CROWDSOURCING AS USER-DRIVEN INNOVATION, NEW BUSINESS PHILOSOPHY'S MODEL

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Abstract

Purpose – This work aims to summarise research papers on crowdsourcing, to determine directions of future research.

Approach – Literature review.

Findings – This paper generalises crowdsourcing taxonomy. Until recent time, especially in pre-crises period, most of innovation initiatives came from manufacturers, often imposing excessive functionality of products to its users. Economical downturn revealed defectiveness and unsustainability of consumer society, the time for a new business thinking paradigm came, which is oriented to true customer needs. The answer to new business philosophy call is user-driven innovation, particularly Crowdsourcing. Crowdsourcing is an online, distributed problem-solving and production model, which emerged recently. Crowdsourcing was mentioned in the literature for the first time in 2006. This work provides an introduction to crowdsourcing and proposes directions of further research.

Value – This paper provides value for those, who are facing problems, which solutions could be drawn from mass online collaboration.

Introduction

In recent time innovation research has become widely spread, because, as history shows, future is behind companies, which are able not only to develop and implement, but also to sustain innovation. Traditionally the source of innovation was a company's internal R&D department. New tendency to attract innovation from outside the company recently emerged, which received severe critique, because it could be interpreted as outsourcing of innovation, which, according to Peter Drucker, is the key factor of companies' competitive advantage (Druker, 1985). Referring to Chesbrough (2003), attracting innovation from outside has its right to existence. The biggest problem with innovation developed within the company is divergence between product's features and real needs of customers. This problem is created due to competition and incremental innovation. Companies have to react to competitors' actions, especially when they introduce new features to rival's product, in order to keep customers and market share, company has no other choice, but to copy new features. As a result, after some time a product becomes overloaded with functions and features, which were introduced to satisfy a wider range of customers and competition. This 'too heavy' product, in terms of features, became appealing for no one, because customer should pay for all extra features. At this stage marketing department helps, if customer has insufficient motivation to buy the product, it should be created artificially, through new design or functionality. Artificial demand is a sign of consumption society, which is unable to create sustainable development. The crisis of 2008 proved this statement, when consumption increased negative consequences of real estate market collapse. But we should not only criticise innovation from manufacturers, it features own benefits, such as better reliability of product, which is explained by the sticky information effect, researched by Erick von Hippel (von Hippel, 1994, 2005).

Customer-centred or user-driven innovation is an alternative to manufacturer-centred innovation, which satisfies real customer needs better. There are several approaches how to involve customer in innovation process, these are: lead user, mass customisation, open innovation and crowdsourcing. The lead user concept emerged the very first – the initial research was published in 1986 by MIT professor Erick von Hippel. Lead users are defined as follows:

> "*Lead users face needs that will be general in a marketplace – but face them months or years before the bulk of that marketplace encounters them, and Lead users are positioned to benefit significantly by obtaining a solution to those needs*".

In other words: Lead users are users of a product that currently experience needs still unknown to the public and who also benefit greatly if they obtain a solution to these needs. Later the lead user method was utilised in 3M's Medical-Surgical Division to develop a breakthrough surgical drape product. 3M assembled a team of lead users which included a veterinarian surgeon, a make-up artist, doctors from developing

countries and military medics, this method consist of 4 stages and require arrangements of conferences and workshops (von Hippel et al., 1999; von Hippel & Sonnac 1999), which is cost-intensive, especially in case when lead users are spread around the globe (Von Hippel & Riggs, 1996).

Mass customisation approach was thoroughly research in Europe by Professor Frank Piller from Aachen University in Germany (Piller & Tseng, 2010). The essence of mass customisation is to give an opportunity to users to modify product in line with unique needs, remaining within mass production price range. Applying this technique, manufacturing company receives information about fashions and trends in the market directly from customers, thus it could promptly introduce products, which correspond with latest trends (Moser et al., 2006). The shortcoming of this method is a high cost to develop and sustain the system for mass customisation.

Open innovation takes it roots in open source software communities, which is successors of first authentic hackers communities, the programming enthusiasts, who created first software in order of developing computer movement, but not profit or IP oriented (Chesbrough, 2006). Open innovation and in particular virtual communities, developing open source software are similar with next approach of user driven innovation, because use internet as technical tool for own realisation, what substantially decrease costs to communication, coordination and data transfer (Lerner & Tirole, 2002).

All four approaches have their differences, but in certain circumstances overlapping each other. I should mention that crowdsourcing is the most recent approach to user-driven innovation. The term appeared for the first time in 2006, in Jeff Howe article "The rise of crowdsourcing", published in the online magazine "Wired" (Howe, 2006a). The word itself is a combination of two – crowd and outsourcing, which create the portmanteau "crowdsourcing" together. Jeff Howe defined crowdsourcing as follows: "Crowdsourcing is the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call" (Howe, 2006b). I should mention that Jeff Howe did not invent the concept, but only the name and definition, which covers a very wide range of actions often differing in its essential features. In modern literature there are two main approaches how to structure crowdsourcing: by type of task and size of reward.

Crowdsourcing is divided in three types of tasks: routine, complex and creative (Schenk & Guitard, 2009). The routine are simple, mechanical, recurring tasks impossible to automate, for example, tagging the photos. Complex tasks require more involvement, comparing to the routine one, but still remain simple and do not require special skills and knowledge, for example, writing a short movie review (Hsueh et al., 2009). Creative tasks are the tasks where solutions to a problem are created, for example, development of molecules for a certain drug. This kind of structuring is used by such authors as Daren Brabhant et alia (Brabham, 2008a; 2009; Hsueh et al., 2009; McCreadie et al. 2010). The shortcoming of this approach is imprecision of definition, as a result, borders between the routine and complex, complex and creative blur.

The second approach to crowdsourcing taxonomy is structuring it according to a size of reward. Many researchers are interested in this field of crowdsourcing, they are interested in people's motivation to take part in crowdsourcing activities, and this is interesting for entrepreneurs as well, since crowdsourcing substantially decreases labour costs. The Dutch researcher Ima Borst suggests dividing crowdsourcing in four categories: with no reward, penny rewards, dollars rewards and millions reward (Borst & Van Den Ende, 2007; 2008). Similar to the previous approach of crowdsourcing structuring the difficulty is in borders among these categories, where exactly dollars rewards end and millions started, since millions are used mostly as a metaphor here.

In order to make crowdsourcing taxonomy more visual, my proposal is to combine both approaches in one matrix, with 9 fields (Tabel 1), because three will not have real life examples due illogicality. No one will pay substantial rewards for simple tasks.

Table 1

Crowdsourcing Matrix

	Routine task	**Complex task**	**Creative task**
No reward	reCAPTCHA	www.noziegumakarte.lv	MIX
Penny reward	www.one.lv	mTurk	iStockphoto
Dollars reward	n/a	Thereadless	FYI
Millions reward	n/a	n/a	PepsiCo

For better understanding of crowdsourcing cases for each category of crowdsourcing are overviewed below, simultaneously rewards and task types.

No reward and routine task. Attractive example of this type of crowdsourcing activities is the project reCAPTCHA, where CAPTCHA stands for "**C**ompletely **A**utomated **P**ublic **T**uring test to tell **C**omputers and **H**umans **A**part". The idea of this project is to combine human identification for using website and library digitalisation project. During books scanning process some words appears to be undetectable by software, traditionally human manually enters meaning for this kind of words, the work of this person should be paid and his productivity is limited, thus the hole process of library digitalisation become more time and labour intensive. ReCAPTCHA project enable to automate this process through crowdsourcing activities in the internet. It offers to identify two words, one's meaning is known, the other one is taken from the blur scans, when several users give same meanings for the same word, and programme put this meaning into the text. As a result, lower labour costs and better efficiency in terms of speed. Internet users help to digitise library, without receiving any reward, only because they need to access certain web-page, which requires human identification (von Ahn et al., 2008).

No reward and complex task. A web application www.noziegumakarte.lv, which could be translated as crime map, is created to inform how safe situation on Latvian streets is. People can check what crimes have happened around place where they are living, working or going to have fun. People can also easily add a crime report that has happened to them earlier. There are options to select crime categor**y, date and place where it happened, add a descriptions. The project motto is to warn others and others** will warn you (Krauze, 2011).

No reward and creative task. The Management Innovation eXchange (MIX) is an open innovation project aimed at reinventing management for the 21st century. The premise: while "modern" management is one of humankind's most important inventions, it is now a mature technology that must be reinvented for a new age. Current management practices emphasise control, discipline and efficiency above all else — and that's a problem. To thrive in the 21st century, organisations must be adaptable, innovative, inspiring and socially accountable. That will require a genuine revolution in management principles and practices. The MIX helps to accelerate the pace of management innovation by energising and organising the conversation around the most critical challenges facing managers today — and by providing a practical platform where they can document, share and develop their leading-edge ideas and practices. The MIX is designed for all those who are frustrated by the limits of our legacy management practices. It is for all the inspired thinkers and radical doers who believe we can — and must — find alternatives to the bureaucratic and disempowering management practices that still rule most organisations. The MIX is joining forces with Harvard Business Review and McKinsey & Company to launch our most comprehensive contest ever, dedicated to reinventing management for the 21st century: The Harvard Business Review and McKinsey M-Prize for Management Innovation. In the first leg of the Harvard Business Review and McKinsey M-Prize for Management Innovation, they are seeking the most progressive practices and disruptive ideas that illustrate how the governing principles and tools of the Web can make our organisations more adaptable, innovative, inspiring, and accountable. Instructive case study or an experimental design are brought to this contest that demonstrates how Web 2.0 values (including transparency, collaboration, meritocracy, openness, community and self-determination) can be unleashed to overcome the design limits of Management 1.0— and help to create Management 2.0. Winners will receive significant recognition as management innovators on the MIX, Harvard Business Review and HBR.org, the McKinsey Quarterly and McKinseyQuarterly.com. Winners will also earn the chance to appear at the MIX Live gathering (www.managementexchange.com).

Penny reward and routine task. Latvian social network www.one.lv uses its customers to moderate photos posted by other customers, in order to determine if photos violate website rules, which prohibit to post photo if there cannot be seen faces; photos of children; animals; objects, celebrities, animation heroes, commercial; links to other websites; erotic and pornographic photos; and offensive photos; if there is more than one person on the picture, who the user is should be mentioned in comments, in case of rules violations photo should be banned. Each photo has a status, which is a decision of majority of moderators (users). For every moderation, a user receives points for a decision, which corresponds with a majority opinion; points are removed in case of differing decisions, compared to the majority. If a substantial number of errors arise, the user is banned to moderate photos and earned points are removed. The points reward system is presented in Table 2, which shows that a system tuned to motivate users to identified photos disobeying rules and has a big penalty for support of misbehaviour. Points has no direct monetary value, but can be traded for website services, which traditionally is paid with real money. There is no precise price list, since all transactions are

arranged in a form of auction, thus services value changes from a lot to lot, but average value of a lot does not exceed one euro.

Table 2

One.lv points reward system

Decision	Photo's status	Gained points
To block	blocked	5
To show	displayed	2
To block	displayed	-1
To show	blocked	-10

Penny reward and complex tasks. Amazon Mechanical Turk is the project of an internet company Amazon. This web-page gives an opportunity to earn small amounts of money, executing simple tasks on computer. Usually these tasks are tagging pictures, writing short reviews and participation in online surveys. Each task is paid for in a form of Amazon.com coupon. This made the service unattractive for contributors from the third world, for whom the level of earning is interesting as a main source of income. Due to low income level in these countries, but the way of receiving a reward is unacceptable, because they cannot receive rewards in their country and trade it for essential goods, like food, medicine and fuel (Barr & Cabrera, 2006).

Penny reward and creative tasks. iStockphoto is a depositary with semi-professional photos. This website sells good quality photos to mass-media for a price below the industry average. It becomes possible thanks to the development of digital photo cameras. Everyone, who thinks that his/her photos has a market potential, could apply to become a member of iStockphoto. This person should submit three photos for evaluation. If judges approve pictures, then a person will be entitiled to submit pictures with proper labelling, to simplify picture search. The price range for photos is from $1 to $100, authors royalties is from 15% to 45% (minimum $0.65) depending on experience and previous performance. In absolute figures it is much lower than professional photographer rates. It is the reason why amateurs take part in this project, while it is not the main source of income for them (Brabham, 2008b).

Dollars reward and complex tasks. The American company Threadless is a classical example of crowdsourcing, since it is embedded in its business model. This company produces t-shirts; a design for prints on t-shirts is submitted by internet users and approved by them, through voting too. In addition to graphical design anyone can submit a slogan, which also goes through voting, if slogan is selected for print, its author receives $500, but no more than $2500, which limits every contributor to five successful slogans. This business model uses product users as drivers of product ideas, which they are interested to buy. Consumer becomes member of a value chain on R&D stage (Duffy, 2009).

Dollars reward and creative task. Airbus contest “Fly your idea” (FYI). In 2011, Airbus held a contest FYI for the second time with a task to find ideas for airline industry to increase eco-efficiency. The main shortcoming of this project, from crowdsourcing point of view, is a limited number of participants. Only groups of students can take part in this contest. But it is the only limitation. Students from all countries, fields and levels are welcome, including PhD students, what substantially increases the number of potential contributors and gives grounds to call them a “crowd”. Submitted ideas are selected in two rounds. During the first one, professionals evaluate a potential of ideas and viability of its development. Selected ideas are progressed to the second round, where participants have time to elaborate the ideas under guidance of a mentor from Airbus. Based on results of the second round, five finalists are chosen who are invited to air show in Paris, as well as to an excursion to Airbus plant in Toulouse. The winner is chosen from finalists, and the main prize is € 30 000. Worth to mention, that there is no limitation only to technological ideas, Airbus welcomes social innovation as well, like passenger logistic in the airport. The winner of first FYI contest in 2009 was the "COz" team from University of Queensland, Australia. Their project was to use the castor plant to develop the first ever single plant-based high performance composite materials for aircraft cabin components (www.airbus-fyi.com).

Millions reward and creative task. Pepsi-Co implements the project “Refresh everything”, an opportunity to receive financial grant for ideas realisation. Ideas could be from fields of art, society, education and every month a special category is offered. The maximum size of grant is $250 000. Project selection is going through voting in the internet. The projects that received maximum financing are: “Fund a

gene therapy to cure the genetic disorder Sanfilippo Syndrome" and "Make 10,000 Schools Safer for LGBT Youth" (www.refresheverything.com).

Crowdsourcing application in marketing

Crowdsourcing finds its application in marketing as well (Whitla, 2009), where it is used as a production model, owing to which, not only ideas are created, but also video commercials. These video commercials have significantly lower production costs than traditionally made. Real crowdsourcing initiative in marketing success story is the cosmetics company L'Oreal, which reduced video commercial production costs to $1000, comparing to $164 200 it usually paid (Hempel, 2006). But it does not work all the time. The real disaster was Chevrolet effort to attract wide internet audience to promote its vehicle Tahoe. As a result, internet was full of jokes and mockery about that car (Bosman, 2006).

Intermediates in crowdsourcing

All crowdsourcing projects are realised by means of internet, owing to new possibilities of Web 2.0. Worth to mention, than it could be built on a company's own web-page, or use a platform of intermediates, these are the companies which bring together enterprises with problems and people with solutions. One of the crowdsourcing success factors is an ability to gain critical mass in crowdsourcing (Toral et al., 2009) that could be a serious barrier for companies with only one crowdsourcing project, which is executed on their own web-page, due to high investment in project promotion. Crowdsourcing intermediates are operating as in creative tasks with substantial reward, as in routine tasks with minimum reward, but they are not interested in projects with no reward, because in this case, there is no one to pay for their services. Most known crowdsourcing intermediate websites are Amazon Mechanical Turk (mturk) and InnoCentive. Research of Karim Lakhani from Harvard Business School shows that InnoCentive helped to solve 29.5% of problems, which could be solved by company's in-house R&D (Lakhani et al., 2007). InnoCentive services are using such giants, like Procter & Gamble, Roche and NASA. The web-page was originally created by the pharmaceutical company Lilly.

Crowdsourcing critique

During its short life, crowdsourcing gained not only followers, but also opponents. First of all crowdsourcing is criticised for its name and too wide definition. Jimmy Wales, co-founder of Wikipedia said: "Any company that thinks it's going to build a site by outsourcing all the work to its users not only disrespects the users but completely misunderstands what it should be doing. Your job is to provide a structure for your users to collaborate, and that takes a lot of work." (McNichol, 2007). Crowdsourcing also is criticised for low quality of outcome, fraud (Chan et al., 2010; Soleymani & Larson, 2010), manipulation with votes and people exploitation (Gill & Pratt, 2008). There is a clear analogy with a critique of social media, right for low quality (Keen, 2007). The problem of low quality results is present in both routine and complex tasks of crowdsourcing, with financial reward – routine tasks and penny reward, complex tasks and penny reward, complex tasks and dollars reward. McCreadie's research shows that participants try to maximise a number of performed tasks, in order to increase their reward (McCreadie et al., 2010). To battle this problem, performance time should be taken into account, and unrealistically fast answers should be rejected, as fraud attempts. Check questions should be included in the tasks, which answers are already known (Kittur et al., 2008). Answers also could be checked by the "crowd" itself, through the second round of crowdsourcing activities, as well as uneven gradation scale for answers, to increase precession of results (Hirth et al., 2010).

Creative and partially complex types of crowdsourcing, independently of reward size could be under pressure of attempts to manipulate votes, if voting is offered for the internet users. In this scenario contributors with wider social network have an advantage, being able to attract more votes for own contributed project. Another problem with voting is disproportional web-page visitors' attention to certain projects in case top leaders are presented, where truly best project could receive insufficient exposure, only due late entry to the contest. Technical means should be used as tools to prevent these shortcomings, like filters to limit number of votes from same IP address, restricted access by direct URL, which disable directly open and vote for certain project. More equal distribution of votes between projects could be reached, by replacing leaders top with random projects, as well as separate in time projects submission and evaluation, although this approach could bring new difficulties, e.g. voters could lose interest and critical mass would not be reached, thus the results would not be objective.

Crowdsourcing received serious critique for human exploitation, absence of agreements for work with contributors and wages level much lover then minimums defined by the law (Cove, 2007; Postigo, 2003). Crowdsourcing is even regarded as the 21st century slavery. Opponents note that participation in crowdsourcing activities is voluntary, there is no any compulsion to take part in crowdsourcing, and thus there are no any signs of exploitation. In case of a creative type of crowdsourcing, an author of idea transfers IP rights by signing an agreement. His/her power is limited to a possibility refuse to grant rights, although this is extremely rear case. Lakhani in his research on InnoCentive describes only one case when the author of idea refused to sign an agreement. Thus the idea was not developed further (Lakhani et al., 2007). From the formal point of view, there is no exploitation, but from ethical position there is a clear misbalance in rights and obligations in favour of crowdsourcing executor. Let's look at a relationship of employers and employees. An employer has a problem, which has to be solved. There is also an employee with special skills to solve this kind of problems. However, the problems were not solved, the problems itself point this out. Speaking about tasks, which require creative approach and mental work, it is impossible to forecast how much time will be required to solve certain problems, but the employer pays the employee, who is trying to solve the problems, even unsuccessfully. There is no guarantee that the employee will solve this problem. In this case the company has losses, which include direct costs to cover the employee's wages, as well as losses due to the unsolved problems. In case of outsourcing the problem solving, the employer becomes an outsourcer, and the cost burden in this relationship moves toward an outsourcee (Figure 1). All depends on a signed agreement, where the outsourcee is a legal person and is less protected than a private person, but still could embed in agreement a minimum reward, even in case of failure, and a much bigger one in case of success. In this case, the outsourcer is tied to this agreement, but not with the legislation concerning labour rights. Theoretically the outsourcee has better chances to find a solution to the problems, owing to more narrow specialisation and bigger experience in similar cases. In a worst-case scenario the outsourcer will have losses, which will be lower. The difficulty is to determine a proper time frame for finding a solution, which might be crucial. In case the crowdsourcing costs are moving further to the contributor or solver, the company will pay only for a successful solution, no minimum payments, no obligations.

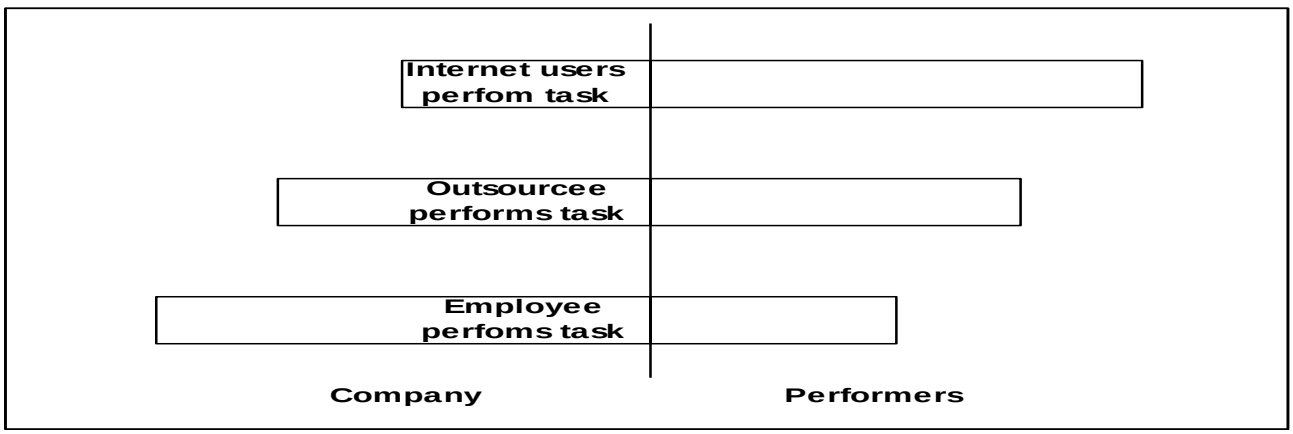

Figure 1. Costs burden migration

After scrutinising crowdsourcing from the ethical point of view, it became obvious that ethical norms are violated at the expense of contributors, and that is how cost reduction is achieved. This conclusion determines future research direction aimed to find out how crowdsourcing is viable, taking into account ethical norms violation.

Future research

First of all, it is the research of ethical part of crowdsourcing, in order to determine borders for a crowdsourcer's behaviour and actions. How far these border can be widened, without negative effect on results. Secondly it is essential to find out a condition, when and where crowdsourcing might be applied, in order to have a clear picture, in which industries it could be used. The third direction of research is crowdsourcing within globalisation process, transfer of crowdsourcing activities to such countries like China and India. Within this direction, the special attention should be paid to technological aspects of crowdsourcing and its perspectives on mobile devices. Developing countries have huge human potential, but

lacking proper infrastructure. The new technological level could help overcoming the problem of infrastructure and add new participants.

Conclusion

In spite of all shortcomings, crowdsourcing remains interesting either to entrepreneurs, or the public sector. Its positive features are: the ability to bring innovative solutions to difficult problems in a short period of time and minimal costs; the ability to attract brightest minds to the solution process (Surowiecki, 2004). Another strong side of crowdsourcing is performance simple tasks, which cannot be automated, at a very low cost, or even for free in the short-term (Van den Ende et al., 2009). At present the largest chunk of internet activities is in developed countries with high level of income, which still does not bother contributors to participate in crowdsourcing activities. Future research will show how far crowdsourcing can go in terms of its distribution in the developing world.

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