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Motives for Participation in On-Line Open Innovation Platforms

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Abstract:
The increasing need to compete on innovation, together with the prevalence of IT in our social and economic interactions has led to a globalization in the sourcing of innovation. One of the best examples of this process is the raise of on-line Open Innovation Intermediaries as both markets for innovation and a locus where innovative solutions are devised. Therefore, understanding what are the main motivations that drive the participation of people into these intermediaries is increasingly relevant for organizations that seek to tap into the massive information potential. This is why this paper aims to develop an understanding on this matter with a modified version of Theory of planned behavior (TPB).

Keywords: Online open innovation platforms ; Open Innovation ; Motivations ; Theory of Planned Behavior

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INTRODUCTION

The idea of Open innovation intermediaries has gained more and more attention recently. Especially after the application of the U.S. Government, Challenge.gov, to find innovative ideas, products and processes for the federal problems, the focus on these intermediaries has been augmented. Apart from the attention of the governments and practitioner, academia has lately focused on the open innovation intermediaries.

Intermediaries can be private organizations, individuals, experts or advisors in the form of retailers, distributors, wholesalers, platforms, media companies, agencies and financial institutions (Howells, 2006; Aoki, 2001). Among these various intermediary types, innovation intermediaries have received great attention with the rise of open innovation concept (Chesbrough, 2006; Lakhani et al. 2007). These intermediaries are used to exploit open innovation through providing an access to a loosely-knit community of innovators.

Even though research on innovation intermediaries has been developed since the 1990s, still most of the studies solely focused on the role of the intermediaries and a few studies addressed on performance (Lichtenthaler, 2005; Howells, 2006; Lichtenthaler and Ernst, 2008). There is however a gap in linking the type of participation common in on-line innovation Platforms, a mix of result oriented driven with concrete objectives together with a more open form of collaboration, with established theories. Yet still the current literature has not explored this field at an individual level or in TPB context. The objective of the present study was to cover this link by applying the explanatory power of the Theory of Planned Behavior (Fishbein and Aizen, 1975; Aizen and Fishbein, 1980) to Open Innovation Intermediaries and explore the motivation of people who participate in these intermediaries. The data were collected through a survey that was completed by the members of Atizo community, an open innovation intermediary.

In addition to academical interests, a better understanding of motivational processes within an intermediary might help to assess the heterogeneity of the needs and decide how to react and increase user commitment. Thus the design of the intermediaries can be improved. Thus a better understanding of user motivations is crucial for its continuous success.

In the following sections, we will first present the existing literature on motivation especially focusing on intrinsic and extrinsic in relevant literatures and theories for predicting human behavior. Then, we will describe the research site and methodologies that have been for the explanation of persons' involvement in open innovation intermediaries. A web-based questionnaire was developed based on theory of planned behavior and completed by members of Atizo community. After describing this questionnaire and its results, we will discuss the implications of the results for our understanding of the motivational processes in open innovation intermediaries.

LITERATURE REVIEW

One common challenge for any online community is to explore how people can be motivated to participate. This is why a vast number of studies focus on the context of people's motivations for participating in such communities. Overall the literature on human motivations, especially psychological theory, distinguished two types of motivations; intrinsic (fun, self-determination, competence, curiosity, interest, task involvement) and extrinsic (evaluation, recognition, money or other monetary incentives) in order to explain the underlying motives of people to participate (Amabile, 1993; Ryan and Deci, 2000).

Intrinsic motivation refers to the do something for its inherent satisfactions rather than for some separable consequences. Thus individuals with intrinsic motivation cognitively desire to have a feel of competence and self-determination and affectively desire to have interest and enjoyment (Ryan and Deci, 2000; Amabile, 1993; Deci and Ryan, 1985; Reeve et al., 1986). Altruism and community identification are also two modes of intrinsic motivation where altruism is when someone seeks to increase the welfare of others and community identification refers to the need for belonging (Zeityln, 2003; Kollock, 1999).

Intrinsic motives such as fun (von Hippel and von Krogh, 2003; Torvalds and Diamond, 2001) recognition (Jeppesen and Frederiksen, 2006; Lerner and Tirole, 2002) and reputation (Bagozzi and Dholakia, 2002; Hargadon and Bechky, 2006; Lakhani and Wolf, 2005) were found to be the main motives for participators rather than monetary rewards. Some studies have only explored

the role of intrinsic motivation whether performing an activity is due to the fact that it is inherently intellectually challenging or enjoyable (Hwang, 2005; Lee, Cheung, and Chen, 2005; Venkatesh, 1999).

Extrinsic motivations have been analyzed mainly by economists in order to define the economic model of human behavior (Frey, 1997). Individuals with extrinsic motivation engage with an activity in order to achieve extrinsic rewards. These extrinsic rewards include direct or indirect monetary compensation such as evaluation, money and recognition (Ryan & Deci, 2000; Amabile, 1993). Both Antikainen and Väätäjä (2008) and Wasko and Faraj (2000) emphasized on the monetary rewards as the main motivation factor. Similarly online community research field also observed that users are motivated by monetary rewards and/or nonmonetary rewards. A stream of research in information systems literature has used motivation theory to explore the factors that influence technology acceptance. However majority of these researches have focused on extrinsic motivations (Davis, 1989, Igbaria, Iivari, and Maragahh, 1995; Igbaria, Parasuraman, and Baroudi, 1996).

With the expansion of online communities; people's motivations gained the interest of other literatures. Applied to the open-source context, developers' motivations to participate have been analyzed within a number of studies. Since open source software projects do not pay for participants' services, contributors' motivations do vary. A large number of studies in open source literature distinctively used two motives, intrinsic and extrinsic, for grouping the contributors' motivations (Hars and Ou, 2002; Bitzer et al. 2007; Lakhani and Wolf, 2005).

Following up this conjecture with empirical research Lakhani and Wolf (2005), Hars and Ou (2002) and Hertel et al., (2003) analyzed the characteristics of the OSS contributors and their motivations. Both Hertel et al. (2003) and Lakhani and Wolf (2005) find intrinsic motives as the most fundamental reasons for programmers to participate into OSS projects. For instance enjoyment-based intrinsic motivation is the strongest and most pervasive drivers than others (Lakhani and Wolf, 2001; Lakhani and Wolf, 2005)

The studies on contributors' motivations of open source software mainly focused on individual motives, impact of firms' and community participation on individual, relationship between motives and technical design (Von Krogh and Von Hippel, 2006).

Open-source programmers mainly participate for a personal need for a certain kind of software, for their own self-interest (Hars and Ou, 2002). There are future indirect rewards such as peer recognition, self-marketability, and the potential for selling its related services or products and to improve their personal skills, capabilities, and knowledge base or by selling related products and services and career advancement (Holmström, 1999; Hars and Ou, 2002).

Open-source programmers may also be motivated by external factors. Social motives and norms found to be relate to individual levels of contribution in open source software projects (Bergquist and Ljungberg, 2001; Osterloh et al., 2004). Therefore, a vast number of studies focus on motivations in open source projects.

Applied to the open innovation intermediaries' context, there are only a few studies. Antikainen, Mäkipää and Ahonen (2010) resulted that intrinsic rewards are as decisive as monetary rewards. Similarly Antikainen and Väätäjä (2010) resulted that open innovation intermediaries both use monetary and non-monetary rewards. Similar to the Open source, in the case of open innovation intermediaries it is also reasonable to assume that users can have various types of motivations. However this is why a social psychological model is required to explore these motivations and their relations on the intention to participate. Thus with this research we aim to contribute to both open innovation and TPB literatures.

CONCEPTUAL MODEL: THEORY OF PLANNED BEHAVIOR

In this section, we discuss the definition and operationalization of the factors of our conceptual model. In the following section, their interrelationships will be discussed. We drew upon the literature about online intermediaries, Theory of planned behavior and open innovation for guidance in developing our conceptual model. The unit of analysis was an online open innovation intermediary and its community.

a. Development of the Model

i. TPB Definition

Psychology has various theories for predicting human behavior but among those the theory of reasoned action (Ajzen and Fishbein, 1980) and its extension, theory of planned behavior models (Ajzen, 1991) are one of the most commonly used in several research fields (Chang, 1998; Sheppard et al., 1984; Madden et al., 1992).

Both theories assume that people are systematically use information and act rationally. The main proposition is that an individual's behavior is determined by the individual's *behavioral intention* (BI) provides the most accurate prediction of behavior (Fishbein and Ajzen, 1975). In TPB behavioral intention is a function of three factors: *Attitude (A)*, *Subjective Norm* (SN) and *Perceived behavioral control* (PBC). The difference between these two theories is that the theory of planned behavior has perceived behavioral control as another factor of behavioral intention (Ajzen, 1991).

Attitude towards the behavior refers to the degree to which a person is favorable or unfavorable for that behavior. Subjective Norm is defined as the degree to which an individual perceives a behavior as a norm among the people who are important to him or her (Ajzen and Fishbein, 1980). Finally perceived behavioral control refers as the degree of difficulty or ease of performing a behavior (Ajzen, 1991). Thus the theory of planned behavior attempts to establish the relationships between attitudes, subjective norm, perceived behavioral control, and behavioral intention using confirmatory modeling techniques.

TRA model has two problems as Sheppard et al. (1988) pointed out; one is that the prediction of behavior from intention is problematic and second there is no conditions in the model for considering either the probability of failing to perform one's behavior or the outcomes of such failure in deciding one's intentions. Due to these problems, Ajzen (1985) extended the model into TPB which resolves these issues.

Although theory of planned behavior is an extension of theory of reasoned action, it fit better for the online open innovation intermediary context. This is due to perceived behavioral control's explanation power in predicting behavioral intention. Therefore, it is reasonable to believe that theory of planned behavior will provide a very good foundation for us to investigate the motivations of participators to open innovation intermediaries.

ii. Modifications

Figure A1 depicts our research model. Note that the model deviates in two major ways from standard TPB formulation in recognizing that attitude inherently involves intrinsic and extrinsic rewards and perceived behavioral control is posited to directly influence intention to participate.

Insert Figure A1 about here

Even though quite a few studies focused on users' motivations in various literatures, still research on motivations in online open innovation intermediaries is lacking. Therefore, our study focusing on the motivations for users to participate in online open innovation platforms context is a novel and essential opening towards holistic understanding and dissemination of open innovation.

iii. Hypotheses and Measures

The theories of reasoned action (TRA) and theories of planned behavior (TPB) have attitude and subjective norms constructs in the original formulations of their models (Ajzen 1991; Ajzen and Fishbein 1980). While most of the researches have analyzed how attitude and subjective norms influence our intentions, some has also examined the linear and nonlinear relationships that can exist between these two constructs in different contexts.

As Ajzen (1991) stated that TRA assumed a complementary relationship between attitude and subjective norms constructs, and this interaction effects were explicitly theorized in TPB. In the

majority of literature, the linear effects of attitude and subjective norms on intentions and behaviors have observed (Terry et al. 2000; Bansal and Taylor 2002; Grube and Morgan, 1990; Brown and Venkatesh, 2005). For instance, Bansal and Taylor (2002) observed a positive interaction between attitude and subjective norms in non-organizational context.

Only a few authors mentioned a negative relationship between behavioral beliefs that produce an attitude and normative beliefs that result in subjective norms in corporation settings (Fleming and Spicer, 2003; Titah and Barki 2009). The research of (Titah and Barki 2009) explored that when SN were high, increases in A had a decreasing marginal impact and vice versa. However as they noted, the contextual differences are important to take account while investigating the relations between attitude and subjective norms and the relations vary based on the contexts. Thus, it is important to highlight and take into account the relationship between A and SN and their impact on intention is different depending on the level of each construct.

> ***Hypothesis 1.*** *Attitude dominates over subjective norm when conforming the intention to participate.*

> ***Hypothesis 2.*** *The greater the subjective norm to participate in Crowdsourcing /Open Innovation contests, the more favorable the attitude towards participation will be.*

Divergences between self-assessment and reality have been most commonly researched in various fields (such as health, work, academic). Numerous researches in psychological analysis proposed that self-assessments about their actual behavior, skill and performance are often flawed. This is due to the fact that people generally tend to overrate themselves either because they do not have all the information they need to or they have it but cannot withstand objectivity (Dunning, 2005). This is why people tend to overestimate and see themselves above average. People also make overly optimistic assessments about their future behaviors and actions.

Most of the researchers found a weak correlation between self-assessments of knowledge, performance and skill against objective one (Chemers, Hu, & Garcia, 2001; DePaulo, Charlton, Cooper, Lindsay, & Muhlenbruck, 1997; Stajkovic&Luchins, 1998). For example, people's

views of their intelligence tend to correlate roughly .2 to .3 with their performance on intelligence tests and other academic tasks (Hansford & Hattie, 1982). Thus the correlation between perception and reality in many domains is moderate to meager and self-assessments may be flawed.

Hypothesis 3. *With the same motivations, there is a divergence between assessed participation and reality.*

Most of the studies in various contexts have analyzed and compared the intrinsic and extrinsic motivations. However the intrinsic and extrinsic motivations' components and their interaction with these constructs have not been analyzed extensively.

The subject of intrinsic motivation has been broadly examined in psychology (Deci and Ryan, 1999; Lindenberg, 2001). In Open Source software context, Lakhani & Wolf (2005) explored that intellectual stimulation derived from writing code, and improving programming skills are the main motives for participators. Intellectual challenge is an enjoyment based intrinsic motivation since enjoyable activities provide feelings of a challenge overcome and discovery (Lakhani & Wolf, 2003; Csikszentmihalyi, 1975). Furnham (2005) defined 4 different types of people based on their Psychology of behavior and one of them is expert who are highly knowledgeable and for the problems are an intellectual challenge. Programmers are these expert ones who enjoy the intellectual challenge of creatively overcoming or circumventing limitations like the participators of online intermediaries.

One would expect level of extrinsic motivation to positively influence the participator's degree of involvement, since the organization serves as a primary source of extrinsic outcomes. Further, one would also expect level of intrinsic motivation to positively influence the worker's degree of involvement.

Hypothesis 4. *Intellectual challenge dominates intrinsic motivations*

The literature on work behavior motivation generally deals with the means by which rewards enhance and sustain behavior. These rewards such as money, benefits, commissions, promotion, intellectual challenge, and enjoyment distinguished into two types; intrinsic rewards and extrinsic

rewards. In this study, money is considered as an extrinsic reward that includes direct or indirect monetary compensation as money, visibility and reputation.

As reinforcement theory of motivation states that behaviors of an individual such as work performance or motivation is a based on the consequences of their behavior such as payment. Thus the use of monetary incentives for motivation is derived from reinforcement theory (Skinner, 1969). Some studies explored that monetary rewards has constructive impact on motivation and innovativeness (Eisenberger, 1999; Laursen & Foss, 2003; Eisenberger & Armeli, 1997).

Alternatively, some researchers have criticized that monetary rewards can lead to an elimination or diminish in intrinsic motivations for a task (Deci, 1971; Amabile et al., 1996; Deci & Ryan, 1985; Ryan, Mims, & Koestner, 1983). This would also weaken the proactive innovativeness and creativity of people especially in the case of explorative tasks (Amabile, 1997). However most of these studies were mainly based on lab environments and there is not a general consensus about this.

Various studies analyzed the motivation of workers in real-world settings or in labs and commonly concluded that monetary rewards are the main motives (Jenkins, et al. 1998; Perry, et al., 2006; Srivastava, et al., 2001; Diener and Biswas-Diener, 2002). However these researches also noticed that employees are not only motivated by monetary compensations and it certainly does not provide superior performances. Perry, Mesch and Paarlberg (2006) suggested that while financial incentives improve performance, their effectiveness still depends on the conditions of organizations. Thus differences in institutional conditions impact the effectiveness of monetary incentives especially for service organizations.

> ***Hypothesis 5.*** *Extrinsic motivations dominate in competitions where the prize basically consists on monetary rewards*

An explanation of a rational participation choice would focus on the costs and benefits of participation for the individual and whether the benefits exceed the costs or not. However people do not always act rationally and their interpersonal relationships also affect their intentions.

These interpersonal relationships establish social and network pressures that are the two main constructs of subjective norms in TPB model. Thus in open innovation platforms, the perceived social pressure could be a result of social and network valuation such as organizational pressure and peer pressure from friends or work colleagues (Loughry & Tosi, 2008). These pressures are weighted by the participant's motivation to comply with these people. Superior pressure is described as the principle actor or the formal authority that can influence intentions of people (Yang , et al., 2007). Thus valuation of organization is can encourage the participation of people to online intermediary communities.

> ***Hypothesis 6.*** *The more favorable the organizational valuation towards participation, the more likely people will form positive intention toward participating in the open innovation communities.*

RESEARCH SITE AND METHODOLOGY

The aim of this research here is to explore the main motivations of users to participate in platforms of open innovation intermediaries. Given the novelty of the research problem, an explanatory study has been chosen as the research method. Following a study on Atizo, we have chosen a quantitative study to achieve an in-depth understanding of the underlying motives of users to participate in open innovation intermediaries.

Research Site

Like the other online open innovation intermediaries, Atizo has a web-based platform where it intermediates companies' challenges with ideas & solutions of creative people. Christian Hirsig, the CEO of Atizo, delineates their business model as a media company so their customer companies are paying for publication of their need as a challenge on the platform. The members of the community then submit their ideas online in where other users can also see and make comments so that the initial idea eventually develops collaboratively. After this online brainstorming phase users filter the ideas by voting and finally companies pick the best ideas among them and divide the award. This mechanism what makes Atizo distinctive from the most

of the innovation platforms that have a system more like an idea box where users individually drop their ideas without any collaboration.

Data Collection

Here the intention by conducting this research is to identify the main motives of users to participate in online innovation intermediaries. To achieve these, a variety of data was collected through structured in-depth interview with Christian Hirsig, CEO of Atizo, non-participant observations in their internet platform and log files.

To test the Theory of Planned Behavior (TPB) model in open innovation intermediary context, we conducted a Web-based survey on Atizo community. The initial version of the survey instruments was refined through a pre-test with MBA students of ESADE Business School, 2009-2010. Then we sent personalized e-mails to member of Atizo, inviting him or her to participate in the survey. The survey generated 113 responses (15 females, 98 males; mean age = 41 years) for a response rate of 18.3% and mainly from Germany, Austria and Switzerland. Most of the participants were full-time employees or freelancers and the rest were students. Users received 6.5 rewards on average for their submitted ideas. Then we examined our hypotheses by applying the partial least squares (PLS) method to the collected data.

We developed the items in the questionnaire by adapting the measures that had been validated by prior researches. TPB measures include items that assess attitude, subjective norm, and perceived behavioral control of intention to participate in open innovation intermediaries. Items that measure perceived pressures were added in the TPB measure section. Measures for intention, attitude, subjective norm, and perceived behavioral control were adopted and modified from Ajzen (1991) and Bock et al. (2001).

In this study, intention is referred as an individual's willingness to participate in an open innovation intermediaries. Thus stronger the intention is the more likely it will be to participate.

Attitude as an antecedent of intention is defined as the degree of an individual's favorableness of participating in an open innovation intermediary (Ajzen & Fishbein, 1980). As a significant predictor of intentions, subjective norm indicates the degree to which an individual perceives

participating in an open innovation intermediary. It is also a function of a person's motivation to comply the behavior and normative belief to perform the behavior (Ajzen and Fishbein, 1980).
As another antecedent of intention, perceived behavioral control is an individual's control over his/her participation in an intermediary (Ajzen, 1991; 1985). We created two items; external influence and interpersonal influence to measure subjective norm. Specifically extrinsic rewards and intrinsic rewards items were developed based on the study of Amabile (1994) on intrinsic and extrinsic motivations. The description of the set of constructs and their corresponding items is presented in Table A1 (Appendix A).

Research Method

The method of data analysis used in this study was partial least squares (PLS). Frequently used in motivation researches, PLS employs a component-based approach for estimations, to evaluate relationships within a structural equation model. PLS has a minimal restriction on sample size, measurement scales, and residual distributions (Chin et al. 2003). PLS was thus chosen since it is particularly useful for this research with small sample size. The statistical program SmartPLS (Chin 1998; Ringle et al. 2010) was used to perform the structural modeling analysis. A large number of studies on the theory of Planned behavior validated the use of SEM. Compared to alternative SEM techniques SmartPLS program has minimal demands in terms of sample size to validate a model. Thus we found highly appropriate to use SEM with SmartPLS Version 2.0.M3 program in our analysis (Ringle et al. 2010). For the items a five-point Likert scale is used anchored at each end with descriptors "strongly disagree" and "strongly agree". For some items (to measure participation) an eleven-point scale is used with the scales ranging from 0 to 10. Data was collected online.

ANALYSIS OF THE STRUCTURAL EQUATION MODEL

Measurement Validation

Prior to estimating the structural models, the measurement model was assessed separately for the each model with full sample. To assess the validity of our measurement model, we checked for

content validity and internal consistency. Content validity between the items and the existing literature was determined by the interview with CEO of Atizo and with a pre-test of the model. Additionally, backward translation was used to ensure consistency between the original English version of the instrument and the German version.

The relationships between the latent constructs and their items are analyzed with these measurement models. The loadings to their respective constructs are presented in Appendix A in order to examine the adequacy of the measures through analyzing the reliabilities of individual item. Even though Chin (1998) indicated that standardized loadings should be greater than 0.7 as a rule of thumb, it is not as rigid at early stages of scale development and loading of 0.5 still can be acceptable. Appropriately loaded items do not indicate the reliability of the items as a whole so composite reliabilities and Cronbach's alpha were calculated as well. The composite reliabilities were included as a contrast to alpha since it does not assume tau equivalency among the measures (Werts et al. 1974; Fornell & Larcker, 1981). Composite reliabilities ranged from 0.72 to 0.88. Except for the subjective norm, all values were above the benchmark value of .80. Even though subjective norm is below the benchmark value, 0.72 is acceptable but weak. We also checked the Cronbach's alpha values for the internal consistency of the instruments (See Table B2 in Appendix B). Internal consistencies of all variables are considered acceptable, ranging from 0.61 to 0.73, signifying tolerable reliability.

Convergent and discriminant validity is checked to assess the adequacy of the measurement models and this holds under two circumstances, (1) when the PLS indicators load larger than cross-loadings, and (2) when the square root of each construct's AVE is higher than its correlations with other constructs (Chin 1998). As shown in Table A3, all items loaded well on their respective factors, which are much higher than all cross loadings for the reflective latent variables. Since extrinsic, intrinsic and participation used as formative measurements then square roots of their average variance extracted is equal to 0,000. Secondly, as the Tables B2 shows that the square roots of all AVEs are above .50. Some of the constructs do not have AVE values since AVE can be calculated only for latent reflective constructs. This is why the formative constructs were checked through bootstrapping. These tests suggest that all measures have adequate convergent and discriminant validity. With the analysis of the measurement models completed, we move on to the structural models.

The Structural Model

The structural model analyzes the relationships between the various latent variables. Thus as following step, we estimated a series of structural models for the full sample. The approach that is selected is consistent with previous researches examining the motivations in various contexts. Our main structural models, TPB models, incorporated the effects of subjective norms, attitude and perceived behavior on intention to participate as a TPB model. However the model modified in two ways from standard TPB formulation, one is the inclusion of intrinsic and extrinsic motivations and the other one, networking as a component of Subjective norm to evaluate their impact on participation.

Initially two separate simple models were run: one using the real data and one using the assessed. They that solely focused on the affects of intrinsic and extrinsic motivations on participation, one with real participation data and one with assessed participation data. Subsequently two separate TPB models are used, one with real participation data and one with assessed participation data. Since, we had a chance to compare the difference. Table C1 and C2 display the structural model comparison for the real participation versus assessed participation based on PLS Algorithm and bootstrapping results. Even though the path impact for participation differed statistically in two models, the influence of the other constructs on the intention to participation was not distorted.

To evaluate the predictive power of the structural models, we checked for R squared (R^2) values' that indicates the amount of variance explained by the exogenous variables (Barclay et al. 1995; Cohen, 1977). Based on the results of PLS Algorithm technique, the R^2 values reflect the respective amounts of variance explained by full model. The results based on the structural equation modeling for the models were depicted in Figures C1, C2, C3 and C4. Here these figures display the factor loadings and R-Squares as a PLS result directly in the path model. Quality indicators for Model 1 (simple assessed model) represent a well explained model with an R^2 of 0.454 whereas R^2 drops significantly in Model 2 (simple real model) to 0.227. A similar state holds for TPB models, Model 3 (TPB assessed) has of 0.358 for participation but this drops to 0.107 in Model 4 (TPB real) with real data. Compared to the assessed participation model with real participation, social factors gain more importance compared to organizational factors. The loadings, quality criteria and t-statistics were presented in Appendix D.

To evaluate the goodness-of-fit indexes we performed confirmatory factor analysis (CFA) in SmartPLS. These are shown in Table E1 and E1. It was observed that both Small models fit the data well with high loading and low standard errors. The $\chi 2$ measure of model fit is 91.26 (df=41) for Model 1 and 140.25 (df=51) for Model 2, which are too small to reject the null of a good fit (p=0.00). Additionally the Comparative Fit Index (CFI_1= 0.92 and CFI_2= 0.85) and Incremental Fit Index (IFI_1=0.92 and IFI_2=0.85) are low which is due to the sample size but still they can be marginally acceptable. Using a cut-off rule of .05, the RMSEA is acceptable to indicate a good fit.

TPB models fit the data well with the $\chi 2$ measure of model fit is 364.40 (df=155) for Model 3 and 432.16 (df=174) for Model 4, which are too small to reject the null of a good fit (p=0.00). Even though CFI_1 (0.99), CFI_2 (0.84) and $RMSEA_1$ (0.09), $RMSEA_2$ (0.1) are slightly low still they can be marginally acceptable. In this model, Incremental Fit Index (IFI_1=0.89 and IFI_2=0.84) which is based on the comparison of the fit of a substantive model to that of a null model is at acceptable parameters. Consequently all these indexes are at acceptable levels (Kline 2005; Bynre 2001; Hu and Bentler 1999).

Using a bootstrapping technique, path estimates and t-statistics (two-tail) were calculated for hypothesized relationships. Results suggest that the models are credible and Subjective Norms, Attitude and Perceived Behaviour Control influence the intention to participate and that has a significant effect on the participation decision (See Table D1 and D2). The path of Model 1 (simple assessed model) is highly significant with t-values 9.676 (intrinsic) and 4.958 (extrinsic). Then again this significantly changes with real participation data in Model 2 (simple real model) to 4.061 (intrinsic) and 5.169 (extrinsic). For the both TPB models the t-values are roughly same and highly significant.

RESULTS

The preceding piece has presented an analysis of the factors affecting the intention to participate in open innovation intermediaries. The results for the measurement model support the reliability and validity of the instruments. Through this Atizo case, the main motives for participation in

online open innovation intermediaries were revealed and could be further used to improve the participation rate. Thus this study provides an evolutionary perspective on users' participation into online open innovation intermediaries. Table F1 summarizes the results of hypotheses testing.

Insert Table F1 about here

The results support the Hypotheses 1 and 2 that Attitude dominates over subjective norm and as subjective norm increases people will have more sympathetic attitude towards participation. In the case of comparison between the impacts of attitude with subjective norm, it is noticed that the marginal influence of Attitude (0,609) on intention to participate is higher than the marginal influence of Subjective norm (0,254). This instance holds also in real TPB model. We also observed that an increase in Attitude while holding SN constant would produce a slightly higher intention than the vice versa.

In simple real Model 2 it is observed that extrinsic motives dominate over intrinsic motives. In intrinsic, community membership (0.802) and intellectual challenge (0,685) dominate. In extrinsic motives, loadings of monetary rewards and money have increased while reputation lowered. Thus there is a clear divergence between real and self-assessed participation motives (See Table C1).

Whereas this divergence in motives is not the case within TPB models which supports the Hypothesis 3 (See Table C2). In both real and assessed TPB models intrinsic dominates with same loadings 0,812. Actually the loadings of all the constructs are relatively similar. Attitude translates to intention fairly well and SN has a positive effect. However PBC become negative in real TPB model. Explanation of intention to participate and R^2 of participation lowers in real TPB model as well. In intrinsic, enjoyment (0.90) and intellectual challenge (0.68) dominates. Thus these findings contradict with the hypothesis 4 that intellectual challenges do not dominate other intrinsic motives, suggesting that enjoyment is more crucial for the participators. In extrinsic, money dominates as in the simple models.

Generally it is expected that the extent of effect of extrinsic motivations on participation is to dominate over intrinsic motivations. However in Model 1 (simple assessed) we observed that in terms of participation that this belief does not hold as much as it is expected to be. Based on the results, intrinsic motives dominate over extrinsic motives. Enjoyment and personal development are the two leading intrinsic motives with 0, 75 and 0,758 loadings. Out of extrinsic motives, money (0.894) and to a lesser extend personal visibility (0,486) dominates extrinsic.

Offering monetary rewards is certainly an important component of member motivation. Motivation to participation is one thing that can be achieved by the money but for an enduring participation entails more than just monetary rewards. The results of the first model show that intrinsic motivations dominate the extrinsic ones based on self assessment participation. However this relation reverses with real participation data. Thus our hypothesis 5 holds as extrinsic motivations dominate in competitions where the prize basically consists on monetary rewards as it has the highest loadings (0.92). This study has also shown that extrinsic reward, money, alone is not the only motivation for members but also intrinsic motivations such as affiliation and intellectual challenge based on real data.

For the hypothesis 6, we analyzed the impact network and organizational valuation on intention to participation. Here we explored that organization pressure positively influenced the participation intention but the peer pressure was positive but insignificant. These results imply that the pressure from organization did substantially motivate individuals to participate in online intermediaries. Here we advanced our understanding of how social valuation affects participation by examining the organizational pressure's mediating effect. Results of our analysis are consistent with our hypothesis 6 and provide insights into the process by which the appeals affect individuals' decisions to help. Through further research we can analyze how the changes in levels of organizational and peer pressure can impact motivation to participate.

DISCUSSION

The objective of this study has been to extend literatures of intermediaries, TPB and open innovation. Accordingly, we (1) revealed main motivations of user to participate in online innovation intermediaries, (2) applied these motives in TPB model based on both real and self – assessed data while extending the boundaries of literature on TPB and Open innovation with a unit of analysis of individual and (3) examined the relations between constructs such as Attitude and Subjective Norm and how these impact on the intention to participation. We further contributed to the collective understanding of intentions to participation in online innovation intermediaries by analyzing the impact of social and network valuations on participators.
Predominantly, the following findings have important implications and require further research.

- Divergences between self-assessment and reality have been clearly observed among our results. This is also consistent with the previous literature (Chemers, Hu, & Garcia, 2001; Stajkovic&Luchins, 1998). This could be due to the fact that participators overrate their participation and their future commitment. Another reason could be the heterogeneity of the community. We may have a composite measure that leads differences in attitude. This indicates that certain groups in the community tend to participate more than other. It is due to the fact that people have different motives and that can lead them to be grouped separately for the sake of homogeneity of groups. Thus cluster analysis is required for the further analysis of TPB model in online communities.

- Apart from providing an additional scope for research on TPB, the analysis intellectual challenge may have another measurement benefit. Similarly intellectual challenge may vary based on different clusters, different types of participators. Like this, evaluating the differences in motivations for each cluster could be an important achieves more accurate implications. Thus further research is required to investigate different group motives.

- The explanation power of TPB model is high with self assessed data. However we observed that TPB model fails to explain real participation. Criticisms on the TAM model studies was also focusing on the fact that self-assessed data is subjective measure and

cannot be reliable compared to real actual data (Legris, Ingham and Collerette, 2003, Yousafzai, Foxall, and Pallister, 2007). Still most of the studies on TAM employ self-assessed data.

- It should also be noted that comparative impact of Attitude and SN could be diverse in different contexts, environments. There are a number of possible reasons why subjective norms have less impact on intentions compared to attitude in this study. Firstly it can be due to the absence of past experience such as shared norms in virtual environments. Secondly, the geographical dispersion leads differences in norms. Since it is a diverse community, acknowledging that among participators may reduce the impact of norms. Finally people do not necessarily behave according to the same social norms of real and virtual worlds. The impact of social norms may also in virtual worlds. These could be the possible explanations why Attitude dominates over SN in online intermediary communities.

This research bears key implications for practitioners as well. Intermediaries are interested in how to attract and sustain more people for the participation into their online communities. Since with more people, they could attract more organizations to submit their challenges. Organizations are interested in attaining best results in a short time period. Thus the number of participators and their engagement is crucial for intermediaries. Based on our results, it is acknowledged that intrinsic motivations such as enjoyment and intellectual challenge are crucial for participators and for attracting them. This can be accomplished by providing an intermediary mechanism that would support these specific motives. There should also be an active support for the collaboration and networking among members during contests in online platforms. Thus this research emphasized that extrinsic rewards, such as money, are not necessarily the primary motive for participation and require supporting mechanisms for other motives.

One potential limitation of the present research is that our findings may well be vulnerable to the threat of single source bias. It is also necessary to examine the generalizability of these findings to other intermediary communities. Attitudes and norms are dynamic measures rather than static.

Thus this study may not be able to fully capture the intention and require longitudinal studies to examine how these dynamic measures evolve over time.

Eventually there are a number of future research directions as implied by the implications, limitations and results of this study. As mentioned previously, the generalizability of these findings in other intermediary platforms, particularly larger and international ones, needs to be studied for the robustness of the findings. Another key direction for future research is to further understanding along the dimensions of affiliation and networking and how the changes in levels of external pressures can impact intentions. Thus cluster analysis is required for the further analysis of TPB model in online communities. As indicated under implications, cluster analysis is required to gather homogenous groups and further analyze TPB models to check whether it is flawed or not. Also through clustering we could evaluate the differences in motivations for each cluster and how it differs.

CONCLUSIONS

Neoclassical economics portrays individuals as utility maximizers in a given set of preferences (Smelser and Swedberg 1994). However, the importance of the behavioral aspects and social network effects has been largely stressed recently. In this research we aim to precisely look at this behavioral aspect when elucidating the motives and intentions for participating in Crowdsourcing/Open Innovation contests.

Two main constructs in our model aim to capture these aspects, the attitude and the subjective norm. There, extrinsic rewards are a mere component in the model and not precisely the most important one. We can observe how intrinsic rewards and networking affect the construct Intention to participate in a more pronounced way than monetary rewards. This contrasts sharply with the established motivations in the actual platforms and the lack of elements allowing the expression and development of what, according to the model, constitute the main motivators.

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Appendix A

Figure A1. Research Model

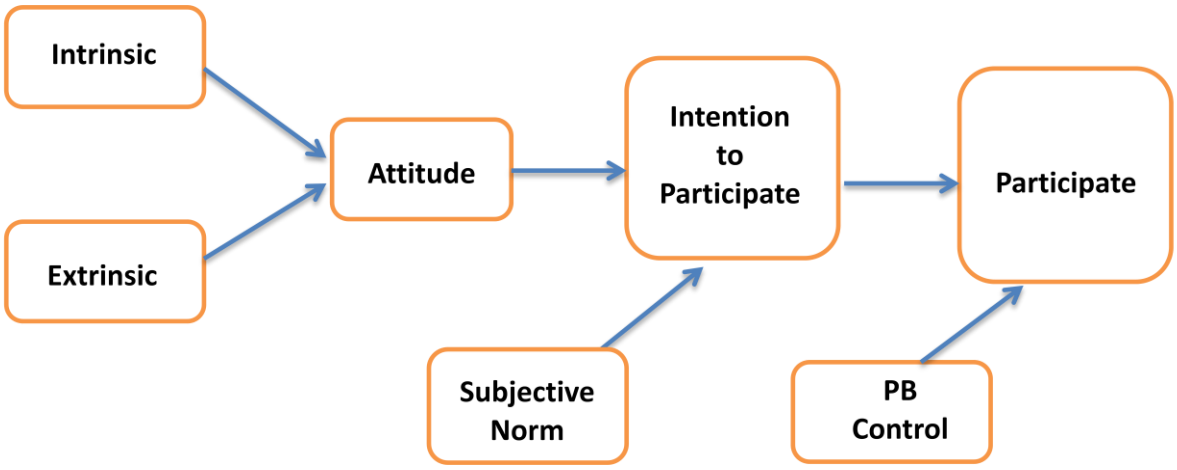

Table A1. Scale Items Used

Construct (with reference)	Definition	Item	Wording	Loadings			
				Model 1. Simple assessed	Model 2. Simple real	Model 3. TPB Assessed	Model 4. TPB Real
Intrinsic Motives (Amabile, 1994; Berlyne, 1971; Reeve et al., 1986; Kim & Lee,1995; Koys & Decotiis,1991)	The degree to which an individual is motivated to engage in work primarily for its own sake because the work itself is interesting, enjoyable, engaging, or satisfying	IN1	For me to participate in innovation contests is, Pleasant / Unpleasant	0,75	0,3747	0,9038	0,9039
		IN2	Participating in innovation contests will be beneficial for my personal development	0,7581	0,4442	0,5172	0,5172
		IN3	Through participating in innovation contests I will feel a member of a community	0,5024	0,8025	0,3784	0,3783

		IN4	I expect that I will enjoy solving problems and generating new ideas in innovation contests	0,6918	0,7542	0,6851	0,6849
Extrinsic Motives (Amabile, 1994; Berlyne, 1971; Lepper& Greene, 1978; Gomez-Mejia and Balkin, 1990; Malhotra & Galletta,1999)	The degree to which an individual is motivated to engage in work in response to something apart from the work itself, such as monetary rewards or recognition or other tangible incentives	EX1	Participating in innovation contests will increase my reputation	0,1915	0,0542	0,4214	0,4218
		EX2	I participate because I need to	-0,1274	0,0825	-0,1982	-0,1979
		EX3	Through participating in innovation contests I think I could increase my personal visibility	0,4867	0,4044	0,3237	0,324
		EX4	I will receive some money for my participation in innovation contests	0,8945	0,9251	0,9288	0,9287
Attitude (Ajzen & Fishbein, 1980; 1975, 1981; Price & Mueller, 1986; Robinson & Shaver,1973)	The degree of an individual's favorableness of participating in an intermediary	AT1	My participation in innovation contests is valuable to me	-	-	0,9133	0,9138
		AT2	I have a positive attitude towards participating in innovation contests	-	-	0,8598	0,8591

Subjective Norm (Ajzen 1991; Mathieson 1991; Taylor &Todd 1995)	The degree to which an individual perceive participating in an open innovation intermediary	SN1	Most people whose opinion I value think that participating in innovation contests is important	-	-	0,4721	0,4684
		SN2	Most people value participation in innovation contests as an important issue	-	-	0,4476	0,4357
		SN3	My organization promotes participation in innovation contests	-	-	0,7529	0,7583
		SN4	My organization values participation in innovation contests	-	-	0,8259	0,8294
Perceived Behavioral Control (Ajzen, 1991; 1985)	The degree of an individual's control over his/her participation in an intermediary	PBC1	My organization allows me to participate in innovation contests	-	-	1	1
Intention (Ajzen & Fishbein, 1980; Lee & Green 1991; Constant et al., 1994; Dennis, 1996; Feldman & March, 1981)	The degree of an individual's willingness to participate in an open innovation intermediaries	IP1	I will try to participate in innovation contests more frequently in the future	-	-	0,6123	0,6616
		IP2	I plan to participate more in innovation contests in the future	-	-	0,8781	0,8515
		IP3	I intend to participate in innovation contests more in the future	-	-	0,8949	0,8715

Participation (Subjectitve)	Assessed participation data based on questions that measure their participation level	PAR1	How often do you participate in innovation contests?	0,8468	-	0,7683	-
		PAR2	How often do you check/log in into innovation contests?	0,9152	-	0,9798	-
		PAR3	How often do you provide a new idea/solution in innovation contests?	0,9393	-	0,8912	-
Participation (Real)	Real data of ideas, projects, comments, ratings	PAR ideas	Based on the real participation data collected from Atizo log files; number of ideas provided, projects completed, comments given and ratings done	-	0,8323	-	0,7768
		PAR projects		-	0,9063	-	0,7799
		PAR comments		-	0,7505	-	0,8068
		PAR ratings		-	0,8807	-	0,8957

Table A2. Correlations among the latent variables for two simple models

		Extrinsic	Intrinsic	Participation
Simple Model – Assessed	**Extrinsic**	1		
	Intrinsic	0,3206	1	
	Participation	0,477	0,6034	1
		Extrinsic	**Intrinsic**	**Participation**
Simple Model – Real	**Extrinsic**	1		
	Intrinsic	0,3006	1	
	Participation	0,4178	0,3444	1

*All correlations are significant at $p = 0.05$.

Table A3. Correlations among the latent variables for two TPB models

		Attitude	Extrinsic	Intention to Participate	Intrinsic	PB Control	Participation	Subjective Norm
TPB Model - Assessed	**Attitude**	0,8869						
	Extrinsic	0,3429	0,000					
	Intention to Participate	0,6357	0,3807	0,8055				
	Intrinsic	0,8354	0,3363	0,7003	0,000			
	PB Control	0,1095	0,2175	0,2025	0,1475	1		
	Participation	0,4903	0,4595	0,5894	0,5383	0,222	0,000	
	Subjective Norm	0,1042	0,1186	0,3177	0,1676	0,5131	0,1554	0,6465
		Attitude	**Extrinsic**	**Intention to Participate**	**Intrinsic**	**PB Control**	**Participation**	**Subjective Norm**
TPB Model - Real	**Attitude**	0,8869						
	Extrinsic	0,3428	0,000					
	Intention to Participate	0,6499	0,3728	0,8004				
	Intrinsic	0,8356	0,3362	0,7154	0,000			
	PB Control	0,3592	0,1485	0,2505	0,3769	1		
	Participation	0,2004	0,3331	0,269	0,2399	-0,1124	0,000	
	Subjective Norm	0,1071	0,1206	0,3222	0,1697	0,0292	0,0062	0,6466

* All correlations are significant at $p = 0.05$.
**The shaded numbers in the row of diagonal are the square roots of the average variance extracted.

Appendix B

Table B1. Scale Reliability Comparison for simple models (assessment of measurement model)

	Simple Model- assessed					Simple Model- real				
Variable	AVE	Composite Reliability	Cronbachs Alpha	Mean	Standard Deviation	AVE	Composite Reliability	Cronbachs Alpha	Mean	Standard Deviation
Intrinsic	0	0	0	0,32	0,0519	0	0	0	0,2582	0,0592
Extrinsic	0	0	0	0,5095	0,0637	0	0	0	0,3697	0,0668
Participation	0	0	0			0	0	0		

Table B2. Scale Reliability Comparison for TPB models (assessment of measurement model)

	TPB - assessed					TPB - real				
Variable	AVE	Composite Reliability	Cronbachs Alpha	Mean	Standard Deviation	AVE	Composite Reliability	Cronbachs Alpha	Mean	Standard Deviation
Intrinsic	0	0	0	0,8118	0,0228	0	0	0	0,8108	0,0235
Extrinsic	0	0	0	0,0743	0,034	0	0	0	0,075	0,0356
Attitude	0,7867	0,8805	0,732	0,6069	0,0322	0,7866	0,8804	0,732	0,6188	0,0297
Subjective Norm	0,518	0,7284	0,618	0,2585	0,0429	0,5181	0,7273	0,618	0,2626	0,0418
PB Control	1	1	1	0,1084	0,0551	1	1	1	-0,2013	0,0686
Intention to Participate	0,6489	0,8438	0,7096	0,5716	0,0457	0,6407	0,8406	0,7096	0,3231	0,0518
Participation	0	0	0			0	0	0		

Appendix C

Figure C1. Simple Model based on assessed participation

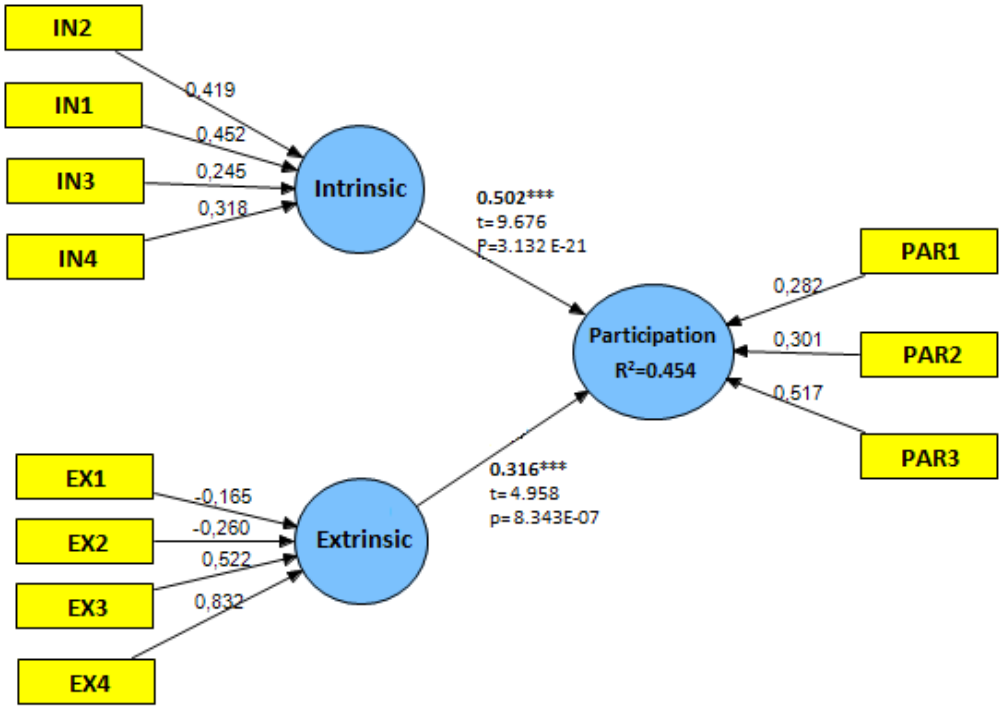

Figure C2. Simple Model based on real participation

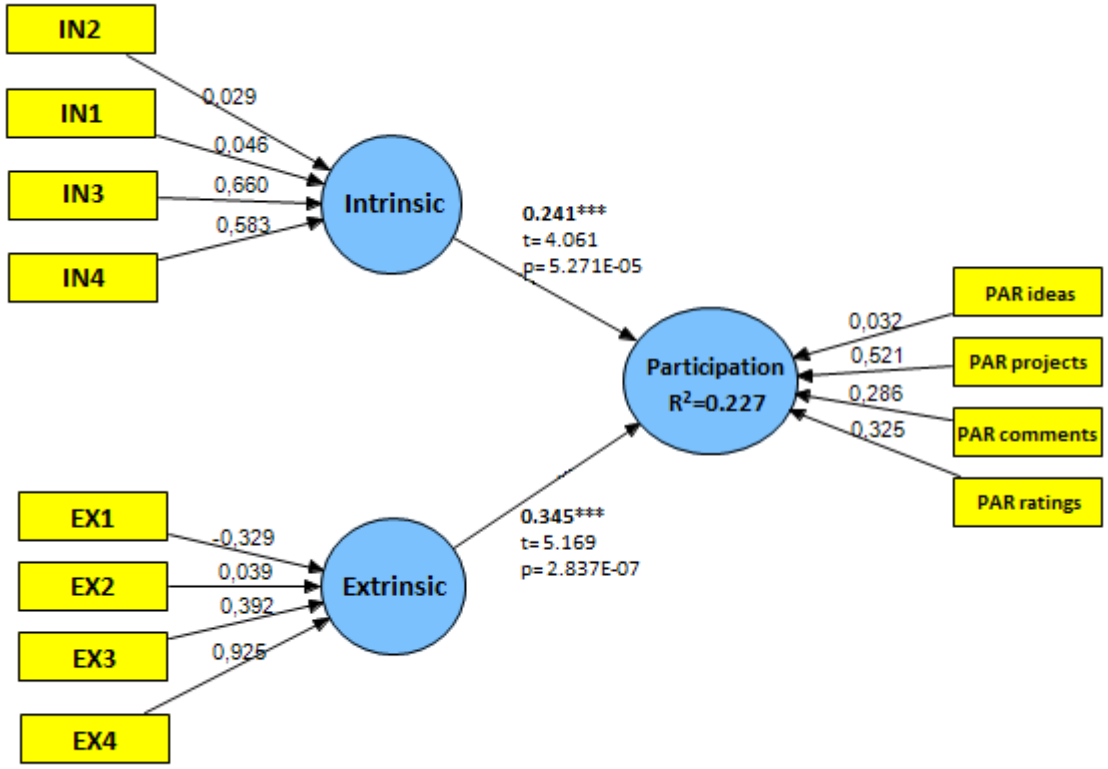

Table C1. Comparison of models

Construct	Item	Loadings	
		Model 1. Simple assessed	Model 2. Simple real
Intrinsic Motives	IN1	0,75	0,3747
	IN2	0,7581	0,4442
	IN3	0,5024	0,8025
	IN4	0,6918	0,7542
Extrinsic Motives	EX1	0,1915	0,0542
	EX2	-0,1274	0,0825
	EX3	0,4867	0,4044
	EX4	0,8945	0,9251
Participation (Subjective)	PAR1	0,8468	-
	PAR2	0,9152	-
	PAR3	0,9393	-

Participation (Real)	PAR ideas	-	0,8323
	PAR projects	-	0,9063
	PAR comments	-	0,7505
	PAR ratings	-	0,8807

Figure C3. TBP for assessed participation

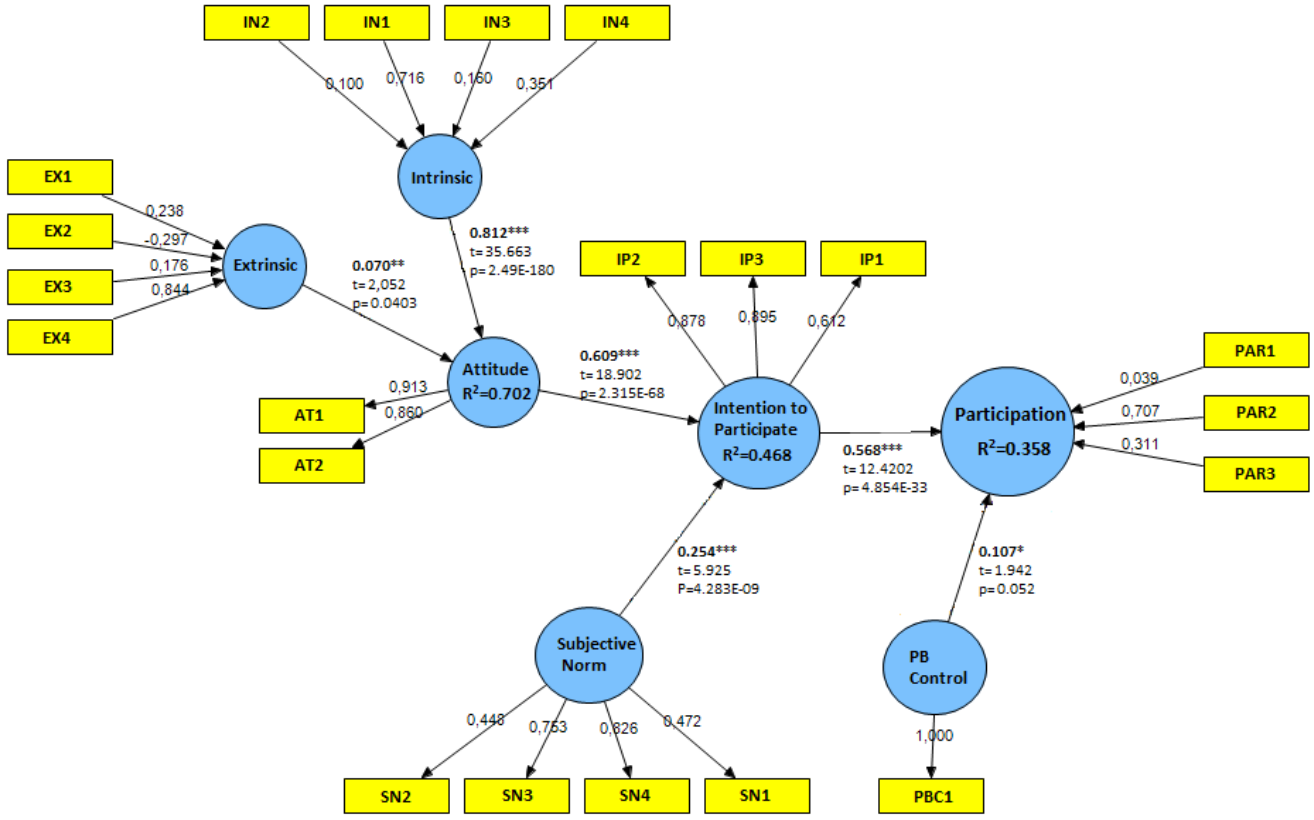

Figure C4. TBP for real participation

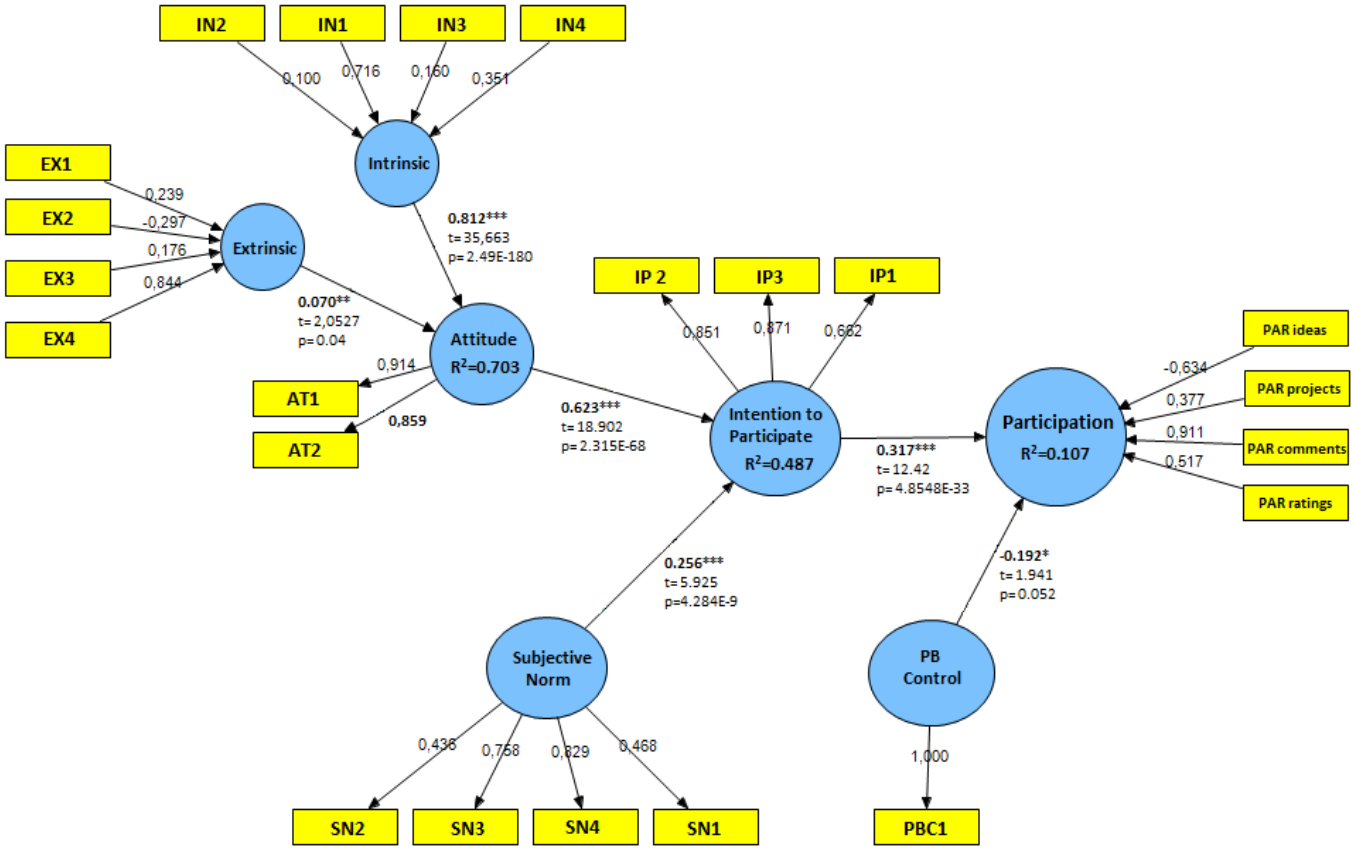

Table C2. Comparison of models

Construct	Item	Loadings	
		Model 3. TPB Assessed	Model 4. TPB Real
Intrinsic Motives	IN1	0,9038	0,9039
	IN2	0,5172	0,5172
	IN3	0,3784	0,3783
	IN4	0,6851	0,6849
Extrinsic Motives	EX1	0,4214	0,4218
	EX2	-0,1982	-0,1979
	EX3	0,3237	0,324
	EX4	0,9288	0,9287

Attitude	AT1	0,9133	0,9138
	AT2	0,8598	0,8591
Subjective Norm	SN1	0,4721	0,4684
	SN2	0,4476	0,4357
	SN3	0,7529	0,7583
	SN4	0,8259	0,8294
Perceived Behavioral Control	PBC1	1	1
Intention	IP1	0,6123	0,6616
	IP2	0,8781	0,8515
	IP3	0,8949	0,8715
Participation (Subjectitve)	PAR1	0,7683	-
	PAR2	0,9798	-
	PAR3	0,8912	-
Participation (Real)	PAR ideas	-	0,7768
	PAR projects	-	0,7799
	PAR comments	-	0,8068
	PAR ratings	-	0,8957

Appendix D

Table D1. Summary of Simple Models

		Simple Model- assessed				Simple Model- real			
		R Square	T Statistics	Standard Error	Path Coeffients	R Square	T Statistics	Standard Error	Path Coeffients
Variable	Intrinsic	0	9,6765***	0,0519	0,5021	0	4,0609***	0,0592	0,2406
	Extrinsic	0	4,9585***	0,0637	0,3161	0	5,1693***	0,0668	0,3455
	Participation	0,4537			0	0,2272			0

(*** significant at 0.001)

Table D2: Summary of Theory of Planned Behavior Models

		TPB - assessed			TPB - real		
		R Square	T Statistics	Standard Error	R Square	T Statistics	Standard Error
Variable	Intrinsic	0	35,6626***	0,0228	0	34,6228***	0,0235
	Extrinsic	0	2,0527**	0,034	0	1,9612*	0,0356
	Attitude	0,7023	18,9019***	0,0322	0,7025	20,9276***	0,0297
	Subjective Norm	0	5,9254***	0,0429	0	6,1152***	0,0418
	PB Control	0	1,9415*	0,0551	0	2,7963***	0,0686
	Intention to Participate	0,468	12,4202***	0,0457	0,487	6,1238***	0,0518
	Participation	0,3584			0,1068		

(*** significant at 0.001; **significant at 0.05; *significant at 0.01)

Appendix E

Table E1. Goodness of Fit for Simple Models

Model	Degrees of Freedom	Chi-square	RMSEA	CFI	IFI	NFI	RMR	NNFI	90 % Confidence Interval for RMSEA
Simple Model – Assessed	41	91.26 (P = 0.00)	0.10	0.92	0.92	0.86	0.099	0.89	(0.073 ; 0.13)
Simple Model – Real	51	140.25 (P = 0.00)	0.12	0.85	0.85	0.79	411.45	0.81	(0.094 ; 0.14)

Table E2. Goodness of Fit for TPB Models

Model	Degrees of Freedom	Chi-square	RMSEA	CFI	IFI	NFI	RMR	NNFI	90 % Confidence Interval for RMSEA
TPB - assessed	155	364.40 (P = 0.0)	0.099	0.89	0.89	0.83	0.096	0.87	(0.085 ; 0.11)
TPB – Real	174	432.16 (P = 0.0)	0.10	0.84	0.84	0.76	230.24	0.81	(0.090 ; 0.12)

Appendix F.

Table F1. Summary of Hypothesis Tests

Hypothesis	Remarks
H1: Attitude dominates over subjective norm when conforming the intention to participate.	***Supported***
H2: The greater the subjective norm to participate in Crowdsourcing /Open Innovation contests, the more favorable the attitude towards participation will be.	***Supported***
H3: With the same motivations, there is a divergence between assessed participation and reality	***Supported***
H4: Intellectual challenge dominates intrinsic motivations	***Not Supported***
H5: Extrinsic motivations dominate in competitions where the prize basically consists on monetary rewards	***Supported***
H6: The more favorable the organizational valuation towards participation, the more likely people will form positive intention toward participating in the open innovation communities	***Supported***