Collaborative Filtering of Ideas in Web 2.0 based Online Communities: A Conceptual Analysis

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***Abstract*— For firms, the fundamental problem of idea selection still remains i.e., selecting a wrong idea and investing resources and time on it for further development (alpha error) or missing/filtering out the best ideas/opportunities (beta error). Moreover, firms are increasingly involving users in the idea-generation process, which is only leading to an overload of ideas, where selecting the most promising idea is like looking for a needle in a haystack. However, emerging empirical evidence from firms suggests that ideas can be selected as a collaborative process in web 2.0 based online communities, and they are found to overcome not only both alpha and beta errors (i.e., at the "fuzzy front end") but communities can also be used as a test market to predict new product success or failure (i.e., during the last stages in new product development) of products or services. Therefore, this study investigates - "under what conditions such collaborative filtering of ideas (idea selection) takes place in online communities? The findings would help convince firms to build and use their brand communities for idea selection.**

Keywords: Idea Selection, Idea quality, Online Community, Experts, Collective choice, User ratings

I. INTRODUCTION AND RESEARCH QUESTION

Advancements in ICT and especially web 2.0 technologies, which allows interaction two ways or more, facilitate not only the consumers to organize themselves as online communities (ex. brand communities) but also for firms to invite idea submissions from consumers. Communities are built around brands (brand communities) or on just about any interesting topic and formed by group of people with shared common interests, and they discuss on those topics (14). Researchers and practitioners alike have focused on harvesting the benefits that firms obtain from such online communities (10; 13). Firms, in their effort to develop new ideas for product development, are increasingly involving consumers/users (also communities)/employees/experts in their idea generation process, as firms are now aware of the fact that users possess the most important but 'sticky' need or problem-knowledge (24). Some of such new idea generation methods are Idea generation contests, innovation contests, idea submission contests, etc. (Examples of firms using such idea-generation methods are; P&G connect and develop, GM Idea submissions, Nokia Beta Labs, Google idea submissions, etc. This idea generation process results in thousands of ideas with varying degrees of usefulness and innovativeness, leaving the Firm's NPD team with a mammoth task to evaluate these ideas and select the best promising idea in order to focus its limited resources on those with the highest potential which is both expensive as well as time consuming (22).

However, empirical evidence from firms suggest that this problem (alpha and beta error) can be minimized to a great extent and sometimes even overcome by *collaborative filtering of ideas or selecting the most promising ideas as a result of collective decision process* by involving web 2.0 based online communities in the idea screening/selecting process. According to Abony (1), the fundamental advantage of the filtering approach is that it increases the likelihood of identifying and/or generating collective choice agreement while minimizing the strategic use of misinformation. Online communities are free and open to public including customers, professionals, experts, hobbyists, novices, etc., and the desire for community members to compete for status within community or their self-interest, reflecting their role as a user of the innovation, will make up their nonfinancial motives (11; 21; 24).

Empirical evidence for collaborative filtering and evaluating of ideas by firm is noticed in online communities. For example- in the online community called '*BMW Connected drive-customer Innovation lab'* the customers are invited to evaluate each idea posted on this site and to even make further suggestions to an existing idea. Later a team of BMW experts will further evaluate the proposals, before developing the idea into a feature or prototype. Other examples of online communities where collaborative filtering including prototype testing is noticed in firms are; my STARBUCKS IDEA, Idea Storm from DELL, Google labs, American Express Lab, Google Project 10, etc., to name a few. Existing theories do not explain this new phenomenon of collaborative filtering using communities and also under what conditions such communities can filter ideas collaboratively. This study is trying to fill this theoretical gap and find the answer to the question *"Can the collective*

ISBN: 978-81-923777-9-7

decision taken by the community help to overcome both the alpha error and beta error and help select the most promising idea? And under what conditions does this collaborative filtering takes place?" Moreover, in user-communities decisions are made in a social context and not as an individual, which means the decision made by one member can affect the decision of another in the community (ex. Herd effects). Thus, this study will look into the social influence of collective decisions.

II. LITERATURE REVIEW

Researchers have investigated the success and failure factors of new product development (8). Though all these researches have focused on different settings and various factors responsible for the fuzziness, they all agree to the fact that the final outcome (success or failure) of innovation and new product development rests on very early stages of innovation i.e. Idea generation and Idea selection. However, the scope of this paper is limited to Idea selection only and especially in the context of an overload of ideas.

Current theories explains the process of how idea screening and selection process take place in companies (E.g., single task vs. Multitask (16); one step vs. two step process; Individual vs. group, etc. (9)). Selection process being objective or relative to other ideas (20) and hence under what conditions each of these processes are most productive in screening and selecting the best ideas/opportunities. Existing literature shows how Idea selection is done in groups, teams, individual and brainstorming (2; 9; 16; 22). The traditional approach of idea screening is to ask one or a few experts to go over the transcripts of ideas and evaluate them (23). However, experts' judgments might not always reflect consumers' needs and preferences. To avoid costly product failures, Toubia and Flores (22) has proposed a practical approach to involving consumers in idea screening. Terwiesch and Ulrich (20) have demonstrated how innovation contests open to public, help in creating and selecting exceptional opportunities. Prior research in economics suggested that having many solvers working on an innovation problem will lead to a lower equilibrium effort for each solver, which is undesirable from the perspective of the seeker. However, in contrast to this, Terwiesch and Yi (21) in their article have established that an innovation solution seeker can benefit from a larger solver population because he obtains a more diverse set of solutions, which mitigates and sometimes outweighs the effect of the solvers' underinvestment in effort.

Collaborative filtering of ideas in communities as a collective decision process:

Online communities are free and open to public including customers, professionals, experts, hobbyists, novices, etc., and the desire for community members to compete for status within community or their self-interest, reflecting their role as a user of the innovation, will make up their nonfinancial motives (11; 24). According to Abony (1), filtering is a non-optimizing basis for collective choice and that filtering is conceptually a simple approach to collective decision whose basic principles may be implemented via a variety of interactive methods.

A community make their collective choice using the features or toolkits available on the online community such as voting (Number of votes), time (spent on individual ideas), Ratings (distribution of ratings), length of comments, overall rank, etc. These quantitative indicators are the independent variables used to predict the quality of ideas which are selected by the community. A promising idea is one which is not only a good idea but it is also an idea which is useful and appealing to the firm. Thus a promising idea to one firm need not necessarily be the same for a different firm. Thus, evaluating and selecting the most promising idea, requires several dimensions to judge the 'quality' of ideas or to differentiate what is a good idea for a given firm? In this study 'quality' means the quality of the best selected idea and not the average quality of all the ideas generated

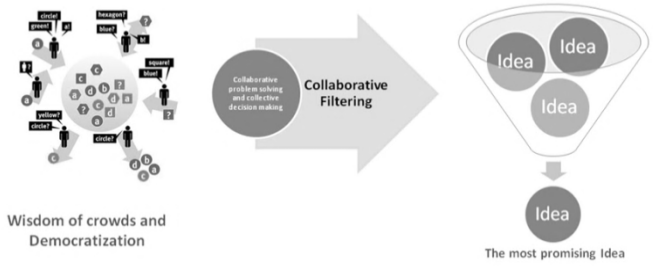

Figure 1: Collaborative filtering of ideas (proposed)

III. PROPOSITION DEVELOPMENT

Based on the research objective, three different unit of analysis is identified as required for this study. They are 1) Quality of ideas, 2) Idea selection process, and, 3) Toolkits or user interface. Propositions are developed separately for each unit of analysis below;

1. Propositions development at the level of Quality of ideas: Different researchers have studied 'quality' of ideas using different dimensions and constructs such as effectiveness, novelty, workability, relevance, specificity, etc. Although a variety of constructs and methods have been used for idea assessment, these constructs map to one of the four primary dimensions identified by MacCrimmon and Wagner (12): novelty, workability, relevance and specificity (4). Different 'ideas' needs different expert 'skills' to evaluate them, or in other words, one cannot be an expert for assessing

ISBN: 978-81-923777-9-7

all the 'ideas' for new products. This means, the nature of idea that are to be screened and selected will determine the type of expert needed for that specific idea. The traditional approach of idea screening is to ask one or a few experts to go over the transcripts of ideas and evaluate them (23). However, experts' judgments might not always reflect consumers' needs and preferences. Moreover, since community is a heterogeneous mix of people who include users, consumers, hobbyists, novices, experts and opinion leaders, etc., will provide adequate need-information necessary for idea selection. Thus;

Proposition 1: *Expert user participation in a specific idea selection has a positive effect on the quality of idea selected*

Brand communities are members of users of a specific product or service. Such members know the product very well and also the culture and value of firms. In such cases, they are better at selecting the ideas which are relevant and effective though not necessarily novel. Ideas selected by brand communities could be mostly incremental in nature. Thus;

Proposition 2: *Brand-specific communities are relatively better or effective than other types of communities in collaborative filtering of ideas for new products.*

2a: *However, the chances are, they select ideas which are incremental in nature since community members' participation is based on their use-context.*

Contrary to brand communities, other open communities (i.e., non-brand specific e.g., multi-brand based communities) are not bounded to any specific brands and the ideas discussed are non-specific to any firms. The nature of ideas selected by open communities are not biased towards any product and hence they are more novel and chances of producing or selecting ideas for radical innovation is very high as compared to brand communities. Thus chances are that some of the members are even lead users. Thus;

Proposition 3: *Non-brand specific communities can help screen ideas that are radical in nature, as compared to brand communities.*

2. Proposition development based on the Idea selection process: The outcome of idea selection is dependent on two factors: the quality of the available ideas, and the quality of the selection process (16). Selecting the most promising idea is the most difficult task and it determines the eventual outcome (success or failure) of the Innovation process and new product development. There are different types of idea selection processes in practice and each one of them is useful only in specific context. For example, there are individual brainstormers whose ideas are pooled and group brainstormers, where ideas are evaluated in small groups (16), and finally the Hybrid process-When members evaluate ideas as an 'individual' and also together with other members (9). Idea selection can also be classified as single task or two task process (16) I.e. An individual or a group or team can perform either just one task (idea screening) or two tasks (i.e. both idea generation and idea selection together).

A new form of idea selection which is emerging among firms called collaborative filtering of ideas using communities. A community is entirely different from a group or team or group of individuals working in isolation. Communities are a form of social network and members continuously interact between each other. Communities are open, voluntary, and collaborative efforts of users – a term that describes enthusiasts, tinkerers, amateurs, everyday people, and even firms who derive benefit from a product or service by using it (17). However, communities are also specific topic oriented or work on specific field of interest ex. Linux open source communities.

Community members discuss about topics or ideas out of their sheer interest and motivation and hence they are non-biased. Given a single idea, members discuss it for a continuous period of time and participation is voluntary, as long as they are interesting and relevant. Ideas get developed further or modified. The number of members attracted to a specific idea shows the popularity of the same. Online Community members has the following role or performs one or more of the following actions; 1) Discuss an existing idea or post a new idea, 2) Follow a specific idea (decision), 3) Rate an idea, 4) Vote for an idea, 5) Rank an idea, 6) Review an idea and comment on an idea, 7) Modify an idea further, 8) Frequency of visits to same idea, 9) Time spent on a specific idea.

Thus measuring the above actions or behavior of community members towards a specific idea, can signal the 'quality' of that specific idea (3). The above actions are directly measurable on an online community, as there are highly useful user toolkits such as 5-point to 10-point ratings scale, ranking system, voting system, etc., that are available in the community website. Since the community members' behavior is voluntary, they will reflect on the popularity of that idea and eventually their usefulness and problem solving abilities of that idea, since more members will participate depending on the attractiveness of the ideas posted. It is also well established that users possess need-information. Prior study have shown that in situations where a substantial amount of time is available, the difference in the quality of the best ideas produced by the two team processes (i.e. 'team process' vs. 'hybrid process') is small. However, if there is a limited, equal amount of time available, the team process significantly outperforms the hybrid process (9). Though, this

ISBN: 978-81-923777-9-7

study do not compare team processes to the community processes, an inference can still be made about the importance of 'time spent' and its impact on the quality of idea. Thus;

Proposition 4: *(a) The higher the time **spent** on a specific idea and/or the (b) higher the **number of comments** received for that specific idea, the higher will be its quality*

Ranking a set of ideas is different from rating the ideas, as ranking is very objective while rating is very subjective (20). However, both the systems (ranking and rating) are required for the selection of the best promising ideas because the most promising idea is one which ranks the highest among other available ideas and also rates very high for the identified quality criteria. Thus;

Proposition 5: *The higher the ranking and rating of an idea, the higher will be its quality*

Not every member in the community reviews and writes comments about an idea. Only those members to whom, the ideas are relevant and appealing are involved in writing comments on ideas and specific writing high quality suggestions for improving the ideas similar to peer reviews in scientific meetings and conferences. Thus;

Proposition 6: *The higher the **number of reviews** received for a specific idea, the higher will be its quality*

3. Proposition development based on user toolkits:

Ratings and their distribution, ranking, voting, time duration, number of participants, etc., are examples of toolkits available on online communities, which firms could use in isolation or combination to judge the quality of the ideas posted in online communities.

The online toolkits (user interface) available for collective decision making also plays a major role in collaborative filtering of ideas. The user interface of the websites (of online user communities or brand communities) lists some special features for rating, reviewing, voting and ranking of ideas/concepts/product designs and these features provide a sound statistical basis for the collective decision making or collaborative filtering of ideas.[1] Other information that can be accessed on these community websites are, the number of participants attracted to a specific idea, average rating obtained for each idea, the time spent on discussing each idea, the length of comments for each idea, the distribution of ratings, the experience and expertise of participants, how recent are each review, etc., all of which provide a rich source of vital information for collective decision making. Different toolkits (selection systems) can aid different kind of collective decision making and the availability of the relevant toolkits can help in selection of ideas. Furthermore, a community is not a collection of pure novices but there are also experts, hobbyists, and free riders etc., all of whom contribute towards the collective idea selection process.

Unlike in teams or groups, a community does not limit itself to the number of members in it or the number of participants in discussing a specific idea or topic, since their involvement is purely voluntary and self-motivation. The more the number of such community members participate in a specific idea for discussing, the higher the likelihood that they address the technical issues, problems, bugs and more important relate to their specific need. Raymond (15) has summarized this effect as "given enough eyeballs, all bugs are shallow". In other words, the number of votes attracted to a specific idea, tells something about the acceptance or popularity of the idea. Thus;

Proposition 7: *The higher the **number of votes** and the **overall rank** (in the particular category of ideas) received for a specific idea, the higher will be its market/social acceptance*

In addition to the number of votes received for a specific idea, the number of reviews or comments especially positive comments or contributions from community members reflects on the quality of ideas. Though in communities, members discuss ideas and issues collectively, the features available on their online community allow each member to give a subjective rating for the quality of each specific idea. However, the ratings can be objective or relative to other ideas (20). Depending on the value of a specific idea to each member, reflected by the number and quality of comments one made, a specific rating is given to that idea on a 5-point or 10-point scale (other scales also exist). Thus, the average of all the ratings given to a specific idea by the participating members reflects on the quality of that idea. Thus;

Proposition 8: *The higher the **average rating** received for a specific idea, the higher will be its quality*

The distributing of such ratings for a specific idea can provide vital clues on the nature of ideas (incremental or radical) and also on the variance in the quality of ideas. While one school of thought believes that collaborative processes lead to convergence (6; Karan et al., 2007; 19)and thus limit the variance; there is another view that diverse knowledge of participants in a team can lead to more

[1] **Systems for Collective Choice,** by Christopher Allen & Shannon Appelcline(http://www.lifewithalacrity.com/2005/12/systems_for_col.html)

ISBN: 978-81-923777-9-7

combinations, cross fertilizations, conflict, breakdown and uncertainty in compatibility of the combination of diverse knowledge components (5; 7). Further, teams create conditions of a "status auction" and "provide skill variety" leading to both great and awful ideas (19). Based on this, the following Proposition can be formulated relating the distributing of ratings to the 'nature' of ideas screened and selected and also to the 'variance' in the quality of ideas. Thus;

Proposition 9: *The **distribution of ratings** for a specific idea can/may determine whether the idea is incremental or radical in nature i.e. (a) the more the ratings are polarized, the higher the chances of the idea being **incremental** in nature and (b) the higher the distribution of ratings, the higher the chances that the idea is **radical** in nature (especially if very few participants rate the idea highly while the majority rate low or in the middle)*

IV. CONCLUSION AND IMPLICATION

This conceptual paper focus on both the fuzzy front end of innovation ('idea-selection' issue), and also on the late stage of new product development in predicting the attractiveness of an idea or potential market success of an idea. Moreover, the study focus on web 2.0 based online communities, and how the user generated data collected by the online toolkits available in the communities, can be used in idea selection (i.e., to overcome alpha error and beta error) as well predicting the attractiveness of new products. Online communities which follows a democratized process of functioning such as voluntary participating and sharing knowledge is an important criteria for making a community intelligent. In addition, and in accordance with James Surowiecki's (18) 'Wisdom of Crowds' a community which has heterogeneous profile of community members, independent governance structure, and aggregation mechanisms (toolkits), make the community collectively intelligent. Such a collectively intelligent community is proposed to be effective in identifying the most promising idea.

The main dependent variable in this study is the 'quality of the selected idea' and the independent variables are at three different levels such as 1) community level 2) individual level, and 3) idea-level. Hence to test the propositions, a mixed method statistical approach is suggested. Determining the correlation co-efficient between these independent variable will help determine which of these variables could be used individually or collectively (e.g., by creating an index) to predict the quality of ideas selected. Thereafter, A multiple regression will help establish the causal relationship between the index of independent numerical variables (quantitative indicators) and the dependent variable 'quality of product idea' which is also a numerical variable (0=poor quality,…4=highest quality). This study will provide new insights into unattended area of NPD (Idea screening/selection) using the Communities (social and human capital network and user and open innovation) literature. Thus the focus is on IDEA SELECTION through collective choice by communities. This study will contribute to the following literatures; 1) NPD literature, 2) Brand Community literature, and 3) User and Open Innovation literature

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ISBN: 978-81-923777-9-7

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ISBN: 978-81-923777-9-7