

Value co-creation mechanisms of enterprises and users under crowdsourcing-based open innovation

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Abstract

Purpose – The purpose of this paper is to systematically review the existing research and summarize the value co-creation mechanism between enterprises and users in crowdsourcing-based open innovation (COI).

Design/methodology/approach – Crowdsourcing is an effective means for enterprises to launch open innovation. This paper will first introduce the concepts and forms of open innovation and crowdsourcing, and then define COI.

Findings – This paper will analyze the key parties in innovative tasks, value co-creation mechanism that creates ideas, the interaction of key participants and the process of integrating internal and external resources to realize open innovation.

Research limitations/implications – In the end, this paper will put forward the theoretical framework for future studies on the development of COI from the perspective of value co-creation.

Originality/value – This thesis will first introduce the concepts and forms of open innovation and outsourcing and then define COI. Then it will systematically review the existing research studies and summarize the value co-creation mechanism between enterprises and users under COI model by analyzing the key parties in innovative tasks, value co-creation mechanism that creates ideas, the interaction mode of key participants and the process of enterprises integrating internal and external resources to realize open innovation.

Keywords Value co-creation, Crowdsourcing-based open innovation, Users' ideas

Paper type Literature review



1. Introduction

Innovation is at the core of the knowledge-based economy, and it creates enormous social and economic value (Marjanovic *et al.*, 2012). Traditional innovation relies on the efforts within a single enterprise or a limited number of enterprises with complementary technologies (Chesbrough, 2003a, 2003b). However, open innovation challenges this traditional concept by encouraging companies to break conventions and existing thought patterns. Chesbrough (2006) defined open innovation as the way enterprises integrate both internal and external knowledge flow to motivate internal innovation, as well as seek out external channels to commercialize the outcome. The core idea of open innovation is to integrate knowledge, skills and ideas from the public (Chesbrough, 2003a, 2003b; Chesbrough, 2012). It is notable that open innovation should become an integrated part of internal research and development rather than replace it, as agreed by Chesbrough and Crowther (2006), Spithoven *et al.* (2011) and Marjanovic *et al.* (2012). The studies of Dahlander and Gann (2010), Cohen and Levinthal (1990) and Laursen and Salter (2006) indicated that open innovation can stimulate companies to integrate and use external knowledge, technologies and resources.

In the current service economy era, users are regarded as value co-creators; the knowledge and technologies they provide have become an important strategic resources of enterprises (Lusch and Vargo, 2006). With the rapid development of Web 2.0 (online sharing platforms), companies can gather a wider range of users through crowdsourcing, thus acquiring external knowledge, technologies and resources at a lower cost (Brabham, 2009). Crowdsourcing, defined by Howe (2008), is the act of taking a task once performed by an employee and outsourcing it to a large, undefined group of people external to the company in the form of an open call. Crowdsourcing stimulates companies to participate in open innovation, especially in research and development programs (Dodgson *et al.*, 2006). Take the case of Xiaomi, this company enables users to participate in the innovation of their phone's MIUI operating system through the MIUI Forum, allowing Xiaomi to collect valuable ideas and then apply them into new versions of the MIUI operating system. Such innovation has adapted MIUI to the demands and habits of Chinese consumers and helped win more than 170 million users.

This paper focuses on the combination of open innovation and crowdsourcing, in which companies acquire knowledge, technologies and resources from users by crowdsourcing on online platforms, thus achieving the open innovation of products. Crowdsource-based open innovation (COI) is defined as the process by which enterprises crowdsource and organize users to participate in open innovation tasks, to realize value co-creation between users' ideas and internal resources. Web 2.0 technology is a crucial tool in this process, which provides a communication platform for the exchange of information and effective value co-creation activities between enterprises and users. Web 2.0 technology not only enables enterprises to launch open innovation projects but also encourages continuous interaction among users and the enterprise (Dodgson *et al.*, 2006). Through this value co-creation process, enterprises ultimately promote and enhance innovation (Chanal and Caron-Fasan, 2010; Schenk and Guittard, 2011; Kohler, 2015).

This paper will first discuss the concepts of open innovation and crowdsourcing and try to define COI, then it will analyze the value co-creation mechanism underlying COI and discuss the following issues:

- the key parties in innovation tasks and their interactions; and
- the value co-creation mechanism of innovation and the realization of open innovation by integrating internal and external resources.

Finally, it will summarize the main conclusions and put forward a theoretical framework for further studies.

2. Concept

2.1 Open innovation

2.1.1 Definition of open innovation. The term open innovation was first promoted by Chesbrough (2003a, 2003b) in his work titled *Open Innovation*. The academic world has generated various definitions of the term open innovation. Laursen and Salter (2006) provided a representative definition: open innovation is the extensive and thorough open search strategy adopted by enterprises to achieve greater innovation. In this definition, Laursen equated openness with external innovation resources and their relationships. However, Henkel (2006) held that openness refers to uncovering undiscovered internal ideas. The definitions given by Laursen and Henkel showed that openness can be run two ways, both inwardly and outwardly (Henkel, 2006; Laursen and Salter, 2006). Combining the two definitions, Chesbrough *et al.* (2006) defined open innovation as the way enterprises integrate both internal and external knowledge flow to motivate internal innovation, as well as seek out external channels to commercialize the outcome. Openness indicates that commercialization projects will develop by various methods simultaneously, and therefore, various methods and channels should also be used to launch the products (Chesbrough, 2006; Chesbrough *et al.*, 2006; Chesbrough, 2012).

2.1.2 Forms of open innovation. Open innovation mainly takes three forms: outside-in, inside-out and two-way innovation (Gassmann and Enkel, 2004; Huizingh, 2011; Cui *et al.*, 2015).

Outside-in open innovation refers to the way that enterprises search, obtain and integrate exterior knowledge or technology (from suppliers, customers, partners, etc.) into interior development work to promote innovation performance (Chesbrough and Crowther, 2006; Chiaroni *et al.*, 2010). Openness encourages breaking boundaries and the introduction of external resources from customers and other companies (Arora and Gambardella, 1990; Von Hippel, 2005). Research by Enkel *et al.* (2009) and Laursen and Salter (2006) suggested that introducing external knowledge and technologies will help enterprises enhance innovation performances. Enkel's study showed that 78 per cent of external knowledge resources comes from customers, 61 per cent from suppliers, 49 per cent from competitors, 21 per cent from public and commercial research centers and 65 per cent from others. A growing number of companies are achieving inside-out open innovation via innovation media platforms, such as Dell's IdeaStorm (Bayus, 2013) and LEGO Cussoo (Schlagwein and Andersen, 2014).

Inside-out open innovation is defined as the process by which enterprises commercialize internal innovative technologies and earn profits by various means, including technology licensing, building subsidiary corporations, joint ventures and allying with others (Chesbrough and Crowther, 2006; Enkel *et al.*, 2009). Openness is reflected in how enterprises expand the ways in which they launch innovative programs through cooperation with other organizations and partners. As argued by Enkel *et al.* (2009), the key to inside-out open innovation is to externalize knowledge and innovation so that the programs can be commercialized by external methods, which will be more time-efficient and effective than internal means. Large and medium enterprises are more willing to implement inside-out open innovation in their sub-projects (Enkel *et al.*, 2009).

Two-way open innovation is defined as the process in which enterprises combine the inside-out (to acquire knowledge) and outside-in (to launch internal ideas to market) channels to promote the development and commercialization of innovation programs (Cui *et al.*, 2015). Gassmann and Enkel (2004) put forward the idea that corporations should

cooperate with each other in strategic networks to achieve two-way open innovation. For example, BMW's Palo Alto Technology Office has implemented multiple inside-out and outside-in partnerships with different industries. One such partnership with local game companies resulted in development of the control rod technique (Gassmann and Enkel, 2004).

2.2 Crowdsourcing

2.2.1 Definition of crowdsourcing. The term crowdsourcing was first put forward by Howe (2006a, 2006b) in his article, *Wired Magazine*, which has attracted enormous attention from academics and the business field as a whole. As he defined it, crowdsourcing is the act of taking a task once performed by an employee and outsourcing it to a large, undefined group of people external to the company in the form of an open call (Howe, 2008). Brabham (2009) defined crowdsourcing as the process in which enterprises adopt a strategic model to attract interested and motivated individuals to provide solutions, in quantity and quality, which are usually accomplished by traditional organizational structures and procedures. In the above two definitions, they both stressed that, in crowdsourcing, the job is undertaken by the general public rather than internal personnel. But the differences lie in that Howe underlined the uncertainty of the public, whereas Brabham focused on the interests and incentives of the public; and that Howe emphasized the appeal for public input, whereas Brabham did not stress this as a significant factor in crowdsourcing.

2.2.2 The forms of crowdsourcing. Crowdsourcing mainly takes three forms: cooperative crowdsourcing, competitive crowdsourcing (Bayus, 2013; Pedersen *et al.*, 2013; Zhao and Zhu, 2014) and candidate crowdsourcing (Ye and Kankanhalli, 2013).

Cooperative crowdsourcing means users participate and cooperate in innovative tasks and produce ideas (Bayus, 2013). Di Gangi *et al.* (2010) and Howe (2006a, 2006b) suggested that interaction and cooperation continues constantly among users and between the enterprise and users and that these interactions take place on intermediary platforms. These intermediary platforms act as information systems to help enterprises build connections with users and collect the knowledge, technologies and solutions they share, as well as help them select and rate the proposals users submit (Ye and Kankanhalli, 2013). Users voluntarily take part in innovative tasks for new products in response to an open call from a company; they participate out of love for the brand, not for economic reward. From this process, they will gain products and services which better cater to their needs, knowledge and abilities related to their interests, joy and personal fulfillment (Djelassi and Decoopman, 2013). These benefits are the main incentives for users to continuously submit proposals and take part in cooperative crowdsourcing. Examples of cooperative platforms include Dell's IdeaStorm (Bayus, 2013) and MIUI Forum of Xiaomi Company.

Competitive crowdsourcing allows users to choose tasks and submit ideas at their will. Enterprises can then select and reward the optimal idea that could be a single one or a multistage one (Terwiesch and Xu, 2008). Yang *et al.* (2008) thought that competitive crowdsourcing is more suitable for short term and clearly defined tasks, for instance, inviting users to design logos. Users barely interact or cooperate with others, but they may have some interaction with company representatives. Information systems help enterprises release tasks to users and select the optimal one from users' submissions. They can ensure users submit proposals individually without being influenced by others as well as enabling users and company representatives to communicate with each other (Ye and Kankanhalli, 2013). For users, their primary incentive for competing in crowdsourcing tasks is to win the competition and earn economic rewards (Zheng *et al.*, 2014); enhancing their abilities and gaining a sense of accomplishment are just supplementary benefits. Examples of

competitive crowdsourcing platforms include Topcoder.com (Archak, 2010) and TaskCn (Yang *et al.*, 2008).

Candidate crowdsourcing occurs when enterprises choose candidates and cooperate closely with them to complete innovative tasks (Bullinger *et al.*, 2010; Morgan and Wang, 2010). Candidate crowdsourcing suits tasks that require close and long-term cooperation between companies and specific partners (Ye and Kankanhalli, 2013). During this process, cooperation and knowledge sharing will occur constantly among candidates and between companies and candidates (Pisano and Verganti, 2008). Via information systems, companies select candidates and build connection with them, they will also share knowledge through these platforms (Ye and Kankanhalli, 2013). However, Chen *et al.* (2010) advocated that enterprises should give more time and energy to fostering cooperation and knowledge sharing between companies and candidates. The primary incentive for candidates to get involved is to complete the task and earn money (Ye and Kankanhalli, 2013). Examples of candidate crowdsourcing platforms include InnoCentive and NineSigma.

2.2.3 Crowdsourcing-based open innovation. From the perspective of open innovation, crowdsourcing can facilitate the launch of an open innovation strategy, whereas, from the perspective of crowdsourcing, open innovation is one of the many goals crowdsourcing can realize. To be more specific, some open innovation practices may not be achieved by crowdsourcing (for instance, when companies cooperate with others in the same industry); conversely, a certain crowdsourcing project may not aim to achieve open innovation (for instance, crowdfunding). Therefore, this thesis focuses on the combination of open innovation and crowdsourcing, namely, COI. COI is defined as the process by which enterprises organize users to participate in open innovation tasks by crowdsourcing them on Web 2.0 platforms, to realize value co-creation between the users' ideas and the enterprise's internal resources.

The organizational form of crowdsourcing helps enterprises launch outside-in open innovation strategies. To achieve open innovation, enterprises outsource a task traditionally accomplished by internal staff to an undefined group of external users to acquire external knowledge and technology. Chanal and Caron-Pasan (2010) argued that crowdsourcing is an effective way for enterprises to expand their internal boundaries and implement open innovative activities. Lilien and State (2002) stated that the organizational form of crowdsourcing, known as open call, and its targets, the users, will not only provide additional knowledge, technologies and resources but also save enterprises from long and repetitive product testing, thereby getting products to launch sooner.

3. Crowdsourcing-based open innovation's value co-creation mechanism

3.1 Key participants of innovation tasks

3.1.1 Users. Users are the consumers of an enterprise's products who voluntarily participate in innovation tasks and submit solutions or ideas out of their own interests or love of the products (Djelassi and Decoopman, 2013). In the era of the service economy, users have evolved from passive product recipients to value co-creators (Walter *et al.*, 2001; Witell *et al.*, 2011; Zhang *et al.*, 2011). Vargo and Lusch proposed in their 2004 and 2006 research papers that enterprises and users interact, exchanging knowledge or skills, in an open manner to realize value co-creation, thereby enhancing the enterprise's performance and better satisfying the users' needs. In other words, enterprises and users are both the co-creators of value and the beneficiaries of value co-creation. Lusch and Vargo (2006) argued that users play a key role in value co-creation and their interactions with the enterprise is at the core of the value co-creation process. Prahalad and Ramaswamy (2013) put forward that value co-creation is achieved by integrating the enterprise's internal and external resources, which, as

suggested by [Vargo and Lusch \(2004\)](#), allows enterprises and users to achieve common benefits by sharing their knowledge or skills.

3.1.2 Enterprise experts. Enterprise experts are research and development experts within an organization, who lead and represent the organization in value co-creation activities. Enterprise experts are hired professionals and technical staff, so they have a dual role of business representative and industry expert. Enterprise experts launch innovation tasks and call for participation from users. They then screen, evaluate and provide feedback on the users' submissions, and ultimately determine the solution to enter the internal R&D process. In addition, enterprise experts are responsible for organizing various activities and coordinating relationships. In the process of value co-creation, enterprise experts play multiple roles, such as experts, managers, leaders and partners. [Di Gangi et al. \(2010\)](#) proposed that enterprises should strategically arrange key personnel to participate in innovative online communities, to ensure users' ideas can be identified quickly and eventually adopted by the enterprise, as well as to promote communication between users and the enterprise, and encourage an exchange of knowledge within the community ([Di Gangi et al., 2010](#)). Business representatives generally have a strong background in professional knowledge and practical product development, including detailed knowledge of the product's features and cost structures ([Di Gangi et al., 2010](#)). Therefore, as the leader, the enterprise expert is the other key participant in value co-creation activities. They use their dual identities of enterprise representative and industry expert to work with users to realize value co-creation of open innovation in new products.

3.2 Value co-creation mechanism of idea generation

Ideas are creative opinions or solutions that users provide for innovative product development and design tasks ([Amabile et al., 2005](#)). Below, we will analyze the value co-creation mechanism of idea generation, as shown in [Figure 1](#).

3.2.1 In the first phase, enterprises choose the form of crowdsourcing and define the task requirements. Initially, the process of idea generation encourages users to participate in new product innovation tasks in the form of public outreach by enterprise experts. At the same time, enterprises need to choose the form of crowdsourcing and define the requirements of innovation tasks.

Enterprises launch new product innovation tasks by making an open call for contributions. For example, Dell's IdeaStorms platform calls on users to tell them what new products or services they want ([Bayus, 2013](#)); the new feature Discussion on Xiaomi's MIUI Forum calls for users to discuss what kind of MIUI mobile operating system features they want. Through LEGO case studies, [Andersen et al. \(2013\)](#) argued that enterprises that develop interesting innovation tasks, which are perceived as trustworthy and fair, are conducive for stimulating the creative potential of users.

In releasing innovation tasks, enterprises should choose the appropriate form of crowdsourcing and define the task requirements at the same time. Cooperative, competitive and candidate crowdsourcing all have different advantages. To obtain high-quality ideas, enterprises should match the appropriate form of crowdsourcing to the innovation task with different characteristics (as shown in [Table I](#)) ([Bullinger et al., 2010](#)). Then, enterprises should set standard procedures for users to submit ideas. For example, the new feature Discussion in the MIUI Forum requires users to first correctly classify their feature suggestion, then describe the recommendation and give examples of scenarios in which the feature may be used, and then "tell (@)" to submit the suggestion to the relevant development group. [Di Gangi et al. \(2010\)](#) proposed that enterprises should create a user

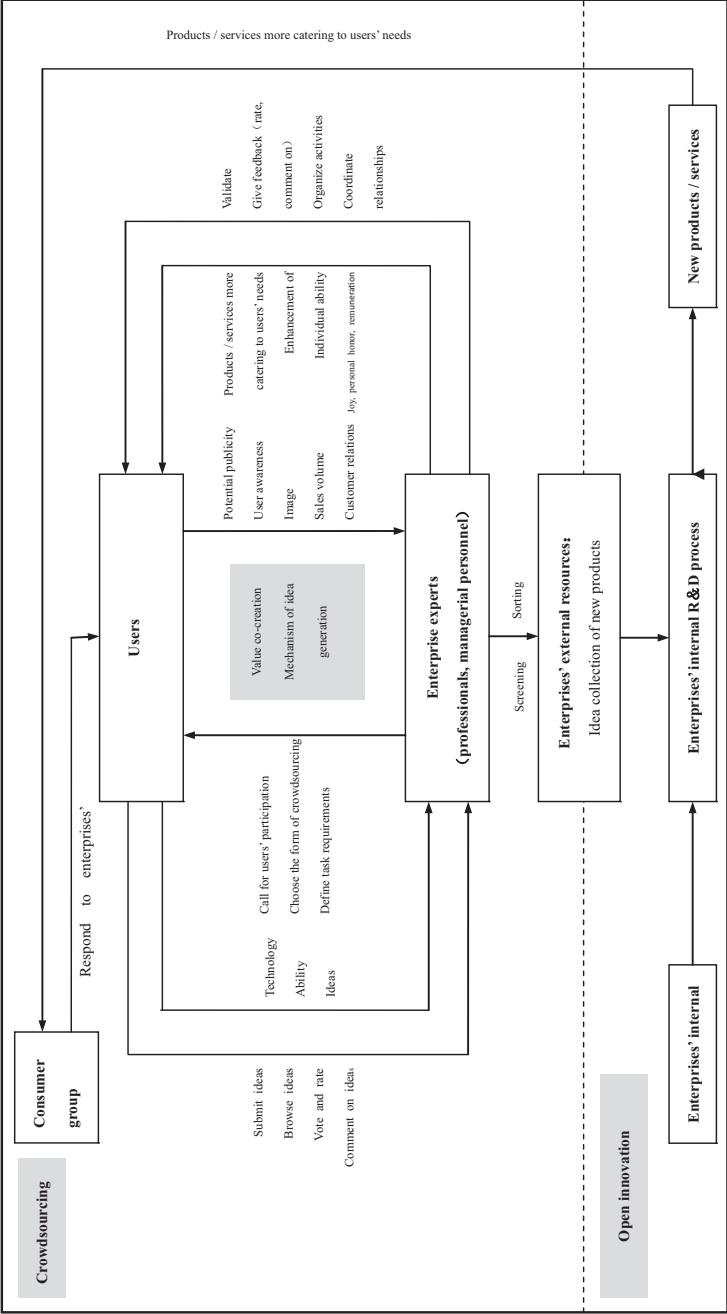


Figure 1.
Value co-creation
mechanism of COI
communities

Items	Cooperative crowdsourcing	Competitive crowdsourcing	Candidate crowdsourcing
Process	Users notice the open call of enterprises and intermediary agents, and then submit proposals. Enterprises and users go through and comment on the proposals together	Enterprises release tasks and invite users to settle them; then choose the best one and reward the winner	Enterprises recruit candidates and cooperate with them to accomplish the task
Features of tasks	Long term and continuously opened task	Short term and clearly defined task	Closely connected and long-term cooperation task
Interaction and cooperation	Continuous cooperation among users and between users and enterprise representatives	Users barely cooperate with each other; company representatives and users may interact a little	Candidates and enterprise frequently interact with each other and share knowledge
Role of the Information System	Encourages enterprises and users to build connections and collect plans; allows enterprises and users to rate, vote for and comment on proposals	Helps enterprises forward tasks to users and choose the best proposal; makes sure users submit proposals individually; allows for connection between users and companies	Help enterprises select candidates and contact with them; encourages knowledge sharing and storing among candidates
Incentives of participating users	Primary user incentives are: the creation of products and services that cater to their needs; enhancement of individual knowledge and ability; joy and personal fulfillment	Primary user incentives are: winning the competition and gaining economic returns	Primary candidate incentives are: accomplishing the task and obtaining the payment
Crowdsourcing platforms	Dell's IdeaStorm; MIUI Forum of Xiaomi Company	Topcoder.com; Taskcn	InnoCentive; NineSigma

Table I.
Features of the forms
of crowdsourcing

toolkit to standardize the rules for idea generation and submission; these measures not only help refine the details of users' ideas but also avoid repetitions more effectively.

3.2.2 In the second phase, users submit and evaluate ideas. After the enterprise releases the innovation tasks, users continuously submit ideas. At the same time, the user browses ideas submitted by fellow users and engage in interactive activities such as voting, rating and commenting. In this phase, enterprises gain resources, such as technologies, abilities and ideas, from users to support product innovation research and development projects (Djelassi and Decoopman, 2013).

Users conceptualize and elaborate on ideas in a variety of ways. Di Gangi *et al.* (2010) suggested that enterprises should pay close attention to the ideas of lead users, as their intimate, first-hand knowledge allows them imagine creative ways to improve existing technologies and methods. Schlagwein and Andersen (2014) presented LEGO users' toy ideas which were submitted to the LEGO Cussoo platform in words, illustrations, pictures

and more. Enterprises get unique non-professional users' ideas which add to the traditional internal organizational learning.

In the generation of ideas, users can simultaneously produce their own ideas while browsing others within the community and then vote for, rate and comment on them. The interaction among users not only promotes constant modification of ideas but also encourages the exchange of opinions and expertise (Di Gangi *et al.*, 2010), thereby greatly improving the quality of the ideas. Di Gangi *et al.* (2010) suggested that enterprises strongly promote the self-governance and continuous interaction among users as it is these users who will help the enterprise identify the most promising ideas among the large number submitted by the community. Djelassi and Decoopman (2013) proposed that users conceptualize and submit ideas while maintaining continuous interaction with each other. Based on the above activity analysis, the enterprise finally obtains the external resources, such as technologies, abilities and ideas, from users, which is of great significance to the success of enterprise innovation projects.

3.2.3 In the third phase, enterprise experts evaluate users' ideas. After the submission of ideas, COI enters the next crucial step, i.e. enterprise experts evaluate users' ideas. Enterprise experts mainly implement three types of activities: evaluating ideas, organizing community activities and coordinating relationships. At this phase, users gain benefits such as products or services that cater more to their needs, experience and enhanced skills and personal enjoyment and fulfillment.

Enterprise experts evaluate whether the user's idea meets the requirements, how innovative it is, how it can be implemented or improved and so on. Enterprise experts interact with users by browsing, rating and commenting on ideas. Di Gangi *et al.* (2010) argued that when integrating an innovative virtual community into the internal R&D process, companies face two major challenges understanding the ideas and then evaluating the best ideas. This study suggests that enterprises should give users quick validation and feedback on their ideas to signal that their ideas have potential value and the enterprise is interested in continued participation and that the enterprise understands their idea.

The evaluation and feedback processes promote communication and interaction between the enterprise experts and users in the community, which helps users not only modify their original ideas but also gain valuable product information and expertise from the enterprise experts, thereby enhancing the quality of users' ideas.

As representatives, enterprise experts organize various types of activities such as idea summary reports, product development progress reports and new feature surveys. Enterprise experts clearly demonstrate the process of innovation and R&D activities to users, which strengthens the dissemination of information between enterprises and users and promotes the communication among all participants, thus maintaining the sustainable development of the innovative virtual community (Di Gangi *et al.*, 2010). Andersen *et al.* (2013) proposed that to create a shared identity and perspective, enterprise experts try to maximize communication among participants and coordinate the relationship between the enterprise and the users, as well as among the users themselves, to encourage continued engagement and contribution of ideas. During this phase, users derive many benefits from the various innovation activities, such as experience and enhanced skills, enjoyment and personal fulfillment, remuneration and, ultimately, products and services which cater better to their needs. These benefits are the key motivators for their continuous participation (Di Gangi *et al.*, 2010).

3.2.4 In the fourth phase, enterprises gain long-term benefits. COI is a cyclic process in which enterprises continuously define and release innovation tasks, then users submit ideas, and enterprises ultimately integrate these high-quality ideas through a screening and

evaluation process. In the process of ideas generation, enterprises may obtain many long-term benefits in addition to the ideas submitted by users. Djelassi and Decoopman (2013) suggested that the idea collection process is a potential publicity exercise for companies and their new products or services, which increases brand awareness, shapes the corporate image, increases sales and helps enterprises and users establish a close and mutually beneficial relationship. These long-term benefits may take time to be realized but can also be extremely valuable.

3.3 Interaction forms between key participants

As discussed in Section 3.1, the user and the enterprise expert are the two key participants in COI innovation tasks. Based on the discussion of the idea generation's value co-creation mechanism in Section 3.2, the key participants interact frequently, i.e. users and enterprise experts and users and fellow users.

This thesis considers that the interactions between users and enterprise experts can be divided into either one-way feedback or two-way feedback according to the direction and depth of the interactions, as shown in Figure 2. One-way feedback refers to enterprise experts or fellow users rating or commenting on other users' ideas. Users submit their ideas and the response and feedback from their fellow users (Phase 2) and enterprise experts (Phase 3) are great motivators for users, and in the process, they can continuously learn relevant knowledge and enhance the quality of their follow-up ideas. Huang *et al.* (2011) focused on the impact of enterprise feedback on idea generation performance. For example, increasing the amount and speed of enterprise feedback can significantly increase the total number of ideas. If an enterprise cannot differentiate between the quality of ideas and the level of users' abilities, the overall value of the ideas will be significantly reduced. Two-way interaction occurs when users have two-way discussions on ideas with enterprise experts or

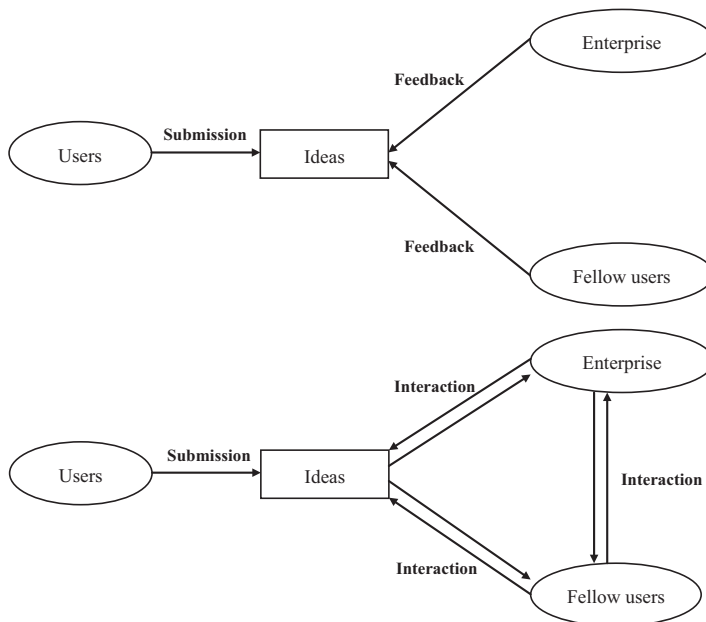


Figure 2.
Feedback and
interactions between
users and enterprise
experts

fellow users via comments. Two-way discussions, among users or between users and the enterprise, can be initiated continuously, which may affect the quality of users' follow-up ideas. In particular, [Di Gangi et al. \(2010\)](#) emphasized the importance of enterprise experts in the innovation community is to encourage communication between users and the organization, which facilitate knowledge exchange, and to ensure ideas are properly evaluated and adopted.

3.4 Open innovation through integrating enterprises' internal and external resources

3.4.1 Enterprises obtain external resources: Idea collection. Ideas are creative opinions or solutions users provide for enterprises' innovation tasks. Idea collection is completed by enterprise experts who screen, validate and aggregate users' submitted ideas. As shown in [Figure 1](#), idea collection is the final step of the cycle of idea generation and the key competitive resources that enterprises obtain from the innovation community. The external ideas that are collected are integrated into the internal R&D process. Idea collection is at the core of COI, opening the traditional boundaries of enterprises, connecting the internal and external resources of enterprises and realizing the open innovation of new products.

3.4.2 Enterprises use external resources: open product development. The basis of enterprises' open innovation to crowdsource users' ideas and then integrate these external ideas into the internal R&D process. [Dong and Wu \(2015\)](#) argued that simply collecting ideas is worthless and the key to value co-creation is how enterprises put the ideas into practice. Through theoretical analysis, this study illustrates that the success of a virtual innovation community relies on the enterprise's ability to collect quality ideas, as well as the ability to effectively put these ideas into practice. Studies of the Dell's IdeaStorms Forum and Starbucks' Idea Platform demonstrate that a positive correlation exists between an enterprise's ability to effectively implement community generated ideas and an enterprise's commercial value. [Andersen et al. \(2013\)](#) argued that enterprises should promote the generation of external ideas and then integrate those ideas into the internal R&D process to ensure that new products and services are better suited to users' needs. The traditional closed-end product development process regards the user as a passive recipient of products or services ([Walter et al., 2001](#); [Wittel et al., 2011](#); [Zhang et al., 2011](#)), while open product development considers the user as a value co-creator and designs products in a user-oriented manner. Therefore, enterprises use external resources, namely, user generated ideas, to carry out open innovation in product development.

4. Discussions

4.1 Conclusions

COI is the process in which enterprises crowdsource users to participate in open innovation tasks on Web 2.0 platforms to realize value co-creation between users' ideas and internal resources. The users and the enterprise expert are the two key participants in COI's value co-creation mechanism. In specific analysis, enterprises first choose the form of crowdsourcing and define task requirements, then, through crowdsourcing platforms, call on users to participate in product innovation tasks. Next, users respond to enterprises' invitation to participate in the tasks by generating and submitting their own ideas, while simultaneously browsing and then voting, rating and commenting on their fellow users' ideas; at this stage, users contribute their technologies, abilities and ideas. Then, enterprise experts scrutinize and give feedback on users' ideas to identify high-quality ideas, and at the same time, organize activities and coordinate relationships among users and the enterprise to stimulate communication. During this stage, users get the benefit of enhancing their skills through practical and cooperative task, enjoyment, personal fulfillment, possible remuneration and

so on, and ultimately, users will gain access to products and services which better cater to their needs. In the long term, crowdsourcing innovation tasks can also produce publicity for the enterprise, raising brand awareness, increasing sales and improving customer relationships. There are two kinds of interaction between users and enterprise experts: one-way feedback and two-way interaction. The continuous interaction and feedback between the participants generates high quality users' ideas, which can be applied to internal R&D to realize open innovation of new product development.

4.2 Suggestions for future studies

In the future, studies can be conducted from the perspective of value co-creation. This thesis has presented the theoretical framework, as shown in Figure 3.

It is recommended that future studies focus on users' contribution of ideas, including the number of ideas submitted, frequency of submissions and quality of ideas, to produce a comprehensive analysis of users' contribution. Future studies may adopt either a subjective or objective assessment to validate the quantity, frequency and quality of ideas. Taking the quality of ideas as an example, it can be measured with objective data, such as whether it is adopted by the enterprise; ideas that are adopted can be interpreted as being of higher quality and vice versa for ideas that are not adopted. At the same time, subjective assessment data can be used to measure the quality of ideas. For example, experts may evaluate the novelty and practicability of ideas; highly novel and practical ideas are of high quality and vice versa.

It is also suggested that future studies explore the contribution of users' ideas from the perspectives of users' features, characteristics of ideas and interactions. Users generate ideas so their task experience, knowledge and community identity affect the quantity, frequency and quality of their ideas. Ideas' popularity, presentation features and content characteristics directly affect the quality of users' ideas. Continuous feedback and interactions among enterprise experts and users trigger information sharing, which increases the quantity, frequency and quality of users' ideas. Future studies can build a theoretical model in the context of COI and carry out empirical analysis.

It is recommended that future studies explore the influence of users' basic needs, intrinsic motivation and emotional factors on ideas they contribute. Studying the users' individual

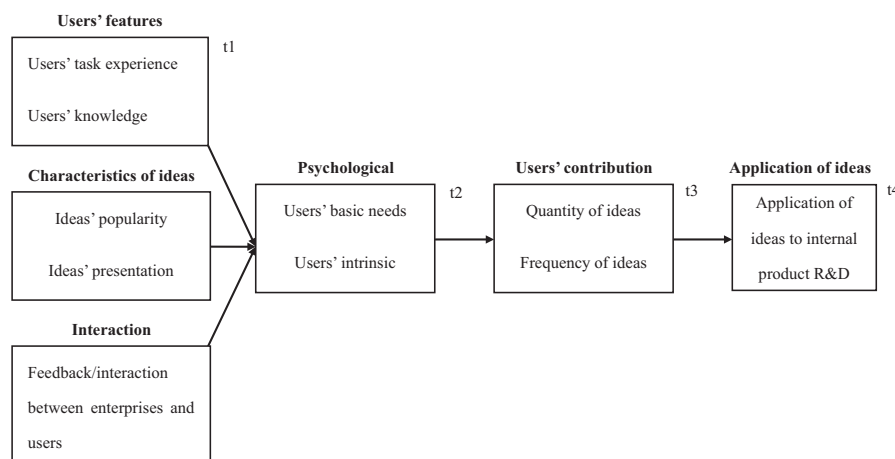


Figure 3.
Theoretical
framework for future
studies

needs (personal development, autonomy and relationships) and intrinsic motivations will not only help researchers and practitioners better understand of users' psychological mechanisms but also help explain the mediating effect of feedback and interaction patterns among participants on users' contributions. In addition, future studies can probe into the impact of emotional effects, such as users' community identity and attachment, on the quantity, frequency and quality of their ideas contributed.

It is suggested that future studies focus on how ideas are applied to the internal R&D process. Enterprises' collection of high-quality ideas is only the first step in product innovation, the key is the successful application of the ideas in the product development process. Future studies can also explore the integration of external users' ideas and internal research resources, which helps to effectively guide the practice of enterprise management.

4.2.1 In the second phase, users submit and evaluate ideas. After the enterprise releases the innovation tasks, users continuously submit ideas. At the same time, the user browses ideas submitted by fellow users and engage in interactive activities such as voting, rating and commenting. In this phase, enterprises gain resources, such as technologies, abilities and ideas, from users to support product innovation research and development projects (Djelassi and Decoopman, 2013).

Users conceptualize and elaborate on ideas in a variety of ways. Di Gangi *et al.* (2010) suggested that enterprises should pay close attention to the ideas of lead users, as their intimate, first-hand knowledge allows them imagine creative ways to improve existing technologies and methods. Schlagwein and Andersen (2014) presented LEGO users' toy ideas which were submitted to the LEGO Cusoo platform in words, illustrations, pictures and more. Enterprises get unique non-professional users' ideas which add to the traditional internal organizational learning.

In the generation of ideas, users can simultaneously produce their own ideas while browsing others within the community and then vote for, rate and comment on them. The interaction among users not only promotes constant modification of ideas but also encourages the exchange of opinions and expertise (Di Gangi *et al.*, 2010), thereby greatly improving the quality of the ideas. Di Gangi *et al.* (2010) suggested that enterprises strongly promote the self-governance and continuous interaction among users as it is these users who will help the enterprise identify the most promising ideas among the large number submitted by the community. Djelassi and Decoopman (2013) proposed that users conceptualize and submit ideas while maintaining continuous interaction with each other. Based on the above activity analysis, the enterprise finally obtains the external resources, such as technologies, abilities and ideas, from users, which is of great significance to the success of enterprise innovation projects.

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