OPEN INNOVATION: THE BENEFITS OF CROWDSOURCING

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Abstract

This paper explains the theories of open innovation and crowdsourcing, which is a part of the open innovation paradigm. These explanations are the basic framework for explaining the use of both paradigms in practice. Based on both the explanation of the use in practice of both paradigms and theories gathered from earlier papers on these subjects, benefits of both paradigms are described.

Keywords: Open Innovation, Crowdsourcing, benefits.

1   INTRODUCTION

This paper is about 'open innovation' and 'crowdsourcing' within a company, written for the final assignment of our group of the course 'Management of Knowledge and Innovation' given at Tilburg University.

We seem to have a special interest in the open innovation paradigm and subjects connected to this paradigm, for example crowdsourcing. We have been searching for articles and examples where open innovation is used in practice to formulate a usable research question. During one of the lectures, the paradigm of open innovation was explained. Besides this, the study association ASSET-Top-down organised a strategic symposium about open innovation. In this way, we got inspired by the subject. A linked subject to open innovation, but not discussed in class, is crowdsourcing.

We would like to state the following research question: To what extent can companies receive benefits from open innovation and crowdsourcing?

2   OPEN INNOVATION

2.1   Theory of open innovation

 "The use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of innovation, respectively' (Chesbrough , 2006 , p. 1) is the definition from Chesbrough that we will use in this paper when we speak about Open Innovation. Open innovation is a concept that contradicts to closed innovation, where closed innovation is often seen as history and open innovation is often seen as a concept more and more used nowadays.

2.1.1   Closed innovation

The change from closed innovation to open innovation can be described by making use of the book of Chesbrough (2006) where the relationship between the public university system of the United States and the United States' corporations in the first half of the twentieth century is described. Public universities were founded by state governments and research was responded to the local commercial needs. Local industries profited from the focus on science and technology in the public university system (Chesbrough, 2006). The end of World War II, when peacetime was coming up, caused the United States (with George W. Bush senior as president) to rethink their defense research and development since they found out that most (even the atomic bomb) inventions were based on knowledge gathered from Europe (Chesbrough, 2006). Public universities and the nation's research and development were redesigned in order to base defense inventions on United States' research and knowledge.

The trend of self performed research and development was taken over by corporations in the United States. Two examples of this trend are IBM who was making and developing their own heads for the disk-drives they made and Xerox who not only made its own toner, copier, light lens, feeding and sorting systems but who even found it needed to make its own paper (Chesbrough, 2006). The funnel which describes the closed innovation paradigm shows us how ideas are dropped in the funnel to let the best ideas enter the market (figure 1).
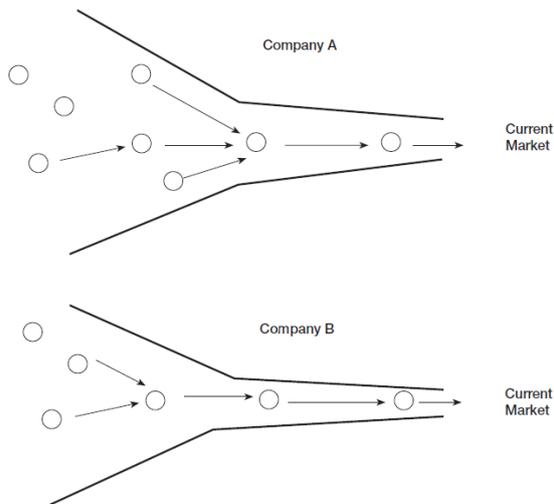
Figure 1.   *The closed innovation paradigm*

2.1.2   From 'closed' to 'open'

The examples of IBM and Xerox are not unique, more and more (mostly technology) companies owned large research and development centers in the postwar period. A lot of inventions of the twentieth century where invented in one of these research centers of large corporations. Because of this trend and better economic times after the World War II, more people got high-skilled and (at the end) mobility under employees of these research centers increased. This higher mobility caused a lot of former employees of these research centers to leave the company and start up an own company with the same expertise or start working in one of these start-ups. This can be illustrated with an example of, again, IBM: "of the ninety-nine U.S.-based startup companies that entered the disk-drive industry, twenty-one had former IBM employees on their founding teams" (Chesbrough, 2006, p. 35).

This, and three other erosion factors of the closed innovation paradigm made the closed innovation paradigm less profitable since companies could invest a lot in knowledge for research and development but where no longer sure of the idea that the knowledge would be kept inside the corporation (Chesbrough, 2006). These made corporations think of a 'new' paradigm in innovation: Open Innovation.

2.1.3   Open Innovation

"Open Innovation means that valuable ideas can come from inside or outside the company and can go to market from inside or outside the company as well" (Chesbrough, 2006, p. 43). With this meaning of open innovation, corporations (that make use of the Open Innovation paradigm) admit the movement started by former employees of their companies in which innovations can go outside the company. New in this paradigm is the idea of innovations entering the company from the outside. Therefore, we could state, that it is again useful for corporations to invest in their research and development since ideas or knowledge can flow out of the corporation but what they get back is ideas or knowledge that comes from external parties. These external parties could be companies but also individuals (Chesbrough, 2006). This is shown by the illustration of the Open Innovation Paradigm (figure 2).

Spithoven, Clarysse and Knockaert (2009) discuss two types of Open Innovation: inbound and outbound open innovation. They describe inbound open innovation as the case where "companies monitor the environment of the firm to source technology and knowledge in addition to in-house research and development" (Spithoven et al., 2009, 1). Where they speak about outbound open innovation, they are speaking about companies that do not only scan the environment for innovation

but also look in the environment for external companies that are more able to commercialize a certain innovation (Spithoven et al., 2009).
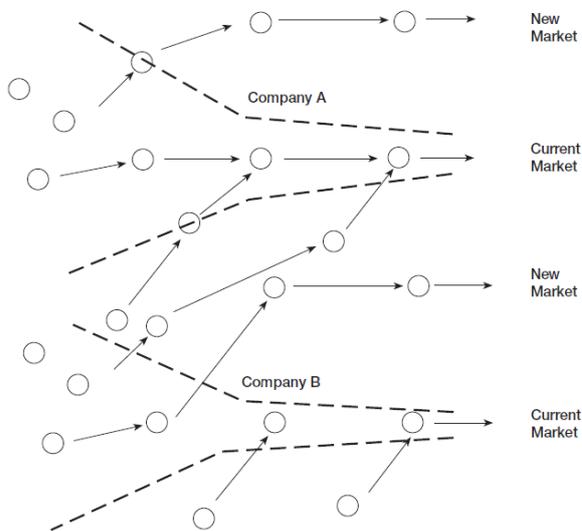

Figure 2.   The open innovation paradigm

2.2   Open innovation in practice

In the previous part of this chapter the characteristics of open innovation are explained. To show how 'open innovation' works in practice, examples of open innovation will be given using P&G.

P&G is a large company that focuses on the consumer businesses. It operates in more than 80 countries and has nearly 140.000 employees. Some well known brands are part of their product portfolio, think about Pampers, Ariel, Pantene and Pringles (www.pg.com).

P&G operates in a competitive, mature global market. The company is searching continually for new and innovative ideas (Dodgson, Gann & Salter, 2006). P&G invests a lot in the innovation process by focusing on the research and development (R&D) of the company. P&G invests 4% of the worldwide sales in R&D, 7.500 scientists are working in 22 research centres and P&G holds 24.000 patents worldwide and receives on average 3.800 patents every year. P&G is part of the world's largest holders of U.S. and global patents (www.pg.com).

To increase growth through innovation, in 1999 P&G launched a new strategy called Organisation 2005 (Dodgson et al., 2006). This strategy is part of the Connect and Develop program that P&G developed (Chesbrough, 2003). Organisation 2005 was based on the recognitions that a majority of the solutions of the problems of P&G lay outside the company. The shift to the use of more external resource and the change in the culture within P&G to encourage searching outside the company for innovation results in an open innovation vision (Dodgson et al., 2006). The purpose of this strategy was stimulating innovation by making P&G's internally focused and fragmented communications more outwardly focused and cohesive (Schilling, 2005). To realize this, P&G created a so called Technology Acquisition Group (TAG). This group has to seek out new complementary technologies from external sources and has to focus on the licensing to increase the returns on investment at P&G (Dodgson et al., 2006).

All the ideas of innovation brought P&G together at Innovation 2000, a 'deal-making/technology trading expo' (Dodgson et al., 2006). They showed the most promising technologies to the employees. If they could not attend, it was possible to take part via web casting and satellite technology. Besides this, P&G gave cell phones to their employees so they could make new connections and record new

ideas. Also external suppliers were invited. For P&G, the innovation 2000 was a big success, which resulted in more than 2.200 new ideas for products and new applications (Dodgson et al., 2006).

Besides the methods mentioned before to bring innovative outside ideas inside the company, P&G also bought buying entrepreneurial companies and created internal seed funds (Dodgson et al., 2006).

After the introduction of the Connect and Develop program, P&G has more attention for new innovation through collaboration with external partners and better use of the patents that P&G already has (Dodgson et al., 2006). Before this program, less than 10% of the technologies P&G owned were used in products (Sakkab, 2002).

The Connect and Develop project assist the creation, transfer and utilization of knowledge across organisational boundaries. These technologies include for instance data searching and mining (for instance by using an intranet and reporting systems for knowledge sharing), simulation and modelling (for instance by coupling suppliers through the integration of information, material and products and financial activities) and virtual and rapid prototyping (for instance simulation and computer-aided engineering). So, if there is an innovative idea, the idea has to be used (Dodgson et al., 2006).

2.2.1   Data searching and mining

The Connect and Develop strategy of P&G connects the internal and external resources by using technologies. Think about a corporate Intranet and reporting system for knowledge sharing (Dodgson et al., 2006).

Employees of P&G can contact each other all over the world by the so called 'InnovationNet' (this is an internal website). The InnovationNet works with accounts of users' interests. This means that people with the same interest are connected to each other (Dodgson et al., 2006). Besides the information exchange between countries, the purpose of P&G is to facilitate communication within and between 'communities of practice' (Brown & Duguid, 2000). P&G has a lot of such 'communities of practice.' Examples of these communities of practice are technology entrepreneurs and organic chemistry.

Researchers can use the internet-based systems in order to share data and information from even internal as external sources, think about communication with external business partners or deliver a link to external databases (Sakkab, 2002). P&G also established the Technology Entrepreneurs network. A group of 70 persons helps to link P&G to external innovation possibilities (Dodgson et al., 2006).

2.2.2   Simulation and modelling

In 1995, P&G started the 'Ultimate Supply System'. This system is intended to link suppliers, by increasing the importance of supply chain management. This has been done by the integration of information, material and products, and financial activities. The objective is "to significantly increase sales, reduce costs, increase cash flow and, ultimately, to provide the right product at the right time at the right price to our customers" (Wegryn & Siprelle, undated; as cited in Dodgson et al., 2006).

P&G has also an internal operations research group who designs the supply network by using optimization and simulation techniques. This group is called 'Global Analytics'. They synchronize planning cycles and production schedules and solve capacity utilization issues in response to closer coupling of supply chains (Dodgson et al., 2006).

2.2.3   Virtual and rapid prototyping

P&G makes use of a computer system to test prototypes of products in a virtual state. The products are eliminated for past requirements and they simulate, without building physical equipment, the effects of

production line changes. Virtual prototyping delivers the opportunity to look forward and makes it possible to answer the what-if question (Dodgson et al., 2006).

Because of the fact that P&G operates in a consumer product market, packaging design is very important. That is the reason why P&G has a group named CreatelInnovate that produces new packages to create brand identity. Also by using a computer-aided design, they visualize prototypes in order to test the representation of package designs with consumers. This also makes it possible for P&G to hire employees from different fields (not only industrial designers and mechanical engineers). For CreatelInnovate, brainstorming is a main task. If they have a good idea with sketches, the model has to be produced in one or two days. This model will be used during the whole process. Teams around the world examine the virtual model and can give positive and/or negative comments. Afterwards sometimes a little video will be made of the product and send it to panels of users. Most of the prototypes fail, but some ideas are very good. This whole process takes days instead of months. Afterwards an extensive market analysis has to be done (Dodgson et al., 2006).

2.3   Benefits of open innovation

As mentioned before, open innovation supports the fact that valuable ideas can come even from inside as outside the company. These ideas can also go from inside or outside the company to the market (Chesbrough, 2006).

Firms can benefit from open innovation. One of the main advantages is that organisations can benefit from their wide range of experts (Whitla, 2009). Companies or individuals from the outside of the organisation can create innovative ideas for a company (Chesbrough, 2006). So, we can conclude that individuals or companies who have a new look at the company, can generate ideas which could not arise by people within the organisation.

In the next previous of this paper, these benefits of open innovation will be explained using Procter and Gamble (P&G) as an example. Important applications of the open innovation paradigm are the digital network of P&G employees all over the world (Dodgson et al., 2006), communication within and between 'communities of practice' (Brown & Duguid, 2000) and virtual and rapid prototyping (Dodgson et al., 2006). The time-to-market can be decreased.

3   CROWDSOURCING

3.1   Theory of crowdsourcing

Since we got interested in open innovation, we found out that there is a new trend in innovation: 'crowdsourcing'. Companies like Procter and Gamble, IBM and Dell use 'the crowd' for, e.g. the design of new products. The term crowdsourcing is an aggregation of the words 'outsourcing' and 'crowd'. Crowdsourcing is first described by Howe (2006a). Howe (2006) states "crowdsourcing describes a new Web–based business model that harnesses the creative solutions of a distributed network of individuals through what amounts to an open call for proposals".

This definition is quite vague. A second more extensive definition of Howe (2006b) says that "crowdsourcing represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call. This can take the form of peer–production (when the job is performed collaboratively), but is also often undertaken by sole individuals. The crucial prerequisite is the use of the open call format and the large network of potential labourers."

This second definition fits better than the first one, because it states clearly that the job can be performed collaboratively, but also individually and that a company uses an open call to reach the large network of potential experts.

After reading some literature about crowdsourcing and open innovation, we found some similarities. Both ways of innovating use (external) people instead of own employees to solve problems or to invent new products or services. But there is a major difference: companies which use a crowdsourcing approach, in contradiction to companies that use an open innovation approach, do not use a predefined group of experts or companies. They outsource functions to an undefined network of people in the form of an open call, where companies with an open innovation approach use a predefined (often contract based) network of experts to collaborate with.

3.1.1 The crowd

The benefits for individuals in the crowd are most of the time uncertain. Besides that, companies sometimes earn big profits by executing the ideas of individuals or a crowd. Therefore it is interesting to know why consumers want to participate in crowdsourcing projects. First the composition of the crowd will be discussed shortly and secondly reasons for consumers to participate in crowdsourcing projects will be discussed.

The crowd needs to be diversified as much as possible to ensure that the crowd renders optimally. But in practice the crowd seems to be undiversified. Brabham (2008) states that the crowd currently is likely to be white, middle– or upper–class, English–speaking, higher educated, with high–speed Internet connections in the home. Moreover, the most productive individuals in the crowd are also likely young in age, certainly under 30 and probably under 25 years of age, as this age group is most active in the so–called Web 2.0 environment of massive content creation, such as through blogging.

Now we know which kind of consumers generally participates in crowdsourcing projects, it is interesting to know why they want to participate, because in most cases, no financial rewards will be paid to consumers. Ryan and Deci (2000) state that there are two types of motivations individuals can trigger to participate, namely extrinsic and intrinsic motivations. An extrinsically motivated person performs an activity in order to obtain some kind of external reward, e.g. recognition for work done, fame, benefits for one's career, the satisfaction of pursuing common goals or the opportunity to receive financial rewards.

An intrinsically motivated person wants to participate in a crowdsourcing project for his or her own sake. Possible motivations could be a possible employment or working experience. Since there is a worldwide economic crisis, participating in a crowdsourcing project can be a good manner to improve one's Curriculum Vitae.

3.2 Crowdsourcing in practice

Howe (2006) describes four types of 'crowdsourcing': collective intelligence, 'crowdcreation', 'voting' and 'crowdfunding'. Kleemann Voβ and Rieder (2008) defined more types of crowdsourcing, but these are very similar to Howe's theory in the end. In this section we try to explain Howes different types of crowdsourcing by using recent business examples.

3.2.1 Collective intelligence

David Griner used his blog to summarize a RadioLab podcast story about collective intelligence. He writes "The RadioLab podcast once told a story of a 1906 country fair at which attendees were invited to guess the weight of a large ox. Hoping for a cash prize, about 800 people made guesses, though no one got it right. Afterward a statistician analysed the written guesses and discovered something interesting: the average of all the guesses was a mere one pound away from the exact weight of the

ox." We assume that sometimes a crowd can be smarter than any one of its members, even when they are not actually working together. This example of Griner (2009), shows the essence of collective intelligence very well.

A first definition of collective intelligence was designed by Douglas Hofstadter (1979) and looks very similar to the example above. Nowadays collective intelligence has more a focus on communications technology, namely the internet. Web 2.0 has enabled interactivity and thus, users are able to generate their own content. Collective Intelligence draws on this to enhance the social pool of existing knowledge. "According to Howe "is collective intelligence not merely a quantitative contribution of information from all cultures; it is also qualitative" (Howe, 2006).

One of the most clarifying examples of recent collective intelligence is the InnoCentive initiative. InnoCentive was launched in 2001 by Eli Lilly as a way to connect companies with brainpower from outside the company. InnoCentive built a web community to collaborate and to deliver solutions for innovative research and development driven organizations. The idea is simple; create a network with a lot of users who can try to solve problems (research and development oriented) for money. Those users are called 'solvers'. On the other side we have 'seekers'. Seekers can be companies in large or small size, or non-profit organizations and government entities. They have in common that they are seeking for an answer. Any solver, of InnoCentive can try to solve their scientific problems. Based on the statistics from InnoCentive, the average success rate is 40%. Despite the chance of solving a problem is not very promising, yet the winning Solvers already have received more than $3.9 million to date (Innocentive, 2009). Jill Panetta, InnoCentive's chief scientific officer, made a proudly remark on the Solvers solutions, "it is the percentage more than would have been solved using a traditional, in-house approach".

Karim Lakhani (2008) has studied the InnoCentive initiative from a technological and innovative view. He discovered that solvers are mostly not who you might expect. What is, at the same time the strength of a network like InnoCentive. The diversity of intellectual backgrounds enables it to gather solutions from different disciplines. For example Howe describes the Colgate-Palmolive case, where Melcarek solved a problem for the research and development department of Colgate-Palmolive. They were looking for a vacuum way to inject a substance into a toothpaste tube. Melcarek, who was rarely employed at all, because of his aversion of 9-to-5 environments, solved the problem within a few minutes. He did held a master degree but not on chemistry, luckily he realized this wouldn't hinder hem when it came to solving this problem. He discovered a way to solve the chemistry challenge by using an electromechanical process he was familiar with from particle physics. He earned 25000 dollard for his effort. If Colgate had to pay its research and development team to develop the same solution if would have cost several times that amount (Howe, 2006).

3.2.2   Crowdcreation

Howe state that another type of crowdsourcing is crowdcreation. Kleemann et al. (2008) describe this type as 'crowdsourcing for product design or configuration'. This is because sometimes a crowdsourcing call is used to gather users for the creation or design of a product that totally depends on their input.

Kleemann et al. (2008) mention the example of product development in collaboration with consumers for the new Fiat 500 introduced in 2007. An initiative open to everybody who wanted to contribute. In short, the Fiat 500 philosophy was: "a car created for people, from people's ideas". A Fiats project team developed a new interactive multimedia platform, especially for the new Fiat 500. It enabled 'the crowd' to contribute to the development of the new car through the internet. After just 50 days online the website counted 500.000 hits and 5.000.000 page views. But even more important, the initiative delivered already 170.000 designs from (sometimes anonymous) contributors all over the world. They came up with thousands of new ideas and suggestions for the car. All the potential customers together created a car that everybody would like. And it worked out. Fiat executives, who have hit the jackpot with the 500, cannot wipe the smiles off their faces because of the 500. The growing waiting list is

evidence of this 500 madness that hasn't been seen since the launch of the new MINI in 2001 (http://www.fiat500.com/). The project was also a great success from a marketing view. The official fiat 500 website has been visited by over four million people in one year (www.italiaspeed.com). The whole crowd sourcing idea was part of the online advertising camping for the Fiat 500. Because so many people where involved in the development process, the cars advertising did it.

Another example of crowdcreation is the Speardshirt.net initiative. On this site, consumers can upload and edit text, graphics, and photos for creating individual t-shirt designs. Customers become designers this way and can then offer their final designs for sale in the Spreadshirt "market-place". Each designer is given their own on-line shop and can determine their prices within a given range. Spreadshirt handles t-shirt printing and delivery. If a shirt is sold with a crowdsourced design, a portion of the proceeds goes to the designer. There are now thousands of t-shirt designs available and the company has been so successful that it was able to take over a French competitor, lafraise.com.

On their site, consumers can create and submit ideas for new shoes. The company publishes the designs and organises on-line voting whereby internet users select their favourites. The most popular designs are then manufactured and offered for sale. As the term "open source" suggests, however, successful designers are not paid for their ideas. Their sole compensation is that their name appears on the final product.

3.2.3   Reporting and voting

A third type of transforming informational inputs, according to Howe, from a large number of users into a marketable product is to organise consumers into a 'community' of registered users who report on new products, new trends or other kinds of new outsiders might be willing to pay for. Take for example trendwatching.com. This website brings together over 8.000 'trend spotters' worldwide. All those spotters create a system where they supply the company with observable changes in market supply or consumer demand. This system can have a great contribution to traditional market research, which always has had a difficulties getting timely information on those latest trends and market developments. They sometimes even write reports or articles, and create product- or user reviews. As Howe describes in his book on how e-commerce can be the practice of activating and publishing consumers' knowledge and opinions about products: "a great development for businesses and consumers".

Something that is not described by Howe but does exist in other literature is 'permanent open calls', which is very similar to the 'reporting and voting' principle. This involves the permanent open call for the submission of information or documentation.

The best known example of this practice is probably the use of "amateur reporters," who submit photos or short articles for publication or broadcast. CNN engages in this practice and allows its amateur reporters to send in material via cell phone (http://www.ireport.com/). CNN offers no compensation for voluntarily submitted material. In contrast, Germany's BILD newspaper offers its "reader-reporters" €500 for every nationally published and €100 for every regionally published photo.

3.2.4   Crowdfunding

The last type of crowdsourcing that Howe describes is crowdfunding. While crowdsourcing is mainly focused on the knowledge and preferences of consumers, crowdfunding is about the financing of project and people by large crowds. Crowdfunding occurs for any variety of purposes, from disaster relief to citizen journalism to artists seeking support from fans, to political campaigns. Crowdfunding, like crowdsourcing, is very much related to online communities and social networks. The crowd can already exist as a community but they can also suddenly form from disparate groups around the world who all happen to share an interest in funding a person, project, event, campaign etcetera. The Internet allows for information to flow around the world, increasing awareness. A Crowdfunded network can assemble and disassemble at any time. This is the primary difference to traditional co-ops.

An existing example of a crowdfunding initiative is IndieGoGo (http://www.indiegogo.com/GrimsWorldProductions). IndieGoGo is an online social marketplace connecting filmmakers and fans to make independent film happen. The platform provides filmmakers the tools for project funding, recruiting, and promotion, while enabling the audience to discover and connect directly with filmmakers and the causes they support. Since launching at Sundance 08, filmmakers have successfully raised thousands of dollars with DIWO (Do-it-with-others) funding.

4   CONCLUSION

The similarity between open innovation and crowd sourcing is that both ways of innovating use (external) people instead of own employees to solve problems or to invent new products or services. There is also a difference: companies which use a crowdsourcing approach, in contradiction to companies that use an open innovation approach, do not use a predefined group of experts or companies. They outsource functions to an undefined network of people in the form of an open call, where companies with an open innovation approach use a predefined (often contract based) network of experts to collaborate with.

Because we found several advantages of open innovation and crowdsourcing, we can conclude that companies receive benefits from open innovation and crowdsourcing.

Open innovation delivers benefits for companies. Open innovation can deliver valuable ideas. If external individuals or companies look to an organisation, they have a new look at the company. They can generate ideas which could not arise by people within the organisation, because of the fact that they have a company vision. Within the case of P&G, some benefits as a result of open innovation where mentioned. These benefits contribute to a decreasing time-to-market.

One of the benefits of using crowdsourcing in organisations is that organisations gain availability to a wide range of experts. Accordingly, the time-to-market will decrease significantly, since the time it takes to develop new products will be reduced. Another additional advantage of the participation of experts from all over the globe is that the product quality can improve significantly, because a crowd can be smarter than its members.

The next benefit of crowdsourcing for organisations is the reduction of the costs of innovation, so the cost-to-market will decrease. Together with the reduced time-to-market, the decreased cost-to-market can achieve a major competitive advantage.

Besides all the direct benefits, there are two indirect benefits, namely the increase of market acceptance of new products and the increase of consumer's subjective perception of the actual newness of a new product.

For future research we suggest to link the benefits of open innovation and crowdsourcing to competitive advantage.

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