chen, 2009).

The willingness to share depends usually on reciprocity, either direct or indirect. Social exchange theory suggests that unlike in economic exchange, the obligations are not fixed but that nevertheless a return in the future is expected (Blau, 1964).

Indirect or generalized reciprocity does not expect a direct compensation for the contribution but anticipates to be rewarded at a later stage through a third party (Davenport & Hall, 2002; McLure Wasko & Faraj, 2005), given that a long term relationship exists (Kankanhalli, Tan, & Wei, 2005). However, empirical results are mixed (Chiu, Hsu, & Wang, 2006; Wang & Noe, 2010) and show that reciprocity is not always increasing knowledge sharing. In fact, the expectation to receive something in return can decrease the quantity of sharing, and has no effect on the quality whatsoever (M.-J. J. Lin et al., 2009). If there is no payback for the provided knowledge the costs for the individual might be too high, which then becomes a barrier to knowledge sharing (Chang & Chuang, 2011; Gee-Woo, Zmud, Young-Gul, & Jae-Nam, 2005). Nevertheless, reciprocity builds trust, which is another motivator for knowledge sharing (M.-J. J. Lin et al., 2009).

Ardichvili et al. (2003) note that the willingness to share knowledge steams from the fact that employees’ see knowledge as a public good, that does not belong to an individual but to the organization as a whole. Sharing then happens because of an obligation not out of self-interest. This is increased by an organization fostering mutual sharing. More self-base reasons were the urge to establish themselves as experts, officially through the hierarchy, and unofficially through contributing, and the more altruistic feeling of giving something back through mentoring and sharing expertise. Since those members are confident that they can help others, they are more motivated to do so (Kankanhalli et al., 2005). Sharing knowledge can also contribute to the professional development, and certainly does if one is to establish themselves as an expert to increase the possibility of career advancements (Correia, Paulos, & Mesquita, 2009; M.-J. J. Lin et al., 2009; McLure Wasko & Faraj, 2005).

### Rewards to increase participation

A lack of rewards has been seen as a barrier to knowledge sharing by some researches (Wang & Noe, 2010), but there are also claims that using rewards and incentives will have a negative effect, because of a motivational crowding-out effect. This suggests that monetary rewards will undermine intrinsic motivation, especially when the intrinsic motivation was already strong (Muller, Spiliopoulou, & Lenz, 2005). Rewards can be defined as desired objects or events that can be obtained by fulfilling some criterion (Fahey, Vasconcelos, & Ellis, 2007).

Problems with rewards arise, where it is not clear who should get the reward, since new developments most often ground on previous work. Furthermore, offering rewards assumes that employees would not actively do what the organization would like them to do. Rewards are used to lead employees to do expected activities. It can become a practice to control people, leading to lower self-determination. Rewards also tend to produce rather short term changes and the behavior change is likely to vanish once rewarding is discontinued. This might be because rewards do not stimulate knowledge sharing, but instead try to change the attitude towards it (Jiacheng, Lu, & Francesco, 2010). It is also possible that knowledge is not seen any longer as a public good because rewards have to be secured (Fahey et al., 2007). Free riding has then to be managed by establishing rules of access. This reward refers to a kind of social capital. Social capital is the capital that lies in the relations between people (Chang & Chuang, 2011). It is not only increased through the information the person might provide but also through the possibilities each actors can provide through being part in a community.

By helping colleagues performing well, individuals can get votes on their contributions from their colleagues and are awarded on this basis. This approach tries to reward collaboration instead of competition and to insure quality at the same time. Cooperative reward systems, rewards for helping each other or incentives the whole group benefits from, are more successful than competitive reward schemes (Wang & Noe, 2010). Another, less tangible, way to promote participation is to enhance reputation above normal reorganization through contribution by inviting participants to workshops or special projects. This acknowledges their higher level of commitment as well as their skills and makes them attractive working colleagues (Davenport & Hall, 2002).

However, empirical results on rewards have been mixed. Some studies have shown that organizational rewards in form of promotions, bonus, higher salary, and performance based salaries have positive effects (Muller et al., 2005), on the frequency on sharing, so do incentives, especially when employees identify with the organization. Hall and Graham (2004) suggest to offer an explicit reward to attract people to the community, however they note that this will not necessarily result in participating. For participation they suggest using soft rewards (incentives) that increase personal reputation and satisfaction. Lee and Ahn (2007) suggest using rewards based on the quantity and quality of the knowledge shared. They also suggest providing different reward equations depending on the relation between quantity and quality. Kankanhalli et al. (2005) for example found that rewards are only helpful, when the organizational and personal interest overlap. On the contrary studies found that anticipated extrinsic rewards had negative effects or no effect at all. In their case study of SAP's attempt to raise knowledge sharing and participation in their virtual community Fahey,

Vasconcelos et al. (2007) found mainly negative effects. Conflicts about the abuse of the rewards program, decreasing trust between the members and the lack of novel, explorative discussions were some of the negative effects (Fahey et al., 2007). He and Wei (2009) report that for individual continuance usage behavior of a knowledge management systems rewards are just irrelevant. Li and Jhang-Li (2010) note that incentives should be given for every time knowledge sharing happens, instead of periodic incentives. They also mention that group rewards are more efficient than individual rewards. Cabrera and Cabrera (2002) suggest that to overcome the public-good dilemma of knowledge sharing, to provide incentives depending on the success of the community as a whole. Cress et al. (Cress, Barquero, Schwan, & Hesse, 2007) suggest to use different reward models depending on whether quality or quantity of knowledge is the priority. For example a reward scheme could focus on the quantity of contributions at the birth of a community of practice, until a critical mass of contributors is reached, then the reward scheme is changed in order to increase the quality of contributions.

### User types

User types can be described as user characteristics that reflect a usage pattern in a community. User types can reflect different types of skills, preferences, motivations (Brandtzæg & Heim, 2009). Dale (2010) refers to three different roles within a community; sponsors, facilitators and members. Sponsors provide the organizational recognition within the organization. Facilitators are providing help and ensure the community of practice runs smoothly. Members are those who participate in the community. Dale also makes a distinction between three different kinds of

memberships. Experts, who are permanent or temporary members that share their knowledge, contributors, who ask and reply to questions frequently, and readers, who contribute rarely if ever and mainly observe and read contributions in the community. Dale notes that each role can be shared by several people and one person can have several roles.

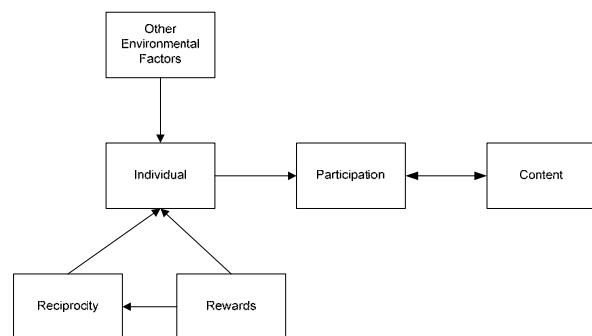


Figure 1 Conceptual Framework

### Hypothesis Development

It is assumed that rewards will increase contributions in general which creates a larger amount of content. The more content is available in the community the more valuable it might become to its members. The more content there others share, the more opportunity there is to contribute for the members with various experiences. In essence, because there is more content there will be more contribution.

**H1.** The more content is created the more people will start participating in the community.

The hypothesis is then related to rewards because if rewards can get the members of the community to start contributing, even though there is not enough content yet, they would have had an important effect. In this sense rewards might then be a quick starter for the community to

reach a certain threshold from which the community can then operate by itself, without further rewards, because enough content is present so that members can benefit from the community, even without external rewards.

Rewards are given to increase contributions therefore there should be a difference in the phases when rewards are available to community members and when they are not. Similarly there should be a difference in the rates of contribution between different communities if only one community is given rewards.

**H2.1.** Before the rewards are administered the average contribution to the community should be lower than during the reward phase.

**H2.2.** Before the rewards are administered the average contribution to the community should be equal to other communities.

**H2.3.** During the reward administration phase the average contribution to the community should be higher than in communities without a reward scheme.

**H2.4.** After the reward administration phase the average contribution to the community should decline.

The literature suggest that the more members are involved in the community the more they getting into the inner circle, because they are adopting and understanding the habits, terms and ways the community interacts. This means that the more content members contribute the community the more they interact with existing or new members. A way to measure this phenomenon is to use the method of social network analysis. In order to verify Wenger's claim of more engagement equaling more importance or centrality to the network, the in-degree centrality is values can be

used to measure if centrality and contribution are positively related.

**H3.** An actor's in-degree centrality is positively related to its contributions to the community.

**H3.1.** A high in-degree centrality is positively related to the creation of articles.

**H3.2.** A high in-degree centrality is positively related to the creation of blog posts.

**H3.3.** A high in-degree centrality is positively related to the creation of bookmarks.

**H3.4.** A high in-degree centrality is positively related to the creation of events.

**H3.5.** A high in-degree centrality is positively related to the uploading of files.

**H3.6.** A high in-degree centrality is positively related to the participation in community forum discussions.

**H3.7.** A high in-degree centrality is positively related to the uploading of galleries.

The hypotheses point the positive relation between in-degree centrality and contribution out. It is however questionable if this prevails during the reward phase, as rewards might have an effect on the motivation that leads to participation it might eventually change the structure of the community. Those actors who previously did not participate or were not in any way involved in the community might now be in for the reward, leading to a higher amount of contributions by those less connected to other community members.

**H4.** A high in-degree centrality is positively related to an above average contribution.

**H4.1.** A high in-degree centrality is negatively related to an above average contribution during the reward phase.

## RESEARCH METHODOLOGY

This research applied a case study research method strategy focusing on one particular CoP at the UNDP, the Poverty Practice Community, with the objectives to measure participation moderated through rewards and to examine possible effects that rewards could have on the community structure. In this case, longitudinal user data of the community provided by the UNDP for the time period 2006 to July 2012 for the Poverty Practice Community and community user data for three other communities of practice at UNDP for the same timeframe are available. Data for equally run communities that have not been given rewards in the same timeframe allow comparing the different communities. It allows gaining insights on different developments that might have occurred due to the promise of rewards for participation in the PPC in comparison to the timeframe where no rewards were given and in comparison to the other communities.

The reward scheme was administered in the Poverty Practice Community (PPC) of the United Nations Development Program (UNDP). Members of the PPC include every UNDP management level all over the world. Rewards are given to those individuals that contribute most content to the community during the reward period. In theory, everybody can log-in from everywhere, even if when on a remote mission, however then, access is limited. Nevertheless, the infrastructure to use the virtual communities from the UNDP office from all around the world is provided.

Overall, there are 8166 community members in all four communities studied. Table 3 shows the population of each community studied (Users Joined column). Included in each population is one practice director, who is also a member of the eight-member strong advisory team, and two

members of the resource team. Those community members, especially the resource team, manage the community. All other members become members by joining the community through a joining form.

## Data

The secondary data consists of participation data from 2006 to January 2012. The data contains information on content information, member information, and view and participation information and is part of a larger collaborative environment. The data does not only include data for one CoP but for all communities within the collaborative online environment of UNDP. The complete available participation data is shown in Table 1.

The way to calculate participation of each member is to count each content item created by a member of the community. There is no data available on how often single users look at a content item. Since the data is entirely secondary, the means to control for non-rewards groups was to run every statistic for every community whenever data was available and compare the results with the rewarded community results.

In addition, relationship data from the community were collected to conduct a social network analysis. The data consists of the relationship ties, called colleagues, in the community. This data is not provided by the secondary data received from the UNDP. The timeframe extracted sums up all the connections made until July. The data has then to be entered into the social network analysis software NodeXL (Foundation, 2012), which allows calculating the in-degree centrality and to visually represent the network. In addition, a second network will be created that shows the relationships between the actors and the content items they created in the community.

**RESULTS**

The Teamworks environment went online at the end of 2010. Accounts for the Poverty Practice Community (PPC) members, previously engaged in the community via email, were created. Initially 1736 accounts were created in November 2010. Subsequently smaller batches of members were added automatically. There is no data available on how often members visit the community, but there is data available when their last login happened. Table 2 shows the amount of members added in relations to the last login.

Overall this accounts for 2307 user accounts in the community and 1534 (66.49%) users that have looked at the first page of the community at least once. Table 3 provides an overview of the different values for members that joined the community between November 2010 and the 4<sup>th</sup> January 2012, the amount of users who accessed at least once the community starting page, and the amount of members that viewed the community space after August 16<sup>th</sup> 2011.

**Table 1** Detailed content of secondary data

User Information	Viewing information of community page	Content Information	Comments to content information
Internal User ID	Community ID	Type of Content <ul style="list-style-type: none"> <li>● Poll</li> <li>● Article</li> <li>● Blog</li> <li>● Bookmark</li> <li>● Event</li> <li>● File</li> <li>● Forum</li> <li>● Gallery</li> <li>● Status</li> <li>● Wiki</li> </ul>	Type of Content <ul style="list-style-type: none"> <li>● Poll</li> <li>● Article</li> <li>● Blog</li> <li>● Bookmark</li> <li>● Event</li> <li>● File</li> <li>● Forum</li> <li>● Gallery</li> <li>● Status</li> <li>● Wiki</li> </ul>
Date and Time when joined the CoP	UserID	Group ID indicating from which environment the content originates	Group ID indicating from which environment the content originates
Last Login to the CoP	Times of Views	Data and Time of creation	Data and Time of creation
Organisation within UN/UNDP		Internal content ID	Internal content ID
Location		Titel of the Content	Content of the comment
UN Duty Station		Views	Expertise of the member who commented
Department		Unique Views	
Role in CoP		Recommendations	
		Comments on the Content	



Table 2 shows that the accessing continuously increases, however that is the case for all examined communities. **Table 3** Table 3 shows that all the communities, apart from Human Development, were visited at least once by more than 50% of

the subscribed community members for the timeframe November 2010 to 16<sup>th</sup> January 2012. It seems that the larger the community the greater the decreases in access rates than the already smaller communities.

**Table 2** Relations of Users Joined the PPC Community to last view of the first community page

Month	User Joined	Last Community Access
November 2010	1736	4
December 2010	11	17
January 2011	38	16
February 2011	13	32
March 2011	18	33
April 2011	62	34
May 2011	57	41
June 2011	10	47
July 2011	338	65
August 2011	11	74
September 2011	5	90
October 2011	6	120
November 2011	1	207
December 2011	0	351
January 2011 (as of 16 <sup>th</sup> January)	1	403

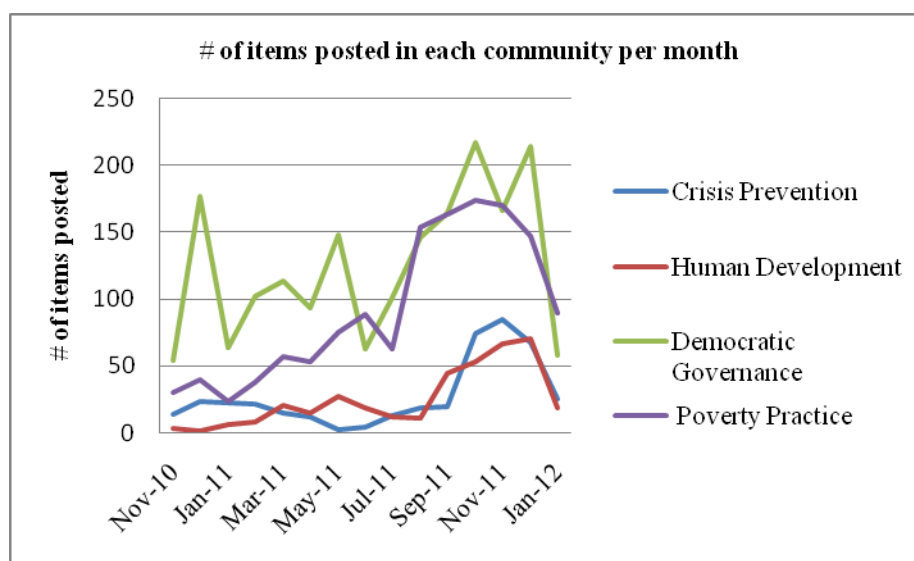
However, despite the decrease in access rates, the amount of single visits per month increases from month to month. This could be an indicator that the community is creating a core of actors that is visiting the community, and is likely to contribute to the community. In numbers; about 32% of the members drive the community forward.

If one looks at the contribution to the community in terms of content items over the

same period it can be seen that the overall amount of content for all communities is steadily increasing. However the content creation is dropping at the end of the year. Figure 2 shows the aggregated number of contributions across all possible categories to contribute in (Articles, Blogs, Bookmarks, Events, Files, Forum, Gallery, and comments to the original post in each category) for all communities.

**Table 3** Comparison of Communities Joined, Accesses, Accessed after 16th Aug 2011

Community	User Joined	User Accessed	User Accessed after 16 <sup>th</sup> August, 2011	Accessed between 1 <sup>st</sup> Dec 2011 and 16 <sup>th</sup> Jan 2012
Poverty Practice Community	2307	1534 (66.49%)	1203 (52.15%)	754 (32.68%)
Democratic Governance	2192	1562 (71.26%)	1228 (56.02%)	779 (35.54)
Crisis Prevention and Recovery	1980	1245 (62.88%)	938 (47.37%)	575 (29.04%)
Human Development	1687	834 (49.44%)	684 (40.55%)	406 (24.07%)



**Figure 2** Number of Items posted in each community per month

The graph shows that all communities somehow start to take off between July 2011 and September 2011 and break down in January, which is likely because the data is only available for half of the month. It might also be that this decline is related to the holiday season in all western countries. However, the graph shows that between for the timeframe July to November the participation in

all communities increased. Considering that the content of the community growth with every post, correlation between the stacked contributions and the views were calculated. Indeed, the correlation is highly significant at .914(Sig.000) for the PPC.

Therefore H1.1. can be accepted.

It was expected that during the reward period the average contribution to the community would be higher. For all the communities the average monthly contribution per user is listed in Table 5. The contribution to user ratio of the PPC is in every month but June 2011 and January 2012 lower than of the Democratic Governance Community. The “post per user” is higher during the reward period in the PPC but in most cases below the ratio of the Democratic Governance

Community. The paired t-test to see if there is a higher contribution during the reward period was done by splitting the stacked contribution of active users into the period before and during the rewards. This is not the case, as the paired t-test failed to be significant (**Error! Reference source not found.**)

H2.1. cannot be accepted.

**Table 4** Paired Sample Test - Contribution before rewards and during rewards

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 OverallContributionBefore	.89	618	5.775	.232
OverallContributionDuring	1.16	618	4.919	.198

Paired Samples Correlations			
	N	Correlation	Sig.
Pair 1 OverallContributionBefore & OverallContributionDuring	618	-.316	.000

Paired Samples Test									
		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	OverallContributionBefore - OverallContributionDuring	-.273	6.293	.253	-.771	.224	-1.080	617	.280

However, there is a tendency to more contributions during the reward period. Unfortunately this is not a unique feature to the PPC Community. All, but the Democratic Governance community, show an increase in their contribution per user ratio. Since the contribution increases in all communities it might have been that the rewards actually attracted new users instead of increasing the participation of the existing user base. It might have been that different or new users in the PPC community started to participate, while the contributing users remained more or less the same in the other communities.

Therefore it was compared how many users participated before the reward period, in the reward period, and the percentage of how many new users started to participate during the reward period. The results can be found in Table 6. It shows that the all communities gain more new members (by percentage) than the already larger groups. While it makes sense that when a community grows new contributors emerge, it seems that the reward had no effect in attracting new participants in the Poverty Practice Community. It seems unlikely that rewards would encourage members that already participate in contributing more, while not attracting new members.

Table 5 Contribution per User Ratio

Month	Poverty Practice Community	Democratic Governance	Human Development	Crisis Prevention
Nov-10	0.017	0.031	0.004	0.009
Dec-10	0.022	0.101	0.001	0.015
Jan-11	0.013	0.036	0.008	0.014
Feb-11	0.021	0.056	0.010	0.013
Mar-11	0.031	0.061	0.025	0.009
Apr-11	0.028	0.049	0.017	0.007
May-11	0.039	0.076	0.031	0.001
Jun-11	0.045	0.032	0.021	0.002
Jul-11	0.027	0.047	0.007	0.007
Aug-11	0.067	0.067	0.007	0.009
Sep-11	0.071	0.075	0.026	0.010
Oct-11	0.075	0.099	0.031	0.037
Nov-11	0.074	0.076	0.039	0.043
Dec-11	0.064	0.098	0.042	0.034
Jan-12	0.039	0.026	0.011	0.013

The PPC starts on a similar low contribution level compared to the Human Development and Crisis Prevention communities and then increases to almost the level of the Democratic Governance Community. The increase only lasts until October before it slowly decreases until January. The high increase from the July drop cannot be attributed to the new automated addition of members to the community since the addition, although in a different size, was made to all communities. The only external change in all communities was that the rewards were given to the PPC. What might be possible is that the amount of content available in the community reached a point where it makes it worthwhile to at least look at the content. Nevertheless, it does not seem to translate into a significantly higher contribution. Therefore it can be concluded that:

H2.2. can be accepted.

The contribution to the PPC starts at a similar level compared to the other three communities and never passes the contributions per user ratio of the Democratic Governance Community.

H2.3. cannot be accepted.

The contribution in the half year of rewarding for it is not passing the Democratic Governance Community even though the participation per user ratio is starting in August on the same level. In fact, the Democratic Governance Community has higher contributions per user than the Poverty Practice Community and is gaining more new contributors. In terms of attracting new contributors the PPC is the weakest of all compared communities, with

only 70.24% being new users that contribute, compared to 86.6% and 86.75% new users. H3 and its sub-hypothesis focus on the different types of contributions.

H3. can be accepted.

There is a low positive correlation (.397, sig 0.01). The result is rather surprising as it indicated

that a high contribution would not necessarily result in many contacts in the community. Therefore it was tested if betweenness centrality, a measure how members help connect other members, was tested for correlations and indeed shows that there is a positive correlation between overall participation and betweenness centrality (.665, sig .000).

**Table 6** Amount of members contributing to the communities before and during the reward period

	Poverty Practice Community	Democratic Governance	Human Development	Crisis Prevention
Contributors before the reward period	150	193	26	46
Contributors during the reward period	205	265	83	97
Percentage of new contributors (absolute amount)	70.24% (144)	73.21% (194)	86.75% (72)	86.6% (84)

The test for correlation was also done for every possible way to participate in the community, namely articles, blogs, bookmarks, events, files, forums and galleries. The in-degree however does not positively correlate on a high level with any way of participation. The highest positive correlation of the in-degree is with articles (.385, sig .000) and forums (.379, sig .000), nevertheless it is positively correlated. All ways of contributing to the community were significantly (0.01) positively correlated with in-degree centrality and betweenness centrality. For betweenness centrality the positive correlations were much higher, indicating that those who participate in the community in whatever form, but especially in articles and forums, connect

people with each other. The only exception was the contribution of events, which is insignificantly negatively correlated to the betweenness centrality.

H3. can be accepted

H3.1. to H3.7. can be accepted.

An actor's in-degree centrality is positively related to its contributions to the community. However it should be noted that the betweenness centrality has a stronger correlation with contributions. A high in-degree centrality is positively related to the creation of articles. This is also true the relation of blog posts, bookmarks, events, files, forum discussion, uploading of galleries. Even though

not part of the hypothesis those results are also true for the betweenness centrality, apart from the event creation which was negatively correlated to betweenness centrality.

It was then tested if there is a difference in the correlations only for the time of the reward period. There is a difference for the contribution of files and events, which seem to be not significantly correlated to the in-degree and again in the case of events negative correlated to the betweenness, even though not significant. Eventually it seems that it is more likely to connect people when one contributes through articles, bookmarks, forums, and galleries.

H4. asked if an above average contribution is

Positively related to the in-degree. Since it was found that the correlation was usually higher for betweenness centrality, the same test was run for both centrality measures and for the whole period November 2001 to January 2012, the period before the rewards and the reward period itself. In both cases the in-degree and betweenness centrality were significantly (.000) higher for those contributing to the community. The in-degree is significantly positively related to an above average contribution, therefore:

H4. can be accepted.

H4.1. cannot be accepted.

Beforehand it had been established that not all users actually posted over the whole year and the average contribution is confirming this result. Therefore it is reasonable to ask if the in-degree centrality, and betweenness centrality respectively, is different only for the sample that actually contributed in each phase. Considering that the

rewards should affect more contributions they should not necessarily affect networking behavior, as this is not part of the reward scheme. It should lead members to only contribute to the community and not network. H4.1. stated that the in-degree is negatively related to a high contribution during the reward phase. The results show that there is no significant relation between the in-degree and the betweenness of people contributing to the community, neither for the period before nor during the reward period. Nevertheless, for the members that started contributing during the reward period, the betweenness is slightly negatively (-.019, sig .784) related.

## DISCUSSION AND CONCLUSION

The analysis shows that, in contrast to the preliminary assumptions rewards most likely do not play a significant role in the contribution to the Poverty Practice Community. At most they are engaging members in the moment they are announced. During the reward period the analysis was not able to show higher contributions rates per user, or higher subscription, or growth rates. There is not more content created, nor is there more networking or different networking. The structure of the community, in terms of how people are connected, shows that those contributing more do network more, but the results do not show that there is a significant difference in networking behavior before and during the reward period.

The fact is that all communities grow, to a certain extent, over the analyzed period. They all create more content and gain new members. The Poverty Practice Community starts at a similar low level as the Human Development and Crisis Prevention Communities and then levels of, reaching the level of the Democratic Governance Community in August, which is the month the

reward was announced. The level of contribution per user is on par with the Democratic Governance Community in the month the reward period is starting. Despite the announcement of rewards the Democratic Governance community outperforms the Poverty Practice Community in terms of contributions and new member participation during the reward period. The most extreme jump in contributions happens in the Poverty Practice Community between July and August. The contributions per member more than double, however this is also true for the Democratic Governance community in the comparison of June and July and for the Crisis Prevention Community for September – October, wherefore the increase might just be a coincidence rather than a result of the reward.

In any case, the rewards do not affect the contribution in a long run, as the gains in contributions only slightly rise and at the end of the year start to drop, even though the reward period is coming to an end, which was expected to actually reinforced contribution rates, as members might have tried to secure their rewards.

Despite the rewards not mattering much, or not at all, contributing to the community is obviously related to the networking in the community. It does not matter in what way people contribute to the community, if they write in the forum, blogs or participate in other ways; it is always positively related to the in-degree centrality of the members and most of the time positively related to their betweenness centrality. In fact, the betweenness centrality shows higher correlations than the in-degree centrality, which can be an indicator that those contributing more are better connected, rather than hubs for expertise. The latter would

be true if the in-degree centrality would have shown a higher correlation.

In all communities alike, the access rates drop eventually and a core of roughly 24% to 35% of all members remain accessing the community. The interesting is however that the lower the access rate, the higher the contribution per user is, which means that a low percentage of the community members is making up for the vast majority of not engaged members. A possible reason for this result might be that the communities established a threshold of content which makes it worthwhile to access the community, at the very least to read the content. Ng, Lin, and Chiu (2005) studied the information sharing in a music sharing peer to peer network. They speak of a deadlock that will eventually destroy the community if not enough content is present that can be shared or attract members, or if there are no members that contribute without expecting any benefits. Even though the Communities of Practice are not peer to peer communities in the strict sense, it might have been that the analyzed period showed exactly these symptoms.

### **Limitations**

This leads to the limitations of this study. While there is enough data to display the contributions for a one year frame, there is no data to extend the study to the period after the rewards were discontinued. Since there is a step increase from July 2011 to August 2011 in the PPC it might be that after the reward period the contributions are falling back to the level of July 2011. The data from December 2011 and mid-January 2012 might suggest that this is the case, if

one looks only at the PPC, however all other communities decrease similarly. Since the UNDP communities of practice are work related communities, in contrast to private communities, the instant drop might just be related to the world-wide holiday season. A second shortcoming is that there is no information available how visible the rewards were to the community. The rewards were announced on the starting page of the community in order for every user accessing the community to see them. However, we only have the access rates, and those do not provide enough information about how users perceive the starting page. It is also unknown how the value and appropriateness of the rewards were perceived by the community. It had already been established that in case of a high intrinsic motivation rewards might have a negative effect on the community. While the analysis did not show any negative effects, and it is therefore unlikely that the community was opposed to the ideas of rewards, it is possible that the majority of members were just not aware of the rewards. However, data does not exist for both cases. Another shortcoming is that there is no way to control the influence on

#### **Further studies**

Despite the limitations, the study provides a step into quantitatively analyzing the effects of rewards in communities of practice. Since this is a first step much remains to be discovered about how rewards can affect a community of practice and the participation of its members. Future studies might focus on the link between the perception of rewards by the community and the eventual results of the application of the rewards.

One could link the organizational culture to the perception of the rewards in order to establish if rewards, or what kind of rewards, are an appropriate means for increasing the participation. It would also be valuable to examine more deeply the relationships between the community members and how they are affected by the provision of rewards. Furthermore it would be useful to analyze the effect of rewards on the quality of contributions. While quality is difficult to define it is of huge importance. Depending on the rewards given to the community, they might have an effect on the quality of contributions. Future research could therefore focus on the possible trade-off between increased contribution and decreased contribution quality.

#### **Implications**

For the given setting the application of rewards does not seem to be useful and past research has shown mixed results (Fahey et al., 2007). It is likely that depending on the organizational culture and the kind of provided rewards, the effects of rewards will vary. Managers have the option to create competitive reward schemes, which reward individuals for the quantity or quality, or both. Or they can create rewards schemes that try to reward the group as a whole, again in terms of quality, quantity or both. Other potential influence factors are the value of the reward and its visibility. Especially the value of the reward is a difficult variable, as it, at least partially, depends on the organizational culture as well. In different organizational cultures, rewards might be valued high, even though the monetary value is not. Furthermore, it might be that the intrinsic motivation to participate, at least in the



UNDP communities, is very high, possibly because of the humanitarian topics they are dealing with. In such an extreme case, rewards might have no effects at all, because the organizational values might overrule the extrinsic motivation. An analysis of the reasons for community members to participate in the community might therefore be useful, before a decision on reward administration is given.

Visibility is the second challenge that has to be overcome if rewards are going to have an effect. Members have to be personally notified that they can receive rewards for contribution. A general message might not be sufficient, especially in an environment in which the content is constantly changing. The notification has also to be made prominent for members that join after the reward period has started and all members should get constant updates on the ranking, if such applies, or who would at the very moment get the reward and how others do compared to the leaders. This will increase visibility and show that the community moderators or managers are taking the rewards seriously and will not forget about it.

Rewards might be useful at the start of a community. Since no, or very few content, is available the value for joining members is rather low. Until the community reaches its tipping point rewards might actually help to keep members interested. However, it might be equally useful to create useful content for the community before it is officially started. One could ask experts in the community to share their knowledge upfront to create a small set of items of high value, on which people can comment and use as working examples for what content should be contributed to the community. The goal would be to move the tipping point

closer to the community creation. A second area where rewards to the community might be helpful is timeframes right after season holidays or timeframes with general low contributions. This could help to rejuvenate the community and spark new discussions.

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