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Can Crowdsourcing Really Be Used in B2B Innovation?

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ABSTRACT

The aim of this research is to explore the use of crowdsourcing especially from business-to-business companies' innovation perspective, and to create a more comprehensive picture of the possibilities of crowdsourcing for companies operating in business-to-business markets. Business-to-business context was chosen because it is in many ways a very different environment for crowdsourcing than business-to-consumer context, and we found no academic studies on the topic. A systematic literature review was performed to gain an understanding of the state-of-the-art, and to create a research framework on the concept of crowdsourcing in innovation covering e.g. the type of crowdsourcing used, which crowds were used and in what innovation process phase crowds were utilized. Concerning the current ways of using 'crowds' and crowdsourcing in B2B innovation process, we found evidence of using crowdsourcing in B2B's in all the three innovation process phases: front-end, product development, and commercialization. Furthermore, evidence was found for crowdsourcing to be used in innovation mainly in the manner of crowd creation, crowd wisdom and crowd funding. We found that the role of social media was quite essential in all the found B2B crowdsourcing examples.

Categories and Subject Descriptors

J.4 [Social and Behavioral Sciences]: Economics.

General Terms

Management, Economics, Human Factors

Keywords

Crowdsourcing, Social Media, Business-to-Business, Innovation

1. INTRODUCTION

Literature in innovation management, Henry Chesbrough [7] in the front-row, has recognized an increasingly important innovation paradigm. This paradigm, "open innovation", emphasizes the importance of the efficient use of all available knowledge and information. Besides the knowledge inside the company borders, it emphasizes the significance of particularly the knowledge residing outside the company borders. This is because valuable innovation-related knowledge is being increasingly widely distributed to different actors, organizations (e.g. companies, customers, suppliers, universities etc.) and

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communities.

Some increasingly important relatively novel means of involving customers, end users and their expertise and knowledge in innovation are social media [2] and crowdsourcing [16] in particular. Social media is an important driver for a quick-paced increase in crowdsourcing approaches. Crowdsourcing has become a buzzword often associated with unrealistic expectations for innovation and a vague understanding of its benefits, challenges and requirements.

The current lack of organized and analyzed case evidence and examples, as well as a lack of a suitable framework for evaluating and pinpointing useful crowdsourcing approaches especially for companies operating in business-to-business markets makes it difficult for managers to estimate the possibilities of crowdsourcing in innovation. Due to some characteristics of the B2B sector, such as B2B's having typically far fewer customers than B2C's [11], often make it difficult to locate sufficiently large crowds of customers for crowdsourcing purposes. Second, the ways to motivate and engage business customers is very different from motivating and engaging consumers [33] for crowdsourcing purposes. Third, various IPR and information security issues [25] set limitations and challenges for social media use and/or crowdsourcing in the B2B sector. Due to the above characteristics, currently available academic studies that almost merely present crowdsourcing examples of companies operating fully or mainly in B2C markets, are useful only in a very limited way to B2B's.

The current studies have failed to bring understanding about the usefulness and most potential areas of application of crowdsourcing in B2B sector, which is often much more problematic in the sense of locating useful and sufficiently large crowds, as well as motivating such crowds to function as a useful resource in innovation.

Due to the existing found gaps in current crowdsourcing literature, using a systematic literature research, our aim is to understand the use of crowdsourcing in specifically B2B and innovation contexts. We arrived at the following research questions:

- Is crowdsourcing possible in innovation purpose for companies operating in business-to-business markets?
- What different kinds of current ways of using 'crowds' and crowdsourcing exist for companies operating in business-to-business markets in their innovation process?
- What is the role of social media in the analyzed crowdsourcing platforms used by companies operating in B2B markets?

We concentrate on the newer forms of crowdsourcing that have been brought up by e.g. novel forms of internet-based collaboration and social media.

A systematic literature review was performed to gain an understanding of the state-of-the-art, and to create a research framework on the concept of crowdsourcing in innovation covering e.g. the type of crowdsourcing used, which crowds were used and in what innovation process phase crowds were utilized.

We have shown that B2B sector is really in many ways a very different context for applying crowdsourcing than B2C sector, which has not been discussed in current research. On the basis of our study, the use of crowdsourcing is, within certain limitations, possible not only in B2C but also in B2B sector. The cases and the case analysis demonstrate that companies operating in business-to-business markets have been able to apply crowdsourcing in a large variety of innovative ways. The extant application ways have been analyzed and described in this study.

The study adds the understanding of crowdsourcing specifically from B2B sector standpoint, as no earlier academic studies have analyzed and described the use of crowdsourcing in this specific context.

2. CROWDSOURCING IN B2B INNOVATION

In this section, we try to define the concept crowdsourcing to be able to answer the given research questions in a useful sense, carrying out the literature review on the basis of this section, and to allow other researchers to evaluate the results, as well as refine and extend the conclusions in later studies.

Crowdsourcing definitions

Crowdsourcing is a relatively new concept which has transformed into a fashion word. One widely accepted useful definition clarifying the general nature of crowdsourcing has been presented by Howe [16]. He describes crowdsourcing as an “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.” However, a couple of fuzzy concepts in the definition, making it somewhat difficult to explicitly understand “crowdsourcing” are related to terms “undefined”, “generally large group of people”, and “open call”. First, “undefined” meaning fully undefined, or focused to certain populations, markets, groups or communities? Second, “generally large” is not easily defined – how large a group could be considered “large”: 100, 10.000 or 1.000.000, where should the limit be drawn? Third, “open call” is not easily defined, either, because in practice, calls are always restricted in some sense. Is a call open if *in principle* anyone can find and answer to the call, but in practice, is very difficult to find or run into, and is presented e.g. in certain language and within a certain community? Is a call that is presented within a certain community requiring registration or community manager acceptance an open one? Is a call open if it is presented in a global very large company’s intranet or is it open if the call is presented very openly but it is given in English, Portuguese or Chinese? As a conclusion, we find it not very easy to give a straight-forward answer, trying to define whether a certain approach is crowdsourcing or not. Therefore, we have to make some limitations in our study for the concept to be able to give a useful answer to our research questions.

We adopt Penin and Burger-Helmchen’s [26] concept of open call as a call in which everybody can (at least in principle) answer

the call - individuals can participate in addition to restricting the call within firms only, as well as non-profit organizations, or communities of individuals.

In current crowdsourcing literature the definitions have varied from very specific notions to broad generalist concepts depending on the subjects or the scopes of research projects. To unify the vague group of definitions Estellés-Arolas and González [9] studied over two hundred documents, related to crowdsourcing, and found 40 different crowdsourcing definitions which they used to form one universal interpretation to act as a theoretical base: “Crowdsourcing is a type of *participative online activity* in which an *individual, an institution, a non-profit organization, or company* proposes to a group of individuals of *varying knowledge, heterogeneity, and number*, via a *flexible open call, the voluntary undertaking of a task*.” In addition, they also emphasize the mutual benefit between the crowdsourcer and users (individuals who perform the given tasks) by not only recognizing the nature of the task and different efforts needed to fulfill the task, but also distinguishing the different needs that both actors have during the process [9].

A very central concept, ‘crowd’, has no generally accepted definition. A number of authors [e.g. 28] have defined crowd as a large set of anonymous individuals. Implicit in this definition is the idea that a firm cannot “build its own crowd” [28], which would be in disagreement with principles of ‘crowd’, ‘open call’ and probably at least partly the voluntary nature of crowdsourcing. Still, a crowd may be composed of professionals, such as scientists and experts in various fields, but also of novices (ibid).

Crowdsourcing is, by its very nature, receiving various types of value and benefiting from outside capabilities, information, knowledge, monetary resources, or other kinds of valuable resources.

Crowdsourcing types

Along with the above definitions, classifications of crowdsourcing have earned substantial attention in recent crowdsourcing literature. For example, Howe [16] has described four primary types of crowdsourcing: crowd wisdom, crowd creation, crowd voting and crowd funding. His classification is based on the conclusion that is achieved with help of the crowd by emphasizing the diversity of the crowd [24]. Schenk and Guittard [28, 29], instead, have collected and classified different crowdsourcing practices based on the type of tasks sourced (simple, complex or creative), as well as the nature of the crowdsourcing process (selective or integrative). Similar kind of classification is introduced by Brabham [6], who categorizes crowdsourcing into four dominant approaches: the knowledge discovery and management approach, the broadcast search approach, the peer-vetted creative production approach, and distributed human intelligence tasking. In addition, Vukovic [34] classifies crowdsourcing by its function (spanning the different parts of product life cycle) and crowdsourcing mode (whether the request is a tender or a competition). These classifications manage to bring some further clarity to the vague topic of crowdsourcing. However, the current categorizations are fairly generalizing and they fail to bring forth the differences in using crowdsourcing between B2C and B2B sectors.

For the above reasons, we will try to enhance the above and other existing definitions of crowdsourcing by defining crowdsourcing from the specific viewpoint of companies in B2B markets. First, B2B crowdsourcing could be defined from a very narrow viewpoint, defining it to be *B2B companies* crowdsourcing a

certain task *from the individuals of some other companies*. This is the way many commonly currently understand the concept of B2B crowdsourcing, due to the very nature of B2B's: by definition, they mainly deal with some direct customers being companies that pay for the product, seldom dealing directly with the products' end users and consumers. The problem is that this definition excludes very many currently existing and yet non-existing innovative ways for B2B companies to benefit from crowdsourcing. Furthermore, quite often crowdsourcing is understood as something directed towards utilizing merely the customer side of the supply chain, not the supplier or partner side. We decided to currently include both directions, not excluding any particular source of crowdsourcing. We neither exclude e.g. non-profit organizations, such as universities or research institutions, nor individual professionals or entrepreneurs, or intermediary companies such as InnoCentive that may themselves act as crowdsourcers making the crowdsourcing calls if a company operating in B2B markets benefits from it in some way. Furthermore, we include also other crowdsourcing sources such as communities or communities building around community platforms in the manner of NI Community, even though these are sometimes referred to as community sourcing. What we naturally do exclude, is e.g. actors that are not B2B companies, aiming to benefit from crowdsourcing, i.e. individuals, non-profits, institutions, public organizations, and B2C's, as referred to above in Estellés-Arolas and González's [9] crowdsourcing definition. Secondly, we exclude intra-organizational crowdsourcing, because even if this is possible on a voluntary basis, we think it does not really fulfill the criteria of 'crowd', 'outsourcing' or the 'openness' of the call. Thirdly, we exclude traditional well-known and already much studied forms of sourcing, for instance open source activities and conventional forms of beta-testing with end-users, such as Microsoft and other companies giving out beta versions of novel program versions in the purpose of outsourcing parts of their product development. Open source is not actually crowdsourcing while in crowdsourcing, firms usually make traditional use of IPR (e.g. patenting), in large part contrary to open source ideology. We concentrate the more novel forms of crowdsourcing enabled by e.g. developments in internet- and social media-based forms of collaboration and interaction.

So finally, we end up for defining 'B2B crowdsourcing', drawing from the above commonly cited crowdsourcing definitions, rather extensively as "*companies operating in B2B markets, using crowdsourcing in any way to their business benefit*", thus not necessarily the B2B's starting or making the actual crowdsourcing call themselves, or only between companies (as name "business-to-business" might refer). We will transform the above definition to a generic format, allowing us to make the definition compact and us to analyze usefully what B2B crowdsourcing really is, and how it can be used in B2B innovation. The generic format is thus defined as participatory online activity, carried out via an open call, in which

"companies operating in Business-to-Business markets propose themselves or aim to benefit in some other way from voluntary provision of A from B in C purpose, benefiting from this in D sense"

in which

A = concepts, ideas, information, knowledge, funding or other resources

B = a group of individuals of *varying knowledge, heterogeneity and number*, consisting from individuals from any

companies, organizations, non-profits, intermediaries, communities or individual professionals

C = new product development (NPD) or the whole innovation process, from ideas and concepts to commercialization (excluding e.g. purely marketing purpose), and

D = cost reduction, quality increase, increased customer orientation and customer understanding, time-to-market time reduction, sales / profit increase, etc. NPD or innovation related benefits

Thus, in this study we seek to a) enhance the understanding of B2B company- related crowdsourcing by focusing and extending the current crowdsourcing definitions towards the purposes of companies operating in the B2B sector, and b) understand broadly the uses and the potential of B2B company -related crowdsourcing in the specific purpose of enhancing innovation process. We use the above preliminary definitions concerning A, B, and C, aiming to find their current status on the basis of found B2B company -related crowdsourcing cases and examples. D will be examined in future research.

Generic benefits and restrictions of crowdsourcing in B2B

Some common generic characteristics of the B2B sector, such as B2B's having typically far fewer customers than B2C's [4], sometimes only few customers, often make it difficult to utilize crowdsourcing in the same sense than it is commonly used in the B2C sector – by locating and involving large crowds of users and customers for crowdsourcing purposes. Furthermore, the ways to motivate and engage business customers is very different from motivating and engaging consumers [33] for crowdsourcing purposes. Third, various IPR and information security issues set limitations and challenges for crowdsourcing in the B2B sector [25]. Due to the above characteristics, the currently available academic studies that almost merely present B2C crowdsourcing examples, are useful only in a very limited sense to B2B's. For the same reasons, many companies and managers have serious doubts against the usefulness of crowdsourcing in the B2B sector.

Current research and research gap

In current academic literature, we found no other studies on analyzing the topic of using crowdsourcing in companies operating in B2B markets in a broader sense, and no research on crowdsourcing in the innovation purpose in B2B's. In individual studies, some examples of crowdsourcing platforms suitable for B2B context were found [e.g. 28, 34], but the results included no analyses on the use, potential or usefulness of crowdsourcing in the specific context of the B2B's and their innovation process. Thus, we cannot currently draw any well-argued conclusions on the possibilities and or restrictions of crowdsourcing in companies operating in the B2B markets, or the above presented research questions, and the academic evidence on the subject is very fragmented in individual studies and is almost non-existing. Some non-academic white papers and writings in authoritative blogs on the topic do exist, which bring forth the need and the topicality of the subject [e.g. 32].

3. RESEARCH APPROACH

3.1 Literature Review

A systematic literature review of state-of-the-art business-to-business crowdsourcing was performed. For the information search, five databases were consulted: ACM, IEEE, ScienceDirect, SAGE and Emerald using "crowdsourcing" as a

keyword. The information search resulted in 1305 documents that were more or less related to our subject (Table 1).

Table 1. Consulted databases

Article Type	ACM	IEEE	SCIENCE DIRECT	SAGE	EMERALD	Total
Journal	112	20	175	69	47	423
Conference Paper	773	102	0	0	0	875
Books	0	0	0	0	7	7
Total	885	122	175	69	54	1305

The discovered articles were skimmed by evaluating their relevance to B2B, innovation and for building an evaluation framework of B2B crowdsourcing. Articles that dealt with only intra-organizational crowdsourcing were excluded. After removing duplicates from the search results of different databases, there were 59 unique documents in total that matched our criteria. These documents were chosen for further analysis. Summary of the selected documents can be seen in Table 2.

Table 2. Selected articles

Document type	ACM	IEEE	SCIENCE DIRECT	SAGE	EMERALD	Total	Total Unique
Journal	15	2	12	3	6	38	33
Conference Paper	16	9	0	0	0	25	24
Books	0	0	0	0	2	2	2
Total	31	11	12	3	8	65	59

In addition, authoritative B2B social media and crowdsourcing blogs were used for discovering more B2B case examples. Socialmediab2b.com, dailycrowdsource.com, and crowdsourcing.org were searched using B2B and crowdsourcing as keywords and 10 additional B2B crowdsourcing cases were discovered.

3.2 Case Study Approach

Case study method was used to evaluate crowdsourcing initiatives. Crowdsourcing initiatives that were applied in B2B sector according to the literature were included in the study. The 18 discovered B2B crowdsourcing initiatives are described in Table 3.

For further analysis B2B crowdsourcing initiatives that represented variety regarding crowdsourcing type and innovation process phase were selected by using the maximum variation case selection strategy [10]. Six platforms were excluded from further analysis on the basis that no evidence for use in innovation was found, although the services or approaches could also be used in innovation. By using the maximum variation selection strategy, five crowdsourcing platforms were excluded from further analysis because of the similarity with other approaches regarding the crowdsourcing type and applied innovation process phase.

Triangulation of researchers was used in the data gathering and data analysis in order to explore the phenomena from multiple perspectives [1], and to avoid bias of individual researcher. The data was mainly gathered by direct observation of the discovered different B2B crowdsourcing services and using secondary data to complement the observations. Direct observation was carried out by signing in the crowdsourcing platforms and for instance observing the functionalities and common social media roles in the platforms. Secondary data included scientific articles, blogs and other internet sources such as non-scientific magazines that described the use of crowdsourcing platforms in B2B companies.

Table 3. Discovered B2B crowdsourcing initiatives

Case	Description	Type of crowdsourcing [16]	Evidence of use in innovation
Alibaba	E-commerce marketplace	Crowd Creation	No
Amazon Mechanical Turk	Online marketplace for work	Crowd Creation	No
Atizo	Online brainstorming	Crowd Creation	Yes
Bombardier	YouRail design contest	Crowd Creation	Yes
Clickworker	Online marketplace for text creation, research, and translation services	Crowd Creation	Yes
GoldCorp	GoldCorp Challenge	Crowd Wisdom	No
IBM	Innovation Jam 'massively parallel conference'	Crowd Creation	Yes
InnoCentive	Problem solving	Crowd Wisdom	Yes
Kickstarter	Funding platform	Crowd Funding	Yes
Lilly	PD2 drug discovery concept	Crowd Creation	Yes
Microtask	Online marketplace for document processing and data entry	Crowd Creation	No
Mydeco	Interior design community	Crowd Creation	No
National Instruments	NI Community	Crowd Creation	Yes
SAP	SAPiPens Idea Community	Crowd Creation	Yes
Scoopshot	Photo and video broker service	Crowd Creation	No
Tecnisa	Ideias open innovation program	Crowd Creation	Yes
TopCoder	Online development community	Crowd Creation	Yes
Wilogo	Graphic designer community	Crowd Creation	Yes

4. CASE STUDIES

Based on the case selection strategy 7 platforms (see Figure 1) were chosen, from the original list of 18 platforms (Table 3), for further analysis. By a crowdsourcing platform we mean a website or other system which handles all the data needed to carry out the crowdsourcing effort (e.g. authentication of users, history of completed requests, charging and payments [34]). Thereby platforms work as a mediator between the working crowd and the crowdsourcing initiator [15], organized by the initiator itself (e.g. Bombardier YouRail) or a special intermediary organization (e.g. InnoCentive). In order to understand how business-to-business companies use crowdsourcing, it was necessary to look deeper at specific applications of the platform by a case company, not just the platform itself. InnoCentive is illustrated with 3 business-to-business cases: EMC that used InnoCentive in the front end, a company that used InnoCentive in product development and Flextegrity that used InnoCentive in commercialization. Atizo is examined through Pago AG case, where the site was applied in the front end of innovation. Kickstarter is illustrated by case examples of use in product development by Jensen and Mogensen and in commercialization by A Quick CNC. On general level all the selected cases represent the various ways of using crowdsourcing in different business functions in B2B sector. These business functions covered funding (e.g. Kickstarter), idea generation and selection (e.g. Atizo), design of new product concepts (e.g. Bombardier), research and development (e.g. InnoCentive).

Majority of the analyzed crowdsourcing cases were focused on the front end phase of innovation process. InnoCentive and National Instrument's Community were applied in all of the innovation process phases including product development. Figure 1 shows the connections between the innovation process phases and the selected platforms.

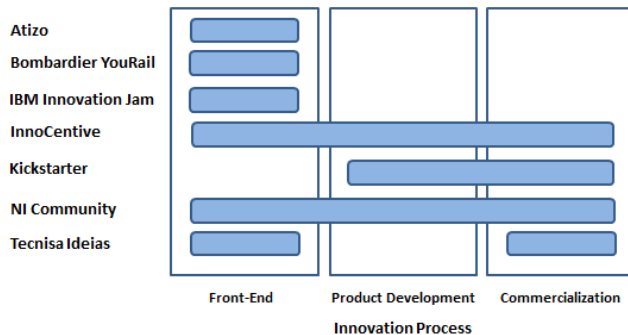


Figure 1. Crowdsourcing approaches in different innovation process phases

The selected crowdsourcing approaches that supported the front end phase of innovation process were Atizo, Bombardier and IBM Innovation Jam. Atizo serves as an interesting example of hybrid crowdsourcing and innovation consultancy service provider that has been applied in business-to-business context. Atizo service offering includes five steps: 1) devise questions, 2) find ideas, 3) select ideas, 4) rate ideas, and 5) plan the implementation. Crowds are used in finding and rating ideas, whereas Atizo's experts are used in selecting ideas and planning the implementation. [14] Bombardier is a global company specializing in aerospace and rail transportation business. Bombardier used a crowdsourcing contest to generate new consumer made interior designs for trains. [4, 5] IBM Innovation Jam is a crowdsourcing concept designed by the multinational company IBM. Differing from other selected cases

Jams are global events that gather together not only IBM's employees but also IBM's partners and other companies around the world to take part in an online brainstorming session. IBM has used Jams under different themes and subjects to develop business. More specific details and examples of used crowdsourcing approaches with B2B examples from each case are described in appendix 1.

InnoCentive and NI Community were the only cases where crowdsourcing was used by B2B companies in every phase of innovation process. InnoCentive is an intermediary company which provides a web-based market for solving scientific problems. Through its online platform various companies can post their problems to the site and let the users, either individually or collaboratively, find the best solution for it. The users vary from individuals to highly professional members of expert communities. [27] National Instruments is a multinational corporation which manufactures and supplies measurement and automation products. NI's crowdsourcing approach is focused around NI Community, which includes an online environment for gathering ideas and sharing solutions regarding the development of application software called LabView. LabView is NI's main product used by engineers and scientists all over the world to create products for their specific needs. The environment is powered by Jive. [8, 20] B2B examples of each phase of the innovation process regarding the above two platforms can be found in appendix 1.

The rest of the cases, Kickstarter and Tecnisa Ideias, were used in two different phases of the innovation process. Kickstarter is an online crowd funding site where users can participate in innovative and creative projects by giving project organizations monetary support. [22] In general, there are two ways of using the funding platform: some companies seek funding for product development phase when others gather funds for manufacturing phase or the launch of the product (commercialization).

Tecnisa uses crowdsourcing in front end and commercialization phases of innovation process. Tecnisa is one of Brazil's most profitable constructors with a lot of experience in property markets. Tecnisa operates in all areas of the real estate development sector. Tecnisa's crowdsourcing approach, Tecnisa Ideias, is an online platform for idea generation that helps the company to gather valuable customer knowledge from any consumer (engineer, architect, city planner, designer etc.). [30] Tecnisa Ideias' and Kickstarter's examples are described in appendix 1.

We also discovered that social media plays an important role generally in crowdsourcing. In previously described crowdsourcing cases social media is used in many ways to enable or enhance the initiative. We use the 5C model [35] to help characterize the different roles of social media in each of the selected cases. 5C model classifies social media tools by the action they enable. Different categories are: 1) *communicating* (publishing and sharing content), 2) *collaborating* (collective content creation), 3) *connecting* (networking people), 4) *completing* (adding, describing, and filtering), and 5) *combining* (mixing and matching information for different purposes). [35] The results of the characterization are presented in table 4.

Table 4. The role of social media in the selected crowdsourcing cases

Case	1	2	3	4	5
Atizo	X	X	X	X	

Bombardier YouRail	X	X	X	X	
IBM Innovation Jam	X	X	X	X	X
InnoCentive	X	X	X	X	
Kickstarter	X		X	X	X
NI Community	X	X	X	X	X
Tecnisa Ideias	X	X	X	X	X

Furthermore, social media is often used to share the open call and information about the crowdsourcing initiative to a larger audience. For example in Kickstarter and Bombardier YouRail cases the open call can be shared via other social media services (e.g. Facebook and Twitter). Some crowdsourcing initiatives even encourage and motivate people to share the call to their network. For example B2B companies operating with InnoCentive can use Challenge Referral Program to reach a larger and more diverse audience for solving the challenge. InnoCentive's Referral Program gives substantial monetary incentives (e.g. \$5,000 USD) for referring the winner of the challenge. [18]

5. DISCUSSION AND CONCLUSIONS

First of all, we defined the concept B2B crowdsourcing, utilizing the earlier common definitions of crowdsourcing. The definition was used in finding examples and evidence of B2B crowdsourcing, and to analyse the nature of B2B crowdsourcing. The definition itself can broaden the understanding of the possibilities of crowdsourcing in B2B context.

We were able to find a number of useful applications of crowdsourcing in a large variety of different application areas in B2B companies' innovation process. Thus, the study clearly demonstrates that not only companies that operate in B2C markets, as commonly earlier presumed, but also companies operating in B2B markets can make use of crowdsourcing in a variety of ways. Concerning the first research question, the possibility of using crowdsourcing in innovation purpose for companies operating in business-to-business markets, the study shows, first, that crowdsourcing is possible for companies operating in business-to-business markets, despite the mentioned challenges typical for B2B's, and the very restricted possibilities to benefit from available B2C sector examples, and second, that crowdsourcing is possible in supporting their innovation processes. All the nine studied cases related to seven crowdsourcing platforms demonstrated the studied companies operating in B2B markets to have applied crowdsourcing to support their innovation process. We found evidence in the cases of the use of crowdsourcing by B2B's with their direct customers, end users, professionals from companies not in direct business relationship with the target B2B's, and non-profits such as universities. A more detailed analysis is done in future studies.

This contributes to the existing crowdsourcing literature, because there are no found earlier academic studies on the use of crowdsourcing in the innovation process in the specific context of companies operating in B2B markets, in addition to the fragmented few academic studies presenting individual related cases and examples, without reflecting the wider usability of crowdsourcing in the B2B sector.

Concerning the current ways of using 'crowds' and crowdsourcing in B2B innovation process, first, we found evidence of using crowdsourcing in companies operating in B2B markets in all the three major innovation process phases: front-end, product

development, and commercialization. Majority of the studied crowdsourcing approaches were focused on the front end phase of innovation process (Appendix 1), but the other phases were also actively supported by found B2B company approaches. Most approaches and platforms concentrated on individual crowdsourcing tasks and individual innovation process phases, even though InnoCentive and National Instruments made use of all innovation process phases. Many of the found approaches were a combination of using crowds and employed personnel. Crowds were used to create, preliminarily screen, elaborate, and test ideas, product and service concepts, visual designs, software code, and even business plans produced by crowdsourcing approaches. Furthermore, evidence was found for crowdsourcing to be used in innovation mainly in the manner of crowd creation, crowd wisdom and crowd funding.

On the basis of our results, it seems that several of the found crowdsourcing approaches are clearly different from crowdsourcing practices of companies operating in B2C markets, as could be expected due to differences of B2B and B2C sectors. For example the approaches themselves, the type of crowdsourced items, and the motivators for participation seem somewhat different. Thus, B2B's can learn from B2C sector crowdsourcing examples only in a very limited way. This means that B2B crowdsourcing should be studied separately, and B2B examples should be developed and analyzed systematically, taking into consideration the B2B and B2C differences, some major differences of which were introduced in this study. Since B2B's have fewer customers and in this manner, smaller direct-customer crowds than in B2C sector are available, B2B's made use, instead of merely direct customers, of non-direct customers such as end users (e.g. Bombardier), partners and other stakeholders (e.g. IBM Innovation Jam). In general, the crowdsourced tasks were relatively simple, but e.g. InnoCentive has been used to crowdsource even very complex concepts and tasks.

Concerning the role of social media in B2B sector crowdsourcing, we found that the role of social media was quite essential in all the found B2B crowdsourcing examples. Our results demonstrate that social media was integrated in many important ways to the platforms and approaches. In all approaches, at least three out of five studied social media roles were utilized. The roles of communicating (publishing and sharing content), connecting (efficient networking of people in many ways), and completing (adding, describing and filtering information) were applied in all cases. Collaborating and combining were also quite essentially supported by social media, e.g. for prioritizing more important and filtering less important content. Least evidence was found in the use of combining (mixing and matching content e.g. by means of mash-ups or embedding content from other medias), but in a limited way, e.g. embedding content from Slideshare or other medias was done. Importantly, the roles were applied in a quite systemic sense, and different social media roles supported each other quite organically. E.g. collective content creation, commenting others ideas to support collective sense making and content filtering roles supported each other.

Preliminarily, our study has shown that the B2B's involved in crowdsourcing activities have been able to make use of crowdsourcing in many ways in their innovation process. Benefits mentioned in found cases include e.g. increased quality and customer-orientation of products, as well as more efficient and speeded up innovation process. Since this was not in the central focus of this study, however, in further research we will analyse in more detail the benefits that B2B's have received from

crowdsourcing efforts, as well as the motivators used for involving crowds in B2B crowdsourcing.

6. REFERENCES

- [1] Baxter, P. and Jack, S. 2008. Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report*. 13, 4 (2008), 544–559.
- [2] Bernoff, J. and Li, C. 2008. Harnessing the power of the oh-so-social web. *MIT Sloan Management Review*. 49, 3 (2008), 36.
- [3] Bjelland, O.M. and Wood, R.C. 2008. An Inside View of IBM's' Innovation Jam'. *MIT Sloan management review*. 50, 1 (2008), 32–40.
- [4] Bombardier Inc. - Bombardier - Home: <http://www.bombardier.com/>. Accessed: 2012-06-04.
- [5] Bombardier YouRail Designcontest: <http://yourail-design.bombardier.com/>. Accessed: 2012-06-04.
- [6] Brabham, D.C. Crowdsourcing: A model for leveraging online communities. *The Routledge Handbook of Participatory Culture*.
- [7] Chesbrough, H.W. 2003. *Open innovation: the new imperative for creating and profiting from technology*. Harvard Business Press.
- [8] Elliott, C. et al. 2007. National instruments LabVIEW: a programming environment for laboratory automation and measurement. *Journal of the Association for Laboratory Automation*. 12, 1 (2007), 17–24.
- [9] Estellés-Arolas, E. and González-Ladrón-de-Guevara, F. 2012. Towards an integrated crowdsourcing definition. *Journal of Information Science (in press)*. (2012).
- [10] Flyvbjerg, B. 2006. Five misunderstandings about case-study research. *Qualitative inquiry*. 12, 2 (2006), 219.
- [11] Gillin, P. and Schwartzman, E. 2011. *Social Marketing to the Business Customer: Listen to Your B2B Market, Generate Major Account Leads, and Build Client Relationships*. Wiley.
- [12] Group: Groundswell Award Entry: Embracing Our Customers for Software Development: <https://decibel.ni.com/content/groups/groundswell-award-entry-embracing-our-customers-for-product-development>. Accessed: 2012-06-04.
- [13] Haller, J.B.. et al. 2011. Innovation Contests. *Business & Information Systems Engineering*. (2011), 1–4.
- [14] Hirsig, C. 2011. Nur neue wege fuhren zu neuen ideen. *Wirtschafts Magazin*.
- [15] Hirth, M. et al. 2012. Analyzing costs and accuracy of validation mechanisms for crowdsourcing platforms. *Mathematical and Computer Modelling*. (2012).
- [16] Howe, J. 2008. *Crowdsourcing: How the power of the crowd is driving the future of business*. Crown Publishing Group.
- [17] InnoCentive - Challenge Overview: A Scalable System to Track Electronic Waste: 2012. <https://www.innocentive.com/ar/challenge/9933011>. Accessed: 2012-05-31.
- [18] InnoCentive - Challenge Overview: Imparting Durability/ Adhesion to Superhydrophobic Silica Coatings: 2012. <https://www.innocentive.com/ar/challenge/9933042>. Accessed: 2012-06-04.
- [19] InnoCentive - Challenge Overview: Seeking Highest and Best Commercial Application for Breakthrough Innovation in Building Technology/Structural Optimization: 2012. <https://www.innocentive.com/ar/challenge/1030000017>. Accessed: 2012-06-02.
- [20] Jive 2010. Engaging across the social web.
- [21] Kickstarter project: MinuteBot Base for LEGO Mindstorms enabled robotics by Soren Jensen. A Product Design Project in Copenhagen.: 2012. <http://www.kickstarter.com/projects/37801615/minutebot-base>. Accessed: 2012-05-31.
- [22] Kickstarter project: Modular Desktop CNC Machine. An Open Hardware project in Minneapolis, MN by AJ Quick: 2011. <http://www.kickstarter.com/projects/ajquick/modular-desktop-cnc-machine?ref=category>. Accessed: 2012-06-04.
- [23] National Instruments: Test, Measurement, and Embedded Systems: <http://www.ni.com/>. Accessed: 2012-06-04.
- [24] Noble, J.A. 2012. Minority voices of crowdsourcing: why we should pay attention to every member of the crowd. *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work Companion* (New York, NY, USA, 2012), 179–182.
- [25] Nordlund, H. et al. 2011. Openness of innovating: the new roles of customers and users in business-to-business context. *International Journal of Entrepreneurship and Innovation Management*. 14, 4 (2011), 282 – 297.
- [26] Penin, J. and Burger-Helmchen, T. 2011. Crowdsourcing of inventive activities: definition and limits. *International Journal of Innovation and Sustainable Development*. 5, 2 (2011), 246–263.
- [27] Sawhney, M. et al. 2005. Collaborating to create: The Internet as a platform for customer engagement in product innovation. *Journal of Interactive Marketing*. 19, 4 (2005), 4–17.
- [28] Schenk, E. et al. 2011. Towards a characterization of crowdsourcing practices. *Journal of Innovation Economics*. 1 (2011), 93–107.
- [29] Schenk, E. and Guittard, C. 2009. Crowdsourcing: What can be Outsourced to the Crowd, and Why? *Workshop on Open Source Innovation, Strasbourg, France* (2009).
- [30] Tecnisa Ideias: <http://tecnisaideias.com.br/web/ideias>. Accessed: 2012-06-04.
- [31] Tecnisa Ideias: 2011. <http://www.crowdsourcing.org/site/tecnisa-ideias-technisaideiascombr/4999>. Accessed: 2012-06-04.
- [32] Tecnisa: Capitalizing on Open Innovation: 2011. <http://www.crowdsourcing.org/editorial/tecnisa-capitalizing-on-open-innovation-/4997>. Accessed: 2012-06-04.
- [33] Tickle, M. et al. 2011. Developmental approaches to B2B virtual communities. *Technovation*. 31, 7 (Jul. 2011), 296–308.
- [34] Vukovic, M. 2009. Crowdsourcing for Enterprises. *Proceedings of the 2009 Congress on Services - I* (Washington, DC, USA, 2009), 686–692.
- [35] Vuori, V. 2011. Social Media Changing the Competitive Intelligence Process: Elicitation of Employees' Competitive Knowledge. *Tampereen teknillinen yliopisto. Julkaisu-Tampere University of Technology. Publication; 1001*. (2011).

Appendix 1. Descriptions for different crowdsourcing methods utilized in innovation process of selected cases.

Case	Front end	Product Development phase	Commercialization
Atizo	Pago AG a business-to-business company that engages in the design, production, and supply of labels and labeling systems used Atizo to crowdsource new product ideas [14].		
Bombardier YouRail	Bombardier orchestrated an online innovation contest to crowdsource freely created designs and configured designs of new interior designs for trains. [13]		
IBM Innovation Jam	Annual crowdsourcing event hosted by IBM, where the company's researchers, employees and outside experts are invited to join in a virtual brainstorming session. The participants post ideas for innovations and then others join in, commenting on the posts and voting for their favorites.[3]		
InnoCentive	InnoCentive has been used in the front end for crowdsourcing proposals to theoretical problems or new ideas, for example EMC's Ideation Challenge: "How can waste from electronics (e-waste) be tracked most efficiently from collection to final destination" [17].	A company used InnoCentive to crowdsource a specific part of product development, a solution that would improve the durability of super hydrophobic coating.[18]	Flextegrity, Inc used InnoCentive to crowdsource commercial application of their innovation in building technology/structural optimization.[19]
Kickstarter		Jensen and Mogensen used Kickstarter successfully to crowd fund the development of MinuteBot Base product, which is a robust base plate that can be used for construction of robotics based on LEGO Mindstorms. According to Jensen the product can be used for example for constructing a robot for biotech research [21].	A Quick CNC used Kickstarter to crowd fund the development of a manufacturable modular desktop CNC machine from a prototype. Those that pledged \$1050,00 or more for the project received a ready to run kit.[22]
NI Community	NI Idea Exchange is used by NI to crowdsource ideas from NI Community [12].	NI Idea Exchange has been used by NI R&D to prioritize and discuss about product ideas submitted by users by means of crowd voting and crowd creation. [12]	NI Labs showcases evolving technologies from NI R&D engineers that aren't quite ready for release. NI Labs is used to crowdsource testing and product feedback from products not launched yet. [20, 23]
Tecnisa Ideias	Tecnisa has used their own platform, Tecnisa Ideias, and social networking website, Orkut, to crowdsource ideas for its new buildings. [32]		Tecnisa Ideias platform is used to crowdsource feedback from the community about the products of the company and also for the community to crowdsource information or answers to their questions. [31]