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Jari Jussila

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Avainsanat: Sosiaalinen media, business-to-business, tuotekehitys, innovaatio, avoin innovaatio, asiakasrajapinta, asiakastietämys

Yhä tärkeämmäksi noussut avoimen innovaation paradigma korostaa, että arvokasta innovaatioihin liittyvä tietoa on hajautunut laajalti yrityksen ulkopuolelle useille eri toimijoille, kuten käyttäjille, asiakkaille ja yhteisöille. Useat uudenlaiset kollaboratiiviset web-työkalut ja lähestymistavat, kuten sosiaalinen media, voivat mahdollistaa ja merkittävästi lisätä hajautuneen tiedon hyödyntämistä sekä yrityksen sisällä että yrityksen rajat ylittäen.

Laajalti oletetaan, että sosiaalista mediaa on vaikeampi hyödyntää business-to-business (B2B) yrityksien innovoinnissa ja asiakasrajapinnassa kuin kuluttajayrityksissä, johtuen merkittävistä eroista B2B-markkinoihin, B2B-tuotteisiin ja tuotekehitykseen liittyen. Huolimatta kasvavasta määrästä akateemista tutkimusta ja yrityksien kokeiluja, sosiaalinen media on edelleen haasteellinen asia monille yrityksille. Sosiaalisen median mahdollisuuksia ja hyötyjä ei vielä ymmärretä hyvin liiketoiminnassa ja erityisesti B2B-kontekstissa. Sosiaalisen median hyödyntäminen B2B-markkinoinnissa on saanut paljon huomiota, mutta innovaationäkökulma on jäänyt huomattavasti vähemmälle huomiolle.

Tämän väitöskirjan tarkoituksena on tutkia ja auttaa ymmärtämään paremmin sosiaalisen median hyödyntämistä B2B-yritysten innovoinnissa. Aihetta lähestytään erityisesti innovaatioprosessin, asiakasrajapinnan ja näihin liittyvän asiakastietämyksen luomisen ja jakamisen näkökulmasta. Tutkimuksen päätavoitteena on ymmärtää paremmin sosiaalisen median haasteita, mahdollisuuksia, käyttöä, hyötyjä ja erilaisia rooleja B2B-yritysten innovoinnissa. Tutkimus on muodoltaan artikkeliväitöskirja, joka on antanut tutkijalle mahdollisuuden tarkastella useasta näkökulmasta vähän tutkittua ja ymmärrettyä ilmiötä. Väitöskirjassa yhdistyy määrällinen ja laadullinen tutkimus. Määrällistä tutkimusta on hyödynnetty sosiaaliseen mediaan liittyvien haasteiden tunnistamisessa ja sen nykyisen käytön ja koetun potentiaalin hahmottamisessa B2B-yritysten innovoinnissa. Laadullista tutkimusta on hyödynnetty syvemmän ymmärryksen luomisessa sosiaalisen mediaan liittyvistä haasteista, hyödyistä ja sen rooleista B2B-yritysten innovoinnissa.

Väitöskirjan kontribuutiona saatiin uutta ymmärrystä tähän asti melko vähän ymmärretystä aihealueesta, sosiaalisesta mediasta ja sen mahdollisuuksista B2B-yrityksien innovoinnissa. Tutkimuksen perusteella ymmärretään paremmin erityisesti niitä haasteita joita B2B-yrityksillä on sosiaalisen median hyödyntämisessä innovoinnissa, uusia mahdollisuuksia ja hyötyjä joita sosiaalinen media tarjoaa innovaatioprosessiin, sekä sosiaalisen median hyödyntämistapoja ja rooleja B2B-yrityksien innovoinnissa.

Lisäksi kehitettiin malleja ja teorioita sosiaalisen median hyödyntämiseen: laadullisen tutkimuksen pohjalta väitöskirjassa kehitettiin esimerkiksi sosiaalisen asiakasoppimisen malli, jonka tarkoituksena on auttaa tutkijoita ja yrityksiä tunnistamaan ja arvioimaan erilaisia sosiaalisen median lähestymistapoja asiakasrajapinnassa ja innovoinnissa; mediarikkausteoriaan ja kanavanlaajennusteoriaan ehdotettiin parannuksia ja muokkauksia, jotka ottavat paremmin huomioon sosiaalisen median ja innovoinnin kontekstin.

ABSTRACT

TAMPERE UNIVERSITY OF TECHNOLOGY

JUSSILA, Jari: "Social media in business-to-business companies' innovation"

Keywords: social media, business-to-business, product development, innovation, open innovation, customer interface, customer knowledge

Regarding the increasingly important paradigm of open innovation, it is recognized that valuable innovation-related knowledge is distributed ever more widely to various actors outside the company borders, such as users, customers, and communities. Various types of novel collaborative web tools and approaches, such as social media, can enable and significantly increase the use of distributed knowledge both within and outside company borders.

It is a common assumption that it is much more difficult to utilize social media in business-to-business (B2B) innovation and the customer interface because of the significant differences in B2B markets, B2B products, and product development, for example. Despite the growing number of company experiments and academic studies, social media are still new to many businesses. The opportunities and benefits of social media are not well understood in business, especially in B2B context. Despite the recent increasing interest in the use of social media in B2B marketing, it has received little attention from the innovation perspective.

The general purpose of this thesis is to study and help to understand the use of social media in B2B companies' innovation. The thesis focuses on the innovation process, customer interface and the related perspective of the creation and sharing of customer knowledge. The main objectives of the dissertation are to understand the challenges, new opportunities, use and benefits, as well as, functions and roles of social media in B2B innovation. The choice of carrying out the dissertation as an article thesis has offered the researcher the opportunity to study from multiple perspectives a phenomenon that has been little researched or understood. The thesis combines quantitative and qualitative research. Quantitative research approach was used to determine the current use and perceived potential of social media tools in innovation, as well as to identify challenges of social media use in B2B company innovation. Qualitative research was used to gain a deep understanding of the challenges and benefits, and roles and functions of social media in B2B innovation.

The thesis contributes to the increasing understanding on the rather little understood topic of social media and its potential in B2B companies' innovation. Based on the research, new understanding was gained on the challenges that B2B companies face in using social media in innovation, on the new possibilities and benefits that social media provide for innovation, as well as on the applications and the roles of social media in B2B innovation.

In addition, models and theories were developed for enhancing social media use: based on the qualitative research, for example, a Social Customer Learning model was built, which aims to help researchers and managers to identify and evaluate different social media approaches in business-to-business customer interface and innovation; modifications and improvements were proposed for media richness theory and channel expansion theory for the better consideration of the social media and the innovation contexts.

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Tampere 7.10.2015

Jari Jussila

LIST OF PUBLICATIONS AND AUTHOR'S CONTRIBUTION

PUBLICATION 1: **Kärkkäinen, H., Jussila, J. Väisänen, J. (2013). Social Media Use and Potential in Business-to-Business Companies' Innovation, Artur Lugmayr, Olli Sotamaa, Heljä Franssila, and Hannu Kärkkäinen (eds.). Special issue on Ambient and Social Media Business and Application (Part II) International Journal of Ambient Computing and Intelligence (IJACI), Vol. 5. No. 1. IGI Global, 2013.**

Publication I identifies the research problem, increases the understanding of challenges and the use of social media in B2B company innovation, and recommends relevant directions for future studies. The author was responsible for planning and executing the survey, participated in the statistical analysis, and wrote the article in collaboration with the co-authors.

PUBLICATION 2: **Jussila, J. J., Kärkkäinen, H., & Leino, M. (2012a). Social media's opportunities in business-to-business customer interaction in innovation process. Int. J. Technology Marketing, 7(2), 191–208.**

Publication II seeks reasons for the lack of understanding of the benefits of social media in innovation and the lack of case evidence, which were identified in publication I. The study increases the understanding of the opportunities of social media use in customer interaction in different phases of the innovation process for companies operating in B2B markets. It illustrates case examples identified in the literature and in a survey. The study also identifies differences in B2B and B2C social media use in innovation. The author was responsible for conducting the literature review, analyzing the survey data, and writing the article with the co-authors.

PUBLICATION 3: **Jussila, J. J., Kärkkäinen, H., Aramo-Immonen, H. (2014) Social media utilization in business-to-business relationships of technology industry firms. Computers in Human Behavior, Vol. 30, January 2014, Pages 606-613.**

Publication III increases the understanding of the perceived potential of the external use of social media in the business functions of companies that operate wholly in B2B markets. It focuses on the current external use of social tools and the most common barriers to the use of social media. The author

was responsible for the statistical analysis of the survey data and was the lead author of the article.

PUBLICATION 4: **Jussila, J. J., Kärkkäinen, H. and Leino, M. (2013) 'Innovation-related benefits of social media in Business-to-Business customer relationships', Int. J. Advanced Media and Communication, Vol. 5, No. 1, pp. 4–18.**

Publication IV contributes to the understanding of the benefits of using social media applications in various customer roles in phases of the innovation process in companies that operate in B2B markets, represent ICT, software, pharmaceuticals, and offer consulting and various types of B2B services. The cases illustrate how various practices of B2B can benefit from the use of social media in innovation. The author was responsible for the literature review and case analysis and was the leading author of the article.

PUBLICATION 5: **Jussila, J. J., Kärkkäinen, H., & Leino, M. (2012b). Learning from and with Customers with Social Media: A Model for Social Customer Learning. International Journal of Management, Knowledge and Learning, 1(1), 5-25.**

Publication V introduces a model of social customer learning, thereby contributing to the application of media richness theory in the social media context. The publication increases the understanding of learning from customers by receiving and providing feedback about new products and concepts by using social media in companies operating in the B2B market, thus addressing the major challenges in learning from customers. The author was responsible for the application of media richness theory in the social media context. The author also conducted the case study and wrote the article in collaboration with the co-authors.

PUBLICATION 6: **Jussila, J., Kärkkäinen, H., Lyytikkä, J. (2011) Towards Maturity Modeling Approach for Social Media Adoption in Innovation. Proceedings of the 4th ISPIM Symbosium, Wellington, New Zealand, 29 November – 2 December 2011.**

Publication VI increases the understanding of the factors that affect the adoption of social media. The publication identifies some of the most critical dimensions that affect the adoption of social media in the innovation of B2B companies. The study seeks to provide answers to the questions that companies have in their adoption new mental models

and practices. The role of the researcher was to perform a literature review of previous studies on social media adoption and related maturity models, design and execute interviews for one case study, and to perform a cross-case analysis of the collected data.

PUBLICATION 7: **Jussila, J. J., Kärkkäinen, H., Multasuo, J. (2013) Social Media Roles in Crowdsourcing Innovation Tasks in B2B-Relationships. In Proceedings of the XXIV ISPIM Innovation Conference, Helsinki, Finland on 16-19 June 2013.**
Publication VII increases the understanding of various roles and functions of social media in crowdsourcing innovation tasks in B2B relationships. The study focuses on what B2B companies have crowdsourced from their customers and users and the role of social media in crowdsourcing. The author was responsible for applying the 5C framework of social media tools, conducting the case study interviews, and writing the article in collaboration with the co-authors.

TABLE OF CONTENTS

ABBREVIATIONS AND NOTATION

B2B	business-to-business
B2C	business-to-consumer
NPD	new product development
SNS	social networking sites
SCL-model	social customer learning model
SoMe	social media
IS	information systems

1 INTRODUCTION

The paradigm of open innovation has become increasingly important (Chesbrough, 2003). It is recognized that valuable innovation-related knowledge is being distributed increasingly widely to various actors, such as users, customers, and communities. Various types of collaborative web tools and approaches, such as social media, can enable and significantly increase the use of distributed knowledge both within and outside company borders (Haefliger et al., 2010; Von Krogh, 2012). Furthermore, it has been recognized that users and customers have an increasing role in innovation (Von Hippel, 2005; Füller et al., 2010; Antikainen, 2011). In many industries, users have successfully contributed to the innovation and product development undertaken by companies (Füller et al., 2010; Franke et al., 2010). Moreover, users are known to innovate independently of manufactures (Von Hippel, 2007).

Web 2.0 is a precursor of social media. It was first used in 2004 to describe the network as a platform where "Web 2.0 applications are those that make the most of the intrinsic advantages of that platform: delivering software as a continually-updated service that gets better the more people use it, consuming and remixing data from multiple sources, including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an 'architecture of participation,' and going beyond the page metaphor of Web 1.0 to deliver rich user experiences" (O'Reilly, 2007). However, Web 1.0 is usually described as an environment controlled by only a few administrators who understand or have knowledge of web techniques and many others who have limited roles in content creation (Zaki et al., 2013). In Web 2.0, all users create content collaboratively (Kaplan & Haenlein, 2010a). Another way to distinguish between Web 1.0 and Web 2.0 is to regard Web 1.0 as communication channel, such as e-mail or person-to-person instant messaging, where digital information can be created by anyone, but the degree of information commonality is low. In contrast, Web 2.0 can be regarded as providing platforms, such as intranets or corporate web sites, where content is generated by group of people, information is widely visible, and its commonality is high (McAfee, 2006). For example, in contrast to e-mail, Web 2.0 applications offer the ability to participate broadly in information sharing and idea formulation such that the information can be extracted, archived, organized, searched, and tagged for easy access (Barker, 2008). In addition to these technological aspects, Web 2.0 is associated with philosophies of openness, collective intelligence, and transparency (O'Reilly and Battelle, 2009). Briefly defined, collective intelligence deals with the ways people and computers are connected; hence, collectively,

they act more intelligently than any individual, group, or computer has previously (Malone, 2008; Mintaka, 2008; Leimeister, 2010).

Social media can be defined as a group of internet-based applications that build on the technological and ideological foundations of Web 2.0 and that enable the creation and sharing of user-generated content (Kaplan & Haenlein, 2010a). Furthermore, social media are often referred to as applications that are either fully based on user-generated content or in which user-generated content and the actions of users have a significant role in increasing the value of the application or the service (Kangas et al., 2007). A large number of generic types of social media-related applications, also referred to as social software, can be identified (Lietsala & Sirkkunen, 2008; Cooke & Buckley, 2008; Warr, 2008; Luoma-aho, 2010; Kärkkäinen et al., 2010; Kärkkäinen et al., 2011; Pawlowski & Pirkkalainen, 2012), such as wikis (e.g., Wikia and Confluence), blogs (e.g. WordPress and Blogger), microblogs (e.g., Twitter), social networking sites (e.g., Facebook and LinkedIn), discussion forums (e.g., phpBB), content-sharing sites (e.g., YouTube, SlideShare, Flickr, and Pinterest), social office tools (e.g., Google Docs), social bookmarking (e.g., Delicious), mashups (e.g., Google Maps), and virtual social worlds (e.g. Second Life). Lietsala and Sirkkunen (2008) suggested using social media as an umbrella term, under which various different types of cultural practices take place and which are related to the online content and the people who are involved with that content. Overall, social media are based on three key elements: Web 2.0, user-generated content, and communities (Ahlqvist, 2008).

Rheingold (1993) described virtual communities using the biological metaphor: "think of cyberspace as a social petri dish, the Net as an agar medium, and virtual communities, in all their diversity, as the colonies of microorganisms that grow in petri dishes. Each of the small colonies of microorganisms—the communities on the Net—is a social experiment that nobody planned but that is happening nevertheless." Following the definition by Ahlqvist (2008), in this study (virtual) communities are interpreted as the third key element in social media, in addition to the elements of Web 2.0 technologies and user-generated content. In addition to the previously described categories of social media applications, another category functions to support innovation in online communities. In this study, it is referred to as "online community platforms" and "crowdsourcing platforms," or "online user innovation communities" (Di Gangi et al., 2010). Other studies referred to this category as "online innovation communities" (Antikainen, 2011) and "virtual communities" (Tickle et al., 2011). Examples of this types of platforms include Dell IdeaStorm, which was based on Salesforce.com (Consulting's Salesforce CRM platform) (Di Gangi et al., 2010), Bombardier YouRail (Haller et al., 2011), which was based on HYVE Innovation Community, and National Instruments Community, which was on Jive platform (Jive, 2013).

From an economic perspective, innovation can be perceived as accomplished in the first commercial transaction involving a new or improved product, process, system, or device (e.g., Koskinen, 2005). In this dissertation, innovation is approached from the perspective of the innovation process and the related perspective of the customer inter-

face, which involves customer knowledge creation and sharing. Knowledge is understood as the result of human thinking and interpretation (Davenport & Prusak, 1998; Thierauf, 2001). Although in most cases knowledge is embedded in human consciousness as tacit knowledge (e.g., Nonaka & Takeuchi, 1995; Polanyi, 1966), it is possible to share it with other people by externalizing it into an explicit form, such as written or spoken language, which is referred to as explicit knowledge (Nonaka & Takeuchi 1995). It has been acknowledged that tacit knowledge is context dependent and situation sensitive (Varela et al., 1992; Varela & Maturana, 1992). Because it is often difficult to express tacit knowledge directly in words, it may be presented as metaphors (e.g., Tsoukas, 1991; Morgan et al., 1997; Goatly, 1997), drawings, and other methods of expression that do not require the formal use of language (Koskinen 2005). The innovation process can thus be seen as a knowledge-intensive phenomenon, in which companies must be able to interpret, internalize, and understand different situations, circumstances, and issues in order to benefit from it (e.g., Koskinen & Vanharanta, 2002; Koskinen et al., 2003; Koskinen, 2005).

The existing social media literature has focused largely on the consumer in the business-to-consumer (B2C) domain (Michaelidou et al., 2011; Brennan & Croft, 2012; Zaki et al., 2013). Because the research has focused on the user side, little is known about the companies' perspective (Bulearca & Bulearca, 2010). Previous research (e.g., Lehtimäki et al., 2009; Bengs & Wiklund-Engblom, 2012; Simula et al., 2012) has assumed that it is much more difficult to utilize social media in B2B because of the many significant differences in B2B and B2C, for example. The numerous differences between B2C and B2B have led to the need to study social media in the specific context of B2B.

Another motivation for studying social media use in B2B company innovation emerged from the practical problems faced by managers and the slow adoption rates of social media in their innovation. In 2009 and 2010, practical managerial problems were identified in a preliminary, joint research project with Technology Center Innopark and Tampere University of Technology, followed by a research project funded by Tekes—Social media in innovation process in the customer interface (SOITA)—from January 2011 to July 2013. The researcher also participated in several social media seminars and events where the participants often asked whether social media were of any use to B2B companies, which reflected the findings of Lehtimäki et al. (2009). One result of discussions with managers and social media experts was that many companies perceive social media as a usable solution for business-to-consumer companies, but not for business-to-business companies, especially regarding user-driven innovation and a customer-centric approach.

The aim of this dissertation is increase the understanding of social media use in B2B company innovation, focussing on the innovation process and the related customer interface perspective of customer knowledge creation and sharing.

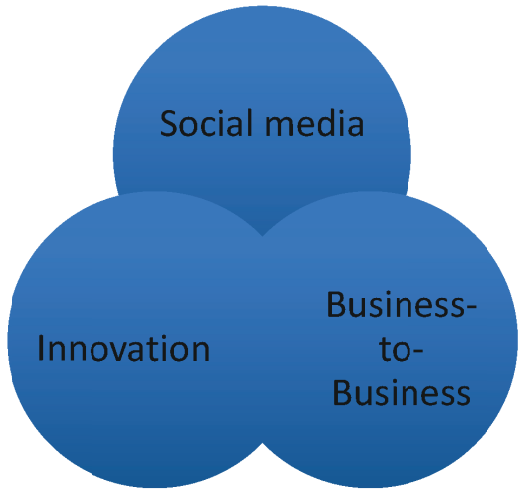


Figure 1. Targeted contribution of the dissertation

In summary, the contribution of this thesis concerns the intersection of social media, B2B, and innovation (Figure 1). It is assumed that social media is used differently in the B2B and B2C domains, especially in the innovation context, which makes it difficult to transfer B2C social media approaches directly to the B2B context or to effectively learn from the B2C case examples that have been studied extensively in the literature (e.g., Jawecki et al., 2009; Kohler et al., 2010, 2011a, 2011b). Many social media studies are presented independent of the context or anonymously without reference to the context, which makes it difficult to understand their contribution to the specific area of the use of social media in B2B innovation. Therefore, this dissertation aims to be as specific as possible regarding the targeted social media, B2B, and innovation context. The primary research problem of understanding social media in the B2B company innovation context is addressed with the following five research questions: What are the challenges when social media are used in B2B innovation? What new possibilities do social media tools provide for B2B innovation? How have B2B companies used social media in innovation? How have B2B companies benefitted from the use of social media in innovation? What kinds of roles and functions do social media have in B2B innovation?

The thesis is structured as follows: In the second chapter, the background of the thesis is introduced, including theoretical approaches to social media in the B2B innovation context, the characteristics of the B2B sector that impact studying the phenomena, a literature review of research related to social media in the B2B sector, and a detailed picture of social media in the B2B innovation context that frames this study.

In the third chapter, the research strategy and design are presented, including the aims and scope of the research, the research questions, and the research strategy. In addition, the netnography research approach and method are outlined in more detail, because they were not described in the individual publications that used the method.

In the fourth chapter, a summary of the individual publications and their major results is presented. The main content and the major results of each publication are presented and their links described.

Finally, in the fifth chapter, how the research results provide answers to the research questions and contribute to new understanding, models, and theoretical frameworks, especially media richness theory and channel expansion theory, is discussed. The fifth chapter includes managerial contributions, an evaluation of the study, the limitations of the study, and suggestions for future research.

2 SOCIAL MEDIA IN BUSINESS-TO-BUSINESS INNOVATION CONTEXT

2.1 Theoretical approaches to social media in business-to-business innovation context

Numerous theoretical approaches has been used to study social media in general (Bechmann & Lomborg, 2012; Gruzd, 2015; Gruzd & Goertzen, 2013; Khang et al., 2012; Van Osch & Coursaris, 2015).

Some of these theoretical approaches have been applied in the social media and innovation context, for example, diffusion of innovation theory (e.g., Chang, 2010; Peslak et al., 2010), the technology acceptance model (Carlos Martins Rodrigues Pinho & Soares, 2011), media richness theory (e.g., Helms et al., 2012; Kaplan & Haenlein, 2010a; Oke & Idiagbon-Oke, 2010; Thomas, 2013), potential absorptive capacity (e.g., Peltola and Mäkinen, 2012; Peltola, 2014), social presence theory (e.g., Kaplan & Haenlein, 2010a; Oke & Idiagbon-Oke, 2010), self-efficacy theory (e.g., Füller et al., 2009), and self-presentation and self-disclosure theory (e.g., Kaplan & Haenlein, 2010a).

The purpose of the theories is to understand, explain, and make predictions about different subjects. For instance, the purpose of diffusion of innovation theory (Rogers, 2003) is to explain how an idea or product diffuses through a specific social system, the purpose of social presence theory (Short et al., 1976) is to explain the effect communication media can have on communication, the purpose of the technology acceptance model is to explain how users come to accept and use a technology (Davis, 1989; Davis et al., 1989), and the purpose of media richness theory is to understand, explain, and predict why managers choose and use a particular communication medium for a particular type of task (Daft & Lengel, 1983).

To build a model that will help researchers and managers identify and evaluate different social media approaches in the business-to-business customer interface and innovation, a suitable theoretical approach that helps understand, explain, and possibly predict social media opportunities and use in innovation in the B2B company context is required. Media richness theory was chosen as the theoretical background. This theory has been previously applied in social media and innovation (e.g., Helms et al., 2012; Kaplan & Haenlein, 2010a), innovation and B2B (e.g., Yan, 2011; Yan & Dooley, 2013), as well as social media B2B innovation contexts (e.g., Oke & Idiagbon-Oke, 2010; Thomas, 2013), which is one indication that the theory is suitable for the intended purpose.

The media richness theory introduced by Daft and Lengel (1983) was originally developed to evaluate communication media within organizations. A central idea of this theory is that managers can improve performance by matching information processing demands with information processing capabilities (e.g., Dennis & Kinney, 1998; Fernandez et al., 2013; Rice, 1992). Information processing capabilities are related to the choice and use of the communication medium, as each communication medium provides a different level of information richness. In the simplest sense, information richness is a one-dimensional construct, in which communication media are classified in terms of decreasing information richness, including 1) face-to-face, 2) telephone, 3) personal documents such as letters or memos, 4) impersonal written documents, and 5) numerical documents (Daft & Lengel, 1983, 1986).

Later, the information richness classification was extended by adding new media, for example, email (Dennis & Kinney, 1998; El-Shinnawy & Markus, 1997; Kishi, 2008; Trevino et al., 1990; Webster & Trevino, 1995), videoconferences (Dennis & Kinney, 1998; Kahai & Cooper, 2003), teleconferences (Kishi, 2008), instant messaging (D'Urso & Rains, 2008), and web-based media tools such as blogs and wikis (Oke & Idiagbon-Oke, 2010; Thomas, 2013). Oke and Idiagbon-Oke (2010) and Thomas (2013) applied media richness theory in the new product development context. Oke and Idiagbon-Oke (2010) investigated the links between communication channel richness and new product development time in horizontal networks, and Thomas (2013) studied the links between communication channel richness and buyer NPD performance in the buyer–seller relationship. However, Oke and Idiagbon-Oke (2010) and Thomas (2013) addressed media richness only as a one-dimensional information richness construct, which is only one of the dimensions or characteristics of media richness.

Overall, media richness includes four characteristics or dimensions (Ferry et al., 2001; Nöteberg et al., 2003): the number of cues available, the immediacy of the feedback, the variety of language, and personalization (Daft & Lengel, 1983, 1986; Daft & Wiginton, 1979; Ferry et al., 2001; Nöteberg et al., 2003; Rice, 1992; Sheer & Chen, 2004; Trevino et al., 1990).

Information richness is defined as the ability of information to change understanding within a time interval (Choo, 1991; Daft & Lengel, 1986). These communication transactions that can overcome different frames of reference or clarify ambiguous issues to change understanding in a timely manner are considered rich (Daft & Lengel, 1986). The capacity of the medium to transmit multiple cues, such as body language, voice tone, and inflection, to convey interpretations (Trevino et al., 1990) are measures of information richness. Rice (1992) included the number of cues and the senses involved in his description of information richness characteristics.

Immediacy of feedback is defined as the extent to which a medium enables users to give rapid feedback on the communication they receive (Daft & Lengel, 1986; Daft & Wiginton, 1979; Dennis & Kinney, 1998).

Language variety ranges from natural to numerical language (Daft & Lengel, 1983). The definition of language variety is drawn from Daft and Wiginton (1979), who pro-

posed that human languages differ in their ability to convey information. High-variety languages include those in which symbols are not restricted and the language (e.g., art, music, and painting) can communicate a wide range of ideas, whereas low-variety languages have symbols that are restrictive in their use, and the languages communicate a narrower range of ideas (Daft & Lengel, 1983).

Personalization is defined as ranging from personal to impersonal communication (Daft & Lengel, 1983). For instance, addressed documents that are of a personal nature are richer than standard flyers and bulletins, which are anonymous and impersonal (Daft & Lengel, 1983).

According to Dennis and Kinney (1998) and Kahai and Cooper (2003), the immediacy of feedback and the multiplicity of cues are arguably the most important of these dimensions and should at the minimum be considered when building and refining models based on media richness theory.

Extending media richness theory, Carlson and Zmud (1994) introduced channel expansion theory as a reformulated model of the theory, which proposes that media richness is seen as less an inherent characteristic of the channel used and more a perception of the user that is based on experience and familiarity with the medium, experience with and knowledge of the message topic, as well as experience with co-participants (Carlson & Zmud, 1994). Channel expansion theory acknowledges that there is nominal media richness that consists of the number of cues, the ability to use natural language, the speed of the feedback, and the ability to personalize (the communication medium) and there is communication richness that concerns the actual amount of channel bandwidth that is manifested during a particular communication event (Carlson & Zmud, 1994).

These two theories, media richness theory and channel expansion theory, form the basis for building the model for identifying and evaluating different social media approaches in business-to-business customer interface and innovation.

2.2 Special characteristics of B2B sector

For example, since the 1970s, the Industrial Marketing and Purchasing Group (IMP) has studied B2B with regard to relationships, networks, and interactions (e.g., Snehota & Håkansson, 1995; Ford et al., 2003; Håkansson et al., 2009). IMP sees B2B as fundamentally different from B2C (Gummesson & Mele, 2010). For instance, in B2B supplier-customer relationships tend to be deeper and long-lasting, and a greater number of individuals from different organizational roles are involved in the relationship (Snehota and Håkansson, 1995; Håkansson et al., 2009). They also concluded that trust and confidence based on experience are more important in business relationships.

The B2B and B2C dichotomy is not without problems, however. Gummesson (2011) argued that B2B is a meaningful dimension and perspective on markets, but it is meaningless as an over-riding category. In many-to-many marketing, additional concepts have been used to extend the B2B and B2C categories (Gummesson, 2004; Gummesson & Polese, 2009). First, consumer-to-business (C2B) was added to distin-

guish it from B2C in order to acknowledge consumer-originated actions towards businesses. Second, customer-to-customer (C2C) was added to highlight the importance of interactions between customers, which that could represent either organizational customers-to-organizational customers, or consumers-to-consumers. Third, B2B was clarified as having the dual meaning that initiatives can be made from either side, the supplier (seller) or the customer (buyer). Hence, it acknowledges that not only the supplier takes the initiative, and the customer is not persuaded or managed to behave according to the desires of the supplier. These additions lead to four possible combinations between the Bs and the Cs: B2C, C2C, C2B, and B2B (Gummesson, 2004; Gummesson & Polese, 2009), as illustrated in Figure 2.

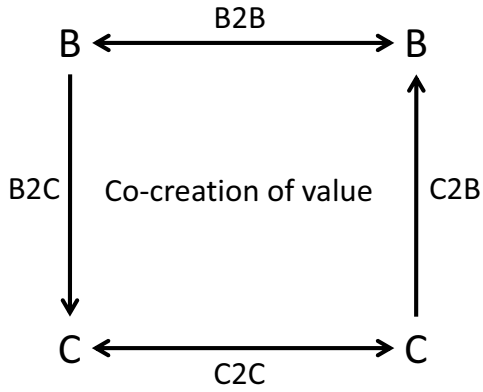


Figure 2. Different combinations of Bs and Cs

Many-to-many (marketing) theory thus extends B2B logic and provides an accurate way of analyzing relationships and interactions in networks, but it does not remove the differences between B2B and B2C or, in consequence, the need for empirical research on B2B companies. The extended B2B logic is included in the analysis of data on B2B companies.

The literature on product development and innovation has discussed several differences between B2B and B2C. For example, the products produced by B2B companies are typically complex (Griffin, 1997), and the development of new products takes significant lengths of time (Griffin, 2002). In the B2B context, customers and users may not have the necessary design capabilities to handle new tools and to undertake complex innovation tasks (Jeppesen, 2002). Moreover, the recognition of the user is difficult in the B2B sector because the customer and user are not necessarily the same actors. However, they could represent different organizational levels, for example, where the former might be the decision maker and the latter the operational user (Nordlund et al., 2011). In many B2B contexts, the users compete against other, which affects their willingness to share knowledge, leading to knowledge protection (Nordlund et al., 2011). Furthermore, customer information and knowledge is more complex in business-to-business markets than it is in consumer markets because it is derived from many levels and numerous sources both within and outside of the company (Rollins et al., 2011). In addi-

tion, in most companies, there is still a strong culture in relation to securing patenting rights and revealing new ideas only after the IPR process has been initiated (Nordlund et al., 2011), which exacerbates the challenge of exchanging of ideas. Because B2B products and related customer information and knowledge are typically more complex in B2B, it can be also assumed that it is more difficult for customers and users to contribute to development of B2B products than to B2C products. Indeed, the former often requires industry specific skills and knowledge (e.g., software engineering, mechanical engineering, automation engineering, etc.).

2.3 Related research on social media in the B2B sector

Previous studies on social media and B2B have largely focused on marketing. A review of the social media literature yielded B2B articles published in the last five years (2008–2012) in the ABI Inform, ACM Digital Library, Emerald, EBSCOhost, and ScienceDirect databases. Pettersson et al. (2014) found that the majority of the articles dealt with marketing and branding-related issues, and only a few articles discussed social media and innovation. Marketing-related literature on social media, however, pointed to some important issues related to the special characteristics of business markets, especially B2B social media use in the customer interface.

The most relevant B2B marketing-related literature on social media include the authoritative books of Gillin and Schwartzman (2010) and Geehan (2011), as well as studies by Lehtimäki et al. (2009), Bulearca and Bulearca (2010) and Michaelidou et al. (2011). An important distinction between B2B and B2C markets identified by these authors (Gillin and Schwartzman, 2010; Geehan, 2011) was that compared to consumer markets, there are typically fewer customers in B2B markets. From the innovation perspective, this discrepancy could make it difficult to locate sufficiently large numbers of customers for innovation crowdsourcing. Lehtimäki et al. (2009) conducted a literature review and an empirical study on harnessing Web 2.0 for B2B marketing. Based on their literature review, they identified the following difficulties in using Web 2.0 as a marketing tool: lack of support by top management; lack of metrics to measure the effectiveness of Web 2.0 marketing; technical challenges in utilizing different Web 2.0 tools; and lack of time or resources needed for updating and monitoring Web 2.0 applications. In this empirical study, Lehtimäki et al. (2009) interviewed four Web 2.0 experts and marketing personnel from six Finnish industrial firms. They compared the main obstacles to Web 2.0 utilization that were found in the literature, and they concluded that the interviews revealed many different kinds of challenges. The issues raised were also consistent between the firm interviewees and the experts. Based on the interviews, they argued that the mindset is the main factor hindering the utilization of Web 2.0 in industrial marketing: “Many interviewees felt that the special features of business markets make it difficult or pointless to utilize Web 2.0 for industrial marketing” (Lehtimäki et al., 2009, p. 60). Other fundamental obstacles to the utilization of Web 2.0, as indicated in the interviews, included the following: Web 2.0 as an environment;

unknown benefits, opportunities and effects; difficulty in setting rules and guidelines (e.g., in a listed company all communications should be controlled); technical difficulties in carrying out Web 2.0 initiatives; and difficulty in creating value for (business) customers with Web 2.0 applications (Lehtimäki et al., 2009). Using case studies, Bulearca and Bulearca (2010) explored the use of Twitter as marketing tool in Romanian and British small and medium-sized enterprises. They found that B2B companies have reservations about using Twitter in customer service. For example, a B2B service company argued that servicing via Twitter was perceived as unsuitable because public tweets contradict confidentiality agreements. Using a questionnaire, Michaelidou et al. (2011) explored B2B's usage, barriers, and measurement of social media marketing in a sample of 1,000 UK B2B SMEs, with an effective response rate of 10.2%. They found that 73% of the B2B SMEs did not use social networking sites to support their brand strategies. The main barriers to using social networking sites to support brands were that SNS are not important within the company's industry (61%); uncertainty about whether or how SNS could help brands (44%); staff was not familiar with SNS (32%); SNS require a big investment in terms of time (23%); competitors do not use SNS (15%); and staff do not have the technical skills to use SNS (15%) (Michaelidou et al., 2011). These findings indicate potential challenges in using social media in B2B innovation.

The most relevant previous studies on social media and innovation include the following: research on virtual worlds (i.e., Second Life); avatar-based innovation (Kohler et al., 2009, 2010, 2011a, 2011b); wikis in innovation (Standing & Kiniti, 2011); the use of blogs in market research by Singh et al. (2008) and Kaplan Haenlein (2010b); the use of social networks in market research (Cooke & Buckley, 2008); user-centered design in Owela (i.e., Open Web Lab; Friedrich et al., 2007, 2008, 2011, 2013); ideation in the Dell Computer Corporation's online user innovation community (Di Gangi et al., 2010); Nokia's corporate wiki forum for consumers to express their views of Nokia products (Lee, 2011); Nokia's IdeasProject, a crowdsourcing service for developers, hobbyists, and consumers (Vuori, 2012); and the social media innovation model (SMIM) that introduces six consecutive steps (1. Define innovation task, 2. Specify relevant social media characteristics, 3. Identify the most suitable social media strategy, 4. Analyze social media, 5. Identify the most suitable social media platforms, and 6. Design the interaction task) that an organization should follow to successfully integrate consumers in the innovation process (Helms et al., 2012).

Some of these studies provide examples of companies operating in B2B markets, such as Cisco, Dell, Nokia, and Pfizer, which use social media in innovation. However, these studies did not discuss the special characteristics of B2B or the development of B2B products with users and customers in social media. Furthermore, some of these studies focused on the internal use of social media in new product development, which is not the focus of the present study.

Nonetheless, several authors have studied social media in B2B innovation. Tickle et al. (2011) explored developmental approaches to virtual communities, using a case study of four B2B virtual communities. An important finding was that the motivators

for active participation in B2B virtual communities differed from the traditional consumer-oriented social media approaches. For example, for members to contribute to a B2B virtual community, they must feel that their contribution is worth the effort and that they will receive some value of their contributions. Moreover, members may be more inclined to contribute if they feel that their participation would enhance their personal reputation (Tickle et al., 2011). Similarly, Bengs and Wiklund-Engblom (2012) explored the factors used by B2B companies in order to motivate their B2B customers to participate in innovation processes by utilizing social media. They found that a set of different motivational factors was used by all companies included in the study (i.e., Autodesk, Bombardier, Psion, RS Components, and SAP). The most common motivational factors in the recognition of active participation were found in most cases, as well as the distribution of interesting, relevant, and unique content (Bengs & Wiklund-Engblom, 2012). Haller et al. (2011) explored innovation contests used as IT-based innovation management tools in corporations, including B2B companies (e.g., Bombardier) and for the advancement of technological or societal development. They identified eight ways that companies could take advantage of corporate challenges: 1) user feedback and identification of trends; 2) idea generation; 3) ideas and designs; 4) concepts and solutions; 5) brand/image, 6) organizational change, 7) corporate social responsibility, and 8) recruiting and HR (Haller et al., 2011). The first four ways of taking advantage of IT-based innovation management tools are included in the scope of this dissertation. Simula et al. (2012, 2013) explored how to facilitate innovations and value creation in industrial B2B firms by digital marketing, social media, and crowdsourcing in a survey (N = 145) and case study of three industrial B2B firms. However, in their study, the industrial B2B firms used crowdsourcing only internally, and although all the firms had internal idea-management tools in place, no publicly open platforms were in place to collect ideas and feedback at the time, that is, external innovation took place in (face-to-face) meetings. Peltola (2014) also studied the use of social media tools in intra-organizational collaboration in product development, using a case study of three B2B companies. The findings showed that social media tools and approaches have positive effects on internal collaboration, particularly in terms of the potential absorptive capacity (PACAP).

2.4 A detailed picture of social media in the B2B innovation context

In reviewing the literature on social media in B2B innovation, it became evident that previous studies were not specific regarding the B2B context. Therefore, the need to develop a detailed picture of the use of social media in B2B innovation context was identified. The picture was developed iteratively, based on knowledge derived from individual publications, which guided the planning of the consecutive publications that make up this dissertation.

At the abstract level, the detailed picture shown in Figure 3 represents maturity in the adoption and use of social media in B2B innovation. In the figure, the maturity of social media adoption and use increases from the bottom up. The picture is presented as one-dimensional; however, the increase in maturity is related to three sub-dimensions: the interaction dimension, the relationship dimension, and the innovation process dimension. The interaction sub-dimension ranges from indirect interaction to community-based interaction. For instance, using social media is much more challenging for reciprocal interaction in various types of customer communities (high level of maturity) compared to companies that use social media passively to collect information about customer needs (low level of maturity). The relationship sub-dimension ranges from no relationship (only internal use of social media) to buyer–supplier (B2B) relationships, and along that continuum, consumer-to-business (C2B) represents less mature use of social media and the company using social media with developers, designers and other professionals' more mature use of social media. For instance, many companies that operate in B2B markets may use social media only with consumers, which is assumed to be less challenging than using social media with B2B customers (e.g., Nordlund et al., 2011). The innovation process sub-dimension acknowledges that it is more challenging to use social media to develop B2B products (collaboratively) with customers (high level of maturity) than, for instance, merely receiving product-related feedback on social media, or, for example, using social media in innovation-related activities with consumers (low level of maturity).

Five levels of studies on social media in the B2B innovation context were identified (Figure 3). The existing research that was conducted on a generic level is illustrated at the bottom of Figure 3. The higher the level of research regarding the topic of this dissertation, the fewer the studies that were found. Almost all existing studies on social media in innovation explored companies that operate in both B2B and B2C markets and where clear distinctions between B2B and B2C customers and products are not made, which are shown in Figure 3.

The bottom of Figure 3 shows studies on companies that operate in B2B markets and use social media in innovation. At this level, there are several challenges in increasing the understanding of social media in B2B innovation. First, research on companies that operate in B2B markets using social media internally in innovation (Simula et al., 2012, 2013; Peltola, 2014) does not directly increase the understanding of how social media can be used innovatively in B2B relationships, such as those with users and customers. Second, it can be argued that using social media internally in innovation might not differ from its use in B2B or B2C companies, thus limiting the contribution of the first level studies to the scope of this dissertation.

The studies identified at the bottom of Figure 3 include studies on companies that operate in B2B markets using social media in the customer interface of innovation. The studies shown at the second level increased the understanding of the innovative use of social media in the customer interface of B2B companies. However, related both to quantitative (survey) and qualitative (case) studies on companies operating in B2B mar-

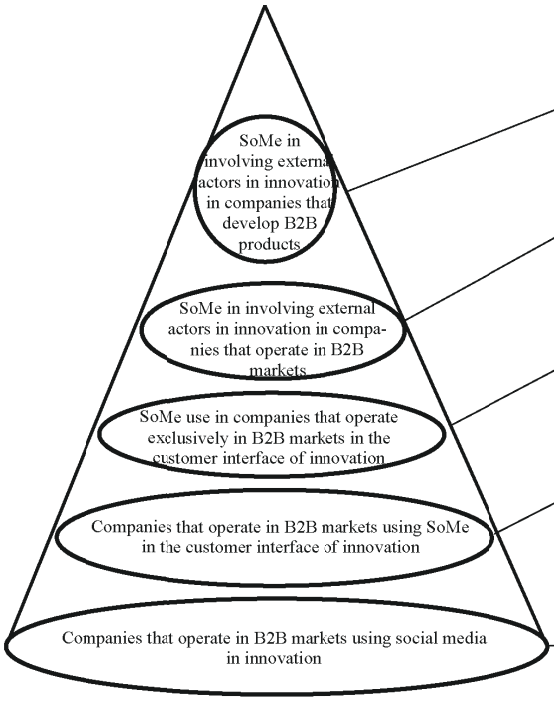
kets, it was not always discernable whether companies that operate in both markets actually used social media in innovation with consumers and consumer products or with B2B customers and B2B products. For instance, global corporations, such as Dell and Nokia, use social media tools to engage users in ideation, but previous case studies and examples focused on B2C idea crowdsourcing (e.g., Lee, 2011; Vuori, 2012), did not specifically discuss ideation with B2B customers (e.g., challenges in involving B2B customers), or were related to the development of B2B products (e.g., Di Gangi et al., 2010). This level includes studies on companies that operate in B2B markets and make use of user and customer knowledge in innovation by limited or passive social media approaches, but not direct interaction with users and customers. Instead, they use social media analytics to learn what customers are saying about the company's product (Singh et al., 2008; Kaplan & Haenlein, 2010b), to gather business intelligence about trends (Lee, 2011), or to include employees in the customer interface in order to document what customers have said about the company's products in corporate wiki (Standing & Kiniti, 2011).

The third level of studies from the bottom up increased the understanding of the B2B context by focusing on companies that operated exclusively in B2B markets and used social media in the customer interface of innovation. For example, Bengs and Wiklund-Engblom (2012) provided information about the motivational factors used by companies operating exclusively in B2B markets and have successfully implemented social media in innovation processes involving their customers. In publication 3, this research strategy was applied, and the potential and use of social media with customers and in an innovation context were analyzed from the perspective of companies that operate exclusively in B2B markets. It can be assumed that the findings of this study contributed to the in-depth understanding of the use of social media in the customer interface of innovation. Examples are social media tools used in the customer interface and the use and perceived potential of social media in the customer interface of B2B companies in Finland. It is assumed that the challenges perceived by the B2B companies that operate exclusively in B2B markets better represent the challenges faced by B2B companies, compared to previous studies that did not emphasize the B2B sector. It can be argued that the studies at this level foster the in-depth understanding of how the knowledge of users and customers could be used in the innovation of B2B companies.

The fourth level (from the bottom) includes studies that acknowledged the importance of identifying the external actors that were involved B2B company innovative use of social media. It is assumed that these studies could lead to the in-depth understanding of the use and possibilities of social media by involving the knowledge of users and customers in B2B company innovation. In publication 5, for example, it was observed that social media approaches differ concerning the quality and type of feedback that can be received from customers and users and that companies have applied different social media approaches to different customer segments, which is why it is important to identify the actors involved in the innovation. For example, social media approaches are available for collecting information about the needs and preferences of

end users, whereas other kinds of approaches are needed to gain in-depth understanding of direct customers. By describing explicitly the social media approaches used by the B2B company and the actors involved in innovation, the possibilities and functions of social media can be better understood. Publication 6, on the other hand, provided in-depth understanding about the challenges of social media in innovation by describing how different customer types and segments of B2B companies affect social media use because of customer confidentiality, information security, and IPR issues. It is more credible to discuss for example about customer confidentiality, information security, and IPR issues, particularly when the actors involved in B2B company innovation are identified and described in the study.

Finally, the studies included on the fifth level from the bottom (Figure 3) recognized that the complexity of the innovation task and the B2B product that is developed are important contextual factors in understanding social media in B2B company innovation. In the studies at this level, the key differences between B2C and B2B are evident as special characteristics of B2B products. Furthermore, B2B product development is taken into account in the use of social media in B2B company innovation. The studies of Oke and Idiagbon-Oke (2010) and Thomas (2013) can be interpreted to belong to this level as the focus of the studies is on web based tools as one medium in new product development in B2B companies or networks including B2B companies. These studies, however, do not disclose what products were developed and exactly with which companies. Publication 7 incorporated all of these characteristics in research design, and thus we were able to increase the understanding of how users and customers could be involved in the innovation of even complex industrial products and components, not only in the software industry but also in manufacturing, construction, information technology, and professional service industry companies. Dealing with complex innovation tasks often requires the extensive and in-depth technical expertise of customers and users, such as mechanical engineering, automation, instrumentation engineering, and chemistry, which distinguishes these tasks from typical consumer innovation.



Most important research related to five levels of social media in the B2B innovation context
Publication 7, (Oke and Idiagbon-Oke, 2010)*, (Thomas, 2013)*
Publication 5, Publication 6, (Kärkkäinen et al., 2012)
Publication 3, (Bengs & Wiklund-Engblom, 2012)
Publication 1, Publication 2, and Publication 4 (Singh et al., 2008), (Di Gangi et al., 2010), (Kärkkäinen et al., 2010), (Kaplan & Haenlein, 2010b), (Standing & Kiniti, 2011), (Haller et al., 2011), (Jussila et al., 2011), (Lee, 2011), (Vuori, 2012)
(Simula et al., 2012), (Simula et al., 2013), (Peltola, 2014)

Figure 3. Detailed picture of social media in the innovation context

3 RESEARCH STRATEGY AND DESIGN

3.1 Aims and scope of the research

The main purpose of the dissertation is to increase the understanding of social media use in B2B company innovation from the viewpoint of the innovation process and perspectives related to the customer interface in customer knowledge creation and sharing. The use of social media by B2B companies purely for marketing communications is excluded from the scope of this dissertation because it has been extensively studied in the literature. The focus of the dissertation is on the external use of social media in innovation. It is assumed that the biggest difference in social media utilization stems from the use between companies, whereas the internal use of social media by B2B and B2C companies may be very similar.

3.2 Research questions

In this dissertation project, the primary research problem concerns the understanding of social media in B2B company innovation. The research problem is addressed in the following five research questions:

RQ1: What are the challenges when social media are used in B2B innovation?
RQ2: What new possibilities do social media tools provide for B2B innovation?
RQ3: How have B2B companies used social media in innovation?
RQ4: How have B2B companies benefitted from the use of social media in innovation?
RQ5: What kinds of roles and functions do social media have in B2B innovation?

3.3 Research strategy

This section clarifies the research approaches taken in this dissertation. It also describes the factors that have most affected the choices of research approaches and methods. The main data sources used in the publications are also described.

The research approaches and methods used to conduct business research are numerous. It is necessary to make a multitude of selections and decisions that affect later choices and decisions. Important factors affecting the selection of the research approach and method are the research questions and the existing knowledge about the topic.

By the analogy of geography, this inquiry does not target an island that is unconnected to other islands in the relevant literature. Instead, innovation, B2B, and social media (Figure 1) are perceived as a mainland studied by others. The aim of the dissertation could be perceived as an investigation of previously unknown area(s) and new peninsula(s) that are connected to the mainland. The researcher can choose to study either one unknown area very deeply or several unknown areas in order to widen the understanding of the phenomena from multiple perspectives and possibly open new, interesting areas for further research. The latter strategy was chosen to guide the selection of suitable research approaches and methods, as well as an appropriate research design.

Despite an overall exploratory research strategy, in practice, the researcher's choices will often be, and in this case have been, affected by the researcher's previous research projects, which have defined what needs to be researched (e.g., social media in the innovation process and customer interface) as well as the possibilities the research projects have opened to exploit certain interesting and exclusive data sources.

Furthermore, the special characteristics of the research area, social media, have provided several alternative ways to study the research topic, thus widening the range of potential research approaches and methods that could be used. In fact, social media, like the internet, can be a research tool or source of data on the research topic (Laaksonen et al., 2013). As a research tool, social media, such as Facebook and Twitter, are used to collect research data. Social media can provide rich data sets on various entities, such as people, corporations, and brands, as well as their properties and relationships (Salonen et al., 2013). The research methods used to analyze this type of social media data include social network analysis (Wasserman and Faust, 1994; Carrington et al., 2005; Melville et al., 2009; Scott, 2012), social set analysis (Vatrapu et al., 2014, 2015; Mukkamala et al., 2015), and discourse analysis (Wood and Kroger, 2000; Herring, 2009; Zappavigna, 2012). In a slightly different approach, social media are sites of community activity. In this approach, the researcher's role and research method must be adapted to the social media environment by other means, such as netnography (Kozinets, 2002, 2007, 2010).

In addition, access to data is an important factor affecting the selection of research methods and approaches. Although a wide range and quantity of data are available on social media, and numerous communities that can be studied by netnography, this method has several limitations. For instance, many social media tools and platforms used by B2B companies are closed and do not have an API for accessing the data. The extraction of ad-hoc social media content has proven to be a complex issue even if an API is available. For instance, although a researcher may choose to use his or her own credentials in automating data retrieval directly from authorized sites (e.g., Facebook), such methods may be perceived malicious by the service provider, even if they formally conform to the terms of use (Salonen et al., 2013). Furthermore, companies are often reluctant to share social media data that are related to developing the company's products for outsiders even if it is available from the communities and the social media platforms being used.

Because of the previous factors, choosing a dissertation type that consists of several individual publications was a logic choice. It enabled the selection and combination of different types of approaches and methods used to answer the research questions while following the overall explorative research strategy. The choice of several individual publications also affected the choice of research methods because they must meet the expectations of the publication forums in the scientific community, such as stressing the need to use surveys and interviews.

We had the opportunity to co-operate with a small number of different types of highly interesting B2B companies that were willing to share their knowledge and experiences of social media use. In addition, the research projects provided access to surveys of social media use that were related to the central themes of the research topic, such as Finnish technology industry firms. Therefore, because empirical data were available, it was logical to conduct empirical research. We used interviews, surveys, observations, netnography, and various combinations thereof to extract empirical data on the research topics in the individual publications. The main data sources are presented in Table 1, which also demonstrates the extent and variety of the empirical material used in this dissertation.

Table 1

Data Sources and Research Methods Used in the Publications

Publication	1	2	3	4	5	6	7
Title	Social Media Use and Potential in Business-to-Business Companies' Innovation	Social Media's Opportunities in Business-To-Business Customer Interaction in Innovation Process	Social Media Utilization in Business-To-Business Relationships of Technology Industry Firms	Innovation-related Benefits of Social Media in Business-to-Business Customer Relationships	Learning from and with Customers with Social Media: A Model for Social Customer Learning	Towards a Maturity Modeling Approach to Social Media Adoption in Innovation	Social Media Roles in Crowdsourcing Innovation Tasks in B2B Relationships
Research questions addressed	RQ1	RQ2	RQ1, RQ3	RQ4	RQ2, RQ3	RQ1	RQ3, RQ5
Method and analysis	Literature Survey	Literature Survey Case study	Literature Survey	Literature Case study	Literature Participant observation Case study	Literature Interviews Case study	Literature Netnography Case study
Data	Survey of 110 Finnish B2B companies, mainly manufacturing and construction	Survey of 110 Finnish B2B companies, mainly Manufacturing and construction Case analysis of several B2B	Survey of 125 B2B technology industry firms, mainly metal products and machinery, electronics and electricity, business plan-	Case analysis of more than 20 B2B company cases from software, information technology, pharmaceuticals consulting and	Case study of 14 B2B company cases and a detailed case study of 4 B2B company cases from manufacturing, construction and	Case study interviews of 6 key persons from 4 B2B companies including social business design consultancy, B2B marketing	Case study of 9 B2B companies from manufacturing, construction, information technology and professional service industries

		companies in different industries	ning and consulting, refining metals	various types of B2B service industries	design industries	agency, automation technology and software company	

One way to characterize research methods is to categorize them into quantitative and qualitative approaches. Quantitative research views reality as an objective "out there," from which variables can be measured by instruments, such as surveys, so that numeric data can be analyzed using statistical procedures (Creswell, 2014). Qualitative research attempts to make sense of, or to interpret, phenomena in terms of the meanings people attach to them. Researchers using this approach study things in their natural settings and turn perceived worlds into series of representations, including field notes and interviews (Denzin & Lincoln, 2000).

Recently, mixed methods research has been accepted as the third mainstream approach in addition to the purely quantitative and qualitative research methods. In mixed methods research, both quantitative and qualitative research methods are used. The combined strengths of the two methods are able to produce more than they could separately (Greene et al., 1989; Morgan, 1998; Creswell & Clark, 2007). Morgan (1998) outlined four basic research designs that combine quantitative and qualitative research methods: 1) preliminary qualitative methods in a quantitative study; 2) preliminary quantitative methods in a qualitative study; 3) follow-up qualitative method in quantitative study; and 4) follow-up quantitative methods in a qualitative study.

Qualitative methods are designated as the principal means of data collection because they are suitable and often selected when the aim is to facilitate deeper understanding of a phenomenon or phenomena. Moreover, because few similar types of academic studies were found concerning the selected topics of this dissertation, qualitative methods were considered appropriate to exploring the novel types of topics and creating the required in-depth understanding of them. Hence, the research design of preliminary quantitative methods in a qualitative study was selected.

The quantitative methods used include two survey studies that were reported in publication 1, publication 2, and publication 3. In publication 2, both quantitative and qualitative methods were applied. The purpose of these quantitative studies was to identify the research problem, increase understanding of the challenges, perceived potential, and use of social media in B2B company innovation, and establish the direction for future research.

The qualitative methods followed the quantitative methods. They are reported in publications 2, 4, 5, 6, and 7. We chose the multiple-case study approach to conduct the exploratory research strategy, which made it possible to inquire deeply into the identified major challenges of social media in B2B innovation.

The case study method is particularly suitable when the nature of the problem is complex, theory development is low, and the problem is studied in a natural context (Bonoma, 1985). The case study is used to investigate the topic comprehensively by using multiple methods and data sources (Yin, 2003) that appropriately reflect the research problem (Koskinen et al., 2005). Potential data sources for the case study may include, but are not limited to, documentation (e.g. white paper reports), archival records, interviews, physical artifacts, direct observations, and participant observations (e.g. Baxter & Jack, 2008). Yin (2003) proposed a rough categorization of four different case study designs: single-case and multiple-case designs, both having either a single (holistic) or multiple (embedded) units of analysis. Multiple-case study design is considered appropriate when the researcher seeks exemplary outcomes (i.e., literal replications) or contrasting results for predictive reasons (i.e., theoretical replication) in relation to a specific theory (Yin, 2003). Multiple-case study design is relatively flexible, but it requires the justification of each case chosen for the research. There is no upper or lower limit regarding the number of cases that can be included in a study (Ghauri & Grønhaug, 2005).

To conduct case studies, Yin (2003) suggested carefully planning the case design, justifying the selected cases by their reflection of the research problem, and using multiple methods and multiple sources of evidence when collecting the data. An important aspect of case studies is their flexibility. Yin (2003) argued that case studies often evolve because new information is discovered during the data collection, which may lead to altering or modifying the original design.

The case study approach used in this dissertation had two objectives. The first was to discover the state-of-the-art use of social media in B2B company innovation from a) the perspective of customer interaction in the innovation process (publication 2), and b) the perspective of benefits of social media use in the innovation process (publication 4). The second objective was to develop an in-depth understanding of the use, roles, and functions of social media in B2B innovation (publications 5, 6, and 7).

In publications 2 and 4, secondary data were utilized as primary data in the case studies. The collection of secondary data as primary data has been extensively used in social media studies (e.g., Singh et al., 2008; Nath et al., 2009; Haller et al., 2011; Standing & Kiniti, 2011; Bengs & Wiklund-Engblom, 2012) although it was not always explicitly stated in the research (e.g., Singh et al., 2008; Haller et al., 2011). Hanson (2010) argued that the selection and comprehensiveness of the data (i.e., which databases and search terms were used, span of time covered by the secondary data collected, choice of extensive methods versus intensive methods, etc.) are critical in undertaking case analysis that utilizes secondary data as primary data. The databases and search terms used for the collection of secondary data are described in detail in the publications 2 and 4.

Netnographic participant observation was chosen as the research method for the case studies in publication 5. For publication 6, the interview was deemed the most suitable research method in the case studies of B2B companies. In publication 7, netnogra-

phy was utilized to study the selected cases in accordance with the research questions posed. The criteria for the case selection and further implementation of research methods are described in the publications.

3.4 Netnography research approach and method

Netnography is a qualitative, interpretative research approach that adapts the traditional techniques of in-person ethnographic research in the field of anthropology to the study of online communities and cultures created through computer-mediated social interaction (Bowler, 2010; Jupp, 2006; Kozinets, 2010, 2002, 1998). Netnography extends the traditional notion of field and ethnographic studies, as well as ethnographic cultural analysis and representation, from the observation of co-located, face-to-face interactions to technologically mediated interactions in online networks and communities and the culture shared between and among them (Bowler, 2010; Kozinets, 2010).

As a research method, netnography is simpler, faster, and timelier than traditional ethnography is. It is also more naturalistic and unobtrusive than surveys or interviews, for example (Kozinets, 2006). Netnography provides procedures for participant observation in the online environment, which include the following: investigating appropriate online communities and entering the online community and culture; collecting and analyzing the data; ensuring trustworthy interpretations; conducting ethical research; and providing opportunities for the feedback of community members (Kozinets, 2006, 2002, 1998). According to Kozinets (2010), the simplified flow of a netnographic research project includes the following five steps: 1) definition of research questions, social sites or topics to investigate; 2) community identification and selection, 3) community participant-observation and data collection (ensure ethical procedures); 4) data analysis and iterative interpretation of findings; 5) writing, presenting, and reporting findings, theoretical implications, and policy indications.

Netnography examines social interactions resulting from computer-mediated communications as a focal source of data (Kozinets, 2010). Communication can be numerical (e.g., “Like” in LinkedIn or Yammer), textual (e.g., tweet in Twitter or blog post in Blogger), visual (e.g., photo in Flickr), audiovisual (e.g., video in YouTube or avatar in Second Life). Three kinds of netnographic data can be collected from computer-mediated communications: 1) archival data, which the researcher directly copies from pre-existing computer-mediated communications by online community members (e.g. saving text in a computer-readable file or taking a screen capture); 2) elicited data that the researcher co-creates with online community members through personal and communal interactions (e.g., eliciting data by posting comments); and 3) field note data that the researcher inscribes regarding his or her own observations of the community, its members, interactions and meanings, and the researcher’s own participation and sense of membership (Kozinets, 2010, 2007).

Netnography has been used to study the following: how members of innovative online communities learn and build collective knowledge through the use of technolo-

gies and discursive practices that enable virtual re-experience (Hemetsberger & Reinhardt, 2006); how discussions in online communities can provide manufacturers and retailers with ideas for new products, service offerings, and bundling (Kozinets, 2002); to explore how the study of virtual communities can provide rich insights for marketers (Maclaran & Catterall, 2002); to identify lead users (Belz & Baumbach, 2010); and to study innovation activities within online consumer communities (Füller et al., 2007; Jawecki et al., 2009). Thus, netnographical method is appropriate in research on innovation in the context of B2B companies.

Regarding the researcher's role, netnographical studies range from non-participatory observational netnography to participatory and even autobiographical/autonetnographical approaches (Belz & Baumbach, 2010; Kozinets, 2010, 2007). A continuum of different types of netnography is illustrated in Figure 4.

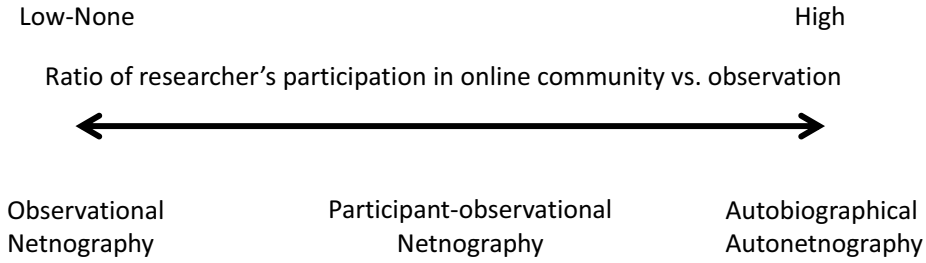


Figure 4. A continuum of different types of netnography (adapted from Kozinets, 2007)

4 SUMMARY OF INDIVIDUAL PUBLICATIONS AND THEIR MAJOR RESULTS

The contents and major results of the publications are summarized in this section. The contribution of the publications and the whole dissertation, as well as the limitations and future research are discussed in the following section 5.

Publication 1. In this paper, we studied the challenges of using social media in innovation by companies that were oriented towards B2B markets. We surveyed a sample of 1,984 Finnish decision-makers in companies with more than 50 employees in either a R&D role or a product design role. We received 110 responses from individual companies, and the effective response rate was 11% (110/1005). We discovered several potential factors that at least partly explained the limited use of social media in B2B innovation. The most important reasons that the respondents considered for not utilizing social media in innovation included the following:

- The lack of understanding the possibilities of social media in innovation
- Difficulties in assessing the financial gains from social media
- Difficulties in adopting new mental models and practices needed for the adoption of social media
- Lack of evidence of similar cases using social media in innovation
- Information security issues

Publication 2. In this paper, we studied the new possibilities that social media provide for B2B company innovation. In order to organize a wide picture of the kinds of applications and opportunities that social media provide for B2B customer interactions we created the following categorization of customer interaction forms synthesizing existing literature (Table 2).

Table 2

Forms of Social Media Customer Interaction in Innovation

Indirect interaction	Information and knowledge about customers can be created and shared internally, such as by documenting customer meetings in wikis, doing social network analyses of social media (e.g., Twitter) data to gain insights into customer interactions and network structure or by various knowledge discovery and data mining approaches from social media data (e.g., Singh et al., 2008), such as opinion mining and sentiment analysis of forum and microblog discussions about a company's products and services (e.g., Softic & Hausenblas, 2008) or discovering customer behavior patterns that can lead to product abandonment, for example.
One-way interaction	One-way interaction, even though occasional feedback may be received, can be further divided into two sub-categories: 1) one-way company to customers' interaction (e.g. broadcasting or communicating product or service marketing-related information to customers) (e.g., Agnihotri et al., 2012); 2) one-way customers to company interaction (collecting customer information to support product development) (e.g., Agnihotri et al., 2012).
Two-way interaction	Two-way interaction is essentially the reciprocal interaction of a company and its customers with little or no interaction between the customers themselves (e.g., Agnihotri et al., 2012).
Community-interaction	A company using or participating in reciprocal interaction in various types of customer communities, where an important feature is interaction between customers.
User toolkit-supported interaction	User toolkits are an essential part of co-creation and allow new ways for customers as well as the company or companies to interact with each other featuring various tools for configuring and co-creating products or product features together (e.g. Von Hippel, 2001; Von Hippel & Katz, 2002; Piller & Walcher, 2006).

We illustrated the defined forms of customer interaction in social media by providing examples of B2B companies' customer interactions in the innovation process, based on the review of academic articles in the Scirus, ABI, Emerald, ScienceDirect and EBSCO databases. We also used authoritative blogs and books as additional sources to supplement the literature review in order to include more B2B examples, which were

relatively rare in the existing academic literature. The condensed results of the literature review are presented in Table 3. For the complete results, see publication 2.

Table 3

Examples of B2B Companies' Customer Interactions in the Innovation Process

	Ideation (idea generation) phase	Concept and development phase	Product testing and support phase
Indirect interaction	Social bookmarking tools in discovering weak signals of future needs (Näkki & Antikainen, 2008)	Using Twitter in marketing research to read what customers have to say (Kaplan & Haenlein, 2010b)	Use of web analytics to see what keywords users are searching (Barlow & Thomas, 2011)
One-way company to customer interaction	Sharing and discussing about industry trends with customers (ibm.com/partnerworld)	Keeping customers informed of upcoming product features and products (decibel.ni.com/content/groups/ni-labs)	Sales promotions in Twitter (Kaplan & Haenlein, 2010b)
One-way customer to company interaction	Customers can vote for conference themes (Barker, 2008)	Blogs can provide customer need information for product development (Singh et al., 2008)	Using mashups to push customer enhancement requests from customer service to product managers (Ogrinz, 2009)
Two-way interaction	Using professional customers as 'credible private focus groups' in LinkedIn (Gillin & Schwartzman, 2010)	Design of items in virtual collaborative spaces (Ondrejka, 2005)	Answering product questions and troubleshooting technology challenges and in Twitter (Barlow & Thomas, 2011)
Community-interaction	Idea competitions to screen for ideas and solutions from communities (Haller et al., 2011)	Online test laboratory for discussing about feedback from prototypes (Näkki & Antikainen, 2008)	Providing links to product tweets on website, thus allowing prospects to see what other customers are saying (Pergolino, 2010)
User toolkit – supported interaction	MyDeco design configurators that bridge consumers, designers and home decoration companies, enabling them, such as discovering market trends and weak signals (mydeco.com)	User toolkits for innovation, such as software design tools for customers to perform design (von Hippel, 2001)	MyDeco designer blogs in communicating professional services and references (mydeco.com)

Publication 3. In this paper, we studied the challenges and current use of social media in innovation by companies operating exclusively in B2B markets (i.e., having only other companies as customers). We surveyed a sample of 2,488 Finnish decision-makers in the Federation of Finnish Technology Industries. A total of 151 responses were received, of which 143 were from separate companies, for an effective response rate of 6% (143/2488). Of the 143 different companies, 125 companies represented wholly (100%) business-to-business markets, which were chosen as the focus of the study. The survey was carried out in May 2011.

The most common barriers against using social media identified in the survey included:

- Other projects are more important or urgent
- No ability to evaluate the benefits for business
- Lack of relevant case studies
- Lack of understanding the possibilities
- Difficulties in adopting new approaches and ways of thinking related to social media
- Information security problems

In all the studied B2B technology industry sectors, social media were used more internally than externally. Social media use in the customer interface was far less common. We found no differences in the external utilization of social media between different company sizes and turnover. When measured by the percentage of respondents using social media at least to some degree in the customer interface, the three most active types of current usage (approx. 40%) were as follows: communications, marketing, and employer branding and recruitment. Over 30% of the companies used social media to discover customer needs. However, less than 10% of the companies used social media to encourage customer participation in R&D. In addition, we found both strong and moderate statistically significant correlations between current social media use and perceived potential for customer interface use.

Publication 4. In this paper, we studied how B2B companies have benefitted from the use of social media in innovation. We summarized and organized a wide picture of benefits for B2B companies of using different types of social media tools (blogs, microblogs, wikis, mashups, social networking sites, and online community platforms) in different innovation process phases (front end, development phase, commercialization).

We were able to find benefits of social media use in B2B companies related to almost all of the social media tool categories and innovation process phases. In addition, were able to find also benefits related to three customer roles described in the literature: customer as resource, customer as co-producer and customer as user, and almost of the social media tool categories.

Majority of the reported benefits were qualitative, non-quantified benefits of using social media, such as gaining better feedback, improved customer service, gaining more

detailed information about customers and their needs. However, in almost half of the cases, the benefits were tried to be quantified at least on the general level (as outputs), such as more than 14,000 ideas from customers, and with more than 89,000 comments on the created product ideas. Interesting further output-related benefits dealing with the core of social media, the increased enabling of interaction, included benefits such as over 1000 employee–customer interactions being recorded, and more than 50% of the customers starting interaction with each other. Actual outcome-related reported benefits were quite few, including benefits such as improved solving time of customer problems by 22%. Especially rare were instances that tried to quantify actual financial benefits gained from social media, including benefits like increased customer interaction with 75% lower costs.

Publication 5. In this paper, we studied the potential and use of social media tools in B2B company innovation. We created a model that could support managers and researchers in analyzing the important characteristics of current social media approaches, especially from the perspective of the B2B customer interface. The model shows the major directions that B2B companies can choose for targeting their innovation efforts. For the model, we selected critical dimensions that explain the major possibilities of social media to support learning from and with customers, especially in the B2B context. The dimensions were selected based on their ability to affect major customer learning challenges, such as individual customer representatives' opinions become too dominant when assessing customer needs, information concerning customers' new needs is biased or changes on the way to R&D, the customer wants the same technical solutions that exist in a competing product and the background needs are not revealed, and the customer's needs assessment focuses too much on short-term customer satisfaction and hidden and future needs are forgotten (see Kärkkäinen et al., 2001). The four dimensions included in the social customer learning (SCL) model are 1) information richness, 2) immediacy of feedback, 3) level of interaction, and 4) number of actors. The definitions of the dimensions ranging on a numerical scale from 1 to 5 are described in Table 4. The dimensions include the two major dimensions of media richness theory considered most important by Dennis and Kinney (1998) and Kahai and Cooper (2003), and two additional dimensions, namely, the level of interaction and the number of actors.

Table 4

Definitions of the Dimensions of the SCL Model

Information richness definitions	
1	Very low: numerical feedback (data)
2	Low: Textual and numerical feedback
3	Moderate: Textual and visual 2-D feedback and/or audio
4	High: Visual 3-D and/or video feedback
5	Very high: Face-to-face or virtual face-to-face

Immediacy of feedback definitions	
1	Very slow: History and trends
2	Slow: Asynchronous
3	Moderate: Periodical and consequent
4	Fast: Real-time and consequent
5	Immediate: Real-time and simultaneous
Interaction level definitions	
1	Indirect interaction
2	One-way interaction (broadcasting)
3	Commenting between two parties
4	Deep dialogue between two parties
5	Community interaction
Number of actors definitions	
1…5	Number of stakeholder groups

The first and second interaction levels of SCL model correspond to the first two interaction forms described in publication 2. The third interaction form, two-way interaction, as described in publication 2 is represented by two interaction levels in the SCL model: a superficial two-way interaction, "commenting between two parties" and a deep and intense two-way interaction, "deep dialogue between two parties." The fourth interaction form (in publication 2), community interaction, corresponds to the fifth interaction level (community interaction). The fifth interaction form (in publication 2), user toolkit-supported interaction, was not represented as a separate interaction level in the SCL model for two reasons. First, user toolkits can be used in different ways in combination with other customer interaction forms. Thus, user toolkits can support different levels of customer interaction. For example, in some cases, user toolkits are used in one-way interactions with customers. The customers use the toolkit to communicate their preferences related to product features to the company (Dahan & Hauser, 2002). In other cases, user toolkits are used to support community interaction (crescendodesign.com). Second, user toolkits differ in terms of the immediacy of feedback and information richness, which are other dimensions of the SCL model that help to distinguish different social media approaches.

We conducted a superficial case study of 14 B2B companies and a detailed case study of four B2B companies, using social media in learning from and with customers. The purpose of the case study was twofold: 1) to test and preliminarily validate the social customer learning model concerning its ability to detect important differences in various social media approaches; 2) to obtain an in-depth understanding of the various ways of utilizing social media in the B2B customer interface. The chosen cases were preliminarily deemed different from each other in at least one of the model's dimensions. Figure 5 illustrates the four cases with the developed social customer learning model.

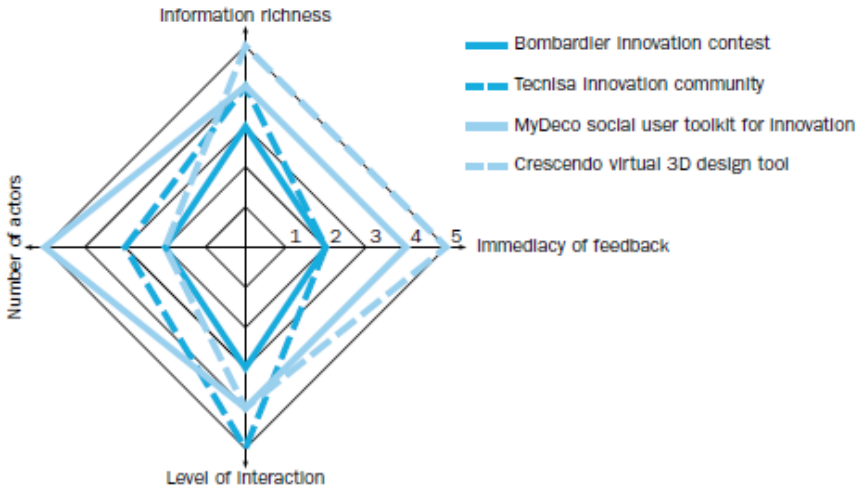


Figure 5. Illustrated case study of the social customer learning model (Jussila et al. 2012b)

The case study elicited three very different types of possibilities for using user toolkits in the learning of the customers of B2B companies.

First, Bombardier's YouRail Design contest enabled users to create their designs by using a configuration tool (user toolkit), making it possible for Bombardier to collect data (e.g. trends) about end user preferences. In addition to the configuration tool, the social media-based platform included a user community in which registered users could explore all the uploaded designs, comment on other users' designs, and rate them. The immediacy of feedback for the company was deemed generally slow because the users contributed designs and comments asynchronously to the platform. Information richness in the platform was evaluated (by direct and participant observations) to be moderate. The acquired feedback included photos of designs that were usually accompanied by textual descriptions. The user community commented on others' designs, although the level of interaction was mainly limited to single textual comments. By implementing the design contest, Bombardier contacted two major stakeholder groups and utilized their creative resources: the end users and other outside experts, such as professional and hobbyist designers. Both groups provided important, novel viewpoints to enable the company to learn about current customer needs from the users' perspective.

Second, Mydeco's social media-based platform includes a community and a 3-D online designer tool, which is a user toolkit by which users can design rooms with realistic 3-D. In the platform, users can also join community subgroups based on their specific interests, and they can create, comment on, and subscribe to the blogs of professional designers or hobbyist home decorators. Evaluations showed that Mydeco provides high information richness because the designs can be seen in 3-D. Feedback immediacy was deemed to range between very slow and fast. This means that the home

decorator could receive visual feedback on his or her designs relatively fast by viewing them in 3-D. However, peer feedback about designs via Facebook or feedback to designer companies about their own designs was moderate, slow, or even very slow. Feedback was very slow when the number of "likes" or views of designs was observed or monitored. Slow feedback was in the form of comments received asynchronously. Feedback was moderate when comments were received periodically. The Mydeco platform provides not only deep dialogue but also community interaction possibilities because users can contact each other on forums where they comment on each other's designs. Three-dimensional plans can also be shared with others when users are willing to design a room collaboratively. Mydeco facilitates the involvement of many stakeholders. The main stakeholder groups involved in the portal are home decorators, professional designers, and furniture manufacturers. In addition, design magazines and constructors could be easily involved by creating their own room decoration competitions, for example.

Third, Crescendo Design's social media approach included interacting with customers in Second Life and using 3-D design tools to do virtual prototyping with customers. In virtual meetings, the company or its clients can test different design ideas in real time, and customers can see the changes instantly while both receiving and giving instant feedback because they experience the design in virtually real environment. The information richness of utilizing the virtual 3-D design tool was evaluated as very high and the acquisition of feedback was rated as fast to immediate because interactions in the virtual world are very close to real-life face-to-face interactions. Customers can receive and give instant feedback on changes to designs because they experience the design in virtual reality. The interaction is usually a deep dialogue between two parties, where the designer and client or client groups meet virtually and discuss the design. Because clients can also meet virtually to obtain the opinions of experts, there are mainly two stakeholder groups involved: customers and outside experts.

In summary, the immediacy of feedback on the user toolkit-based approaches ranged from slow to immediate; the information richness level ranged from moderate to very high; the level of interaction ranged from comments between two parties to community interaction; and the number of actors ranged from one stakeholder group (customer in Crescendo case) to five different stakeholder groups (e.g., in the Mydeco case, home decorators, professional designers, furniture manufacturers, design magazines, and constructors).

Distinct from user toolkit-based approaches, Tecnisa Ideas is an online innovation community that is open to everyone who is interested. In the community, users can generate new ideas, from small enhancement requests to the development of new concepts. The ideas range from Tecnisa's construction projects, building sites, individual apartments to just a single feature in a garage. Through the Tecnisa Ideas community, users can create and develop ideas, vote for ideas, ask questions, and participate in idea challenges created by Tecnisa. They can also contact other users and follow ongoing discussions about ideas and inspirations. In the community of Tecnisa Ideas, the information

richness level was evaluated as varying from a very low level to a high level. The feedback acquired by users varied from the number of "likes" for a certain submission to textual, visual, and even video-based feedback, which is encouraged because it can provide the most informative feedback. However, feedback immediacy was deemed mainly slow because the community of users interact mainly with each other by asynchronous means. Through Tecnisa Ideas, users can generate ideas in collaboration with other users by asking questions and discussing answers with the community of users or by proposing enhancement requests for the ideas of others. These features enable community interaction. The community connects two main groups of stakeholders, end users, and designers, both with each other and with Tecnisa.

Publication 6. In this paper, we studied the challenges and the factors that affect the adoption of social media in B2B companies. We performed a systematic review and a multiple case study. In the multiple case study, we interviewed key persons in four B2B companies: the CEO of a social business design and social media consultancy company; the managing director and project leader of a business-to-business marketing agency; the marketing and product manager of an automation technology company; and the CEO and CTO of a software company. The results of this study showed that in higher levels of maturity B2B companies had different and complex challenges compared to B2C companies. For example, in B2B companies, the importance of information and knowledge security influences social media practices because it places boundaries on the participation of customers in innovation. For instance, customers are not willing to communicate openly about their products or product-related problems in customer communities (e.g., social networking sites and discussion forums). In relation to information and knowledge security, challenges to customers' interactions could originate from either internal or external sources.

External challenges to customer interaction identified in the study included the following. First, customers may be compete with each other, which limits many-to-many interactions between the company and its customers because information and knowledge about customers' products and product-related problems can only be discussed in two-way communication (e.g., by telephone or face-to-face) with customers and cannot be posted in a community that is open and visible to all users (i.e., other customers). Second, communicating with customers in public and open social media-based communities or forums (e.g., Twitter, Facebook, LinkedIn, and discussion forums) makes visible the connections and discussions between people and companies, which can be used as business and competitive intelligence by competitors. Third, B2B companies may have different agreements (e.g., non-disclosure agreements) with customers, which limit interactions and the sharing of knowledge between different parties in social media. In some cases, the agreements might be a prerequisite for interaction, which makes ad-hoc communication with customers more challenging. Fourth, companies with shares listed on a stock exchange for public trading have regulations regarding the

dissemination of information and knowledge by social media, which must be met (i.e., compliance to legislation).

The challenges in internal customer interaction identified in the study include the following: First, the fear of losing control and disclosing information that the company wishes to keep confidential or secret can stop the flow of information to and from customers. Second, if knowledge is considered mainly a source of power for individuals, it is difficult to share knowledge and collaborate with customers. Third, companies may lack capabilities in innovation-related interaction and knowledge sharing with customers in social media. For example, product development uses social media, such as wikis, internally in product development, but the efforts are not coordinated with marketing, which mainly concentrates on delivering a marketing message to customers and paying little attention to ensuring that feedback from customers is delivered to product development.

Publication 7. In this paper, we studied the functions and roles of social media in crowdsourcing innovation tasks in B2B relationships. We performed an exploratory multiple case study to improve the understanding of the use of social media in innovation crowdsourcing by companies that operate in B2B markets and produce B2B products and services. First, a literature review was conducted to gain an overview of the various crowdsourcing platforms related to B2B innovation (Appendix 1). Second, using the netnography approach, participant observation was performed to obtain knowledge about crowdsourcing platforms and to identify concrete B2B innovation cases (Appendix 1). Third, based on the maximum variation strategy the following company cases were selected for multiple case study: Baden-Chemie, Bombardier, Dell, Formlabs, Intuit, Konecranes, National Instruments, Numerex, and Tecnisa, illustrated on Table 5.

Table 5

Social Media Tools and Functions Illustrated by Examples of B2B Applications

Social media tools (generic examples of tools that enable 5C functions)	Purpose (the actions enabled by the tools)	Examples of 5C functions in B2B applications
Communicating: publishing and sharing content		
Blogs, media sharing systems, discussion forums, microblogging, and instant messaging	Publish, discuss, comment (express oneself and show opinion), share, influence, and store	Baden-Chemie Atizo, Bombardier YouRail, Dell IdeaStorm, Konecranes GrabCAD Community, Intuit TurboTax Live Community, Formlabs Kickstarter, and Numerex uTest
Collaborating: collective content creation		
Wikis and shared workspaces	Create content, collaboration, and product usage	GrabCAD Workbench

Connecting: networking people		
Social networks, communities, and virtual worlds	Socialize, network, connect, play, and entertain	Baden-Chemie Atizo, Bombardier YouRail, Dell IdeaStorm, Konecranes GrabCAD Community, Intuit TurboTax Live Community, Formlabs Kickstarter, and Numerex uTest
Completing: adding, describing and filtering		
Tagging, social bookmarking, syndication, and add-ons	Adding metadata, describing content, subscribing updates, combining, and serendipity	Baden-Chemie Atizo, Bombardier YouRail, Dell IdeaStorm, Konecranes, GrabCAD Community, Intuit TurboTax Live Community, and Formlabs Kickstarter
Combining: mixing and matching		
Mashups and platforms	Combining other tools and technologies according to situation and needs	Konecranes GrabCAD Community, National Instruments Community, and Tecnisa Ideas

On the surface level, most studied crowdsourcing platforms enabled communicating, connecting, and completing actions (Vuori, 2011). Regarding communicating, the findings showed differences in sharing information inside and outside the platform. Collaboration, that is, creating content together (Vuori, 2011), was not visibly supported in any of the crowdsourcing platforms related to the crowdsourcing challenge, as observed from the users' perspective. However, the GrabCAD platform included a Workbench, where users could collaborate on projects, such as adding sketches and pins to a CAD model and chatting while viewing the model (e.g., proposing changes to the model by illustrating them with drawings and comments that notify the required collaborator). With regard to completing functions (Vuori, 2011), only a few platforms enabled tagging. Most platforms enabled connecting actions (Vuori, 2011) at the surface level because it was possible to set up a profile in every platform. Combining actions (Vuori, 2011) were possible in only three platforms: GrabCAD, NI Community, and Tecnisa Ideas.

We found that social media served many different functions in B2B crowdsourcing, such as making the crowdsourcing calls more extensively visible and enabling the general networking of the members of the crowds. However, the results of the analyses showed that they also enabled the efficient sharing of information and knowledge.

5 DISCUSSION AND CONCLUSION

This section presents the discussion and conclusion of the dissertation. First, the academic contributions of the publications to answering the research questions are summarized using the framework presented in Chapter 2 (see Figure 3). The contribution to each research question is then discussed in detail. Second, the contributions to academic models and theoretical frameworks are presented. Third, contributions of the dissertation to management are outlined. Fourth, the dissertation project is evaluated against the criteria of qualitative and quantitative research. Finally, the limitations of the study are discussed and suggestions for further research are provided.

5.1 Academic contributions of publications to the research questions

The contribution of this dissertation project to answering the research questions is summarized in this section. All publications in the dissertation project contributed to the intersection of social media, business-to-business (B2B), and innovation (Figures 1 and 6). Although research has been conducted on the use of social media in innovation, the existing literature has focused largely on the consumer in the business-to-consumer (B2C) domain. The pyramid shown in Figures 3 and 6 represents the novelty of this research. Although some previous studies have addressed the intersection related to the two bottom levels of the pyramid, they fail to contribute to the understanding achieved at the higher levels of the pyramid.

First, publications 1, 3, and 6 increased the understanding of challenges in social media use in B2B innovation (RQ1). Previous studies did not consider how involving external actors in innovation would affect the challenges and use of social media in B2B companies. Publication 6 provided deeper understanding of the types of internal and external customer interaction challenges related to social media use in B2B innovation than the previous research did.

Second, publications 2 and 5 increased the understanding of the new possibilities that social media provide for B2B innovation (RQ2). Publication 2 synthesized the existing literature and presented various forms of customer interaction that B2B companies can make use of in innovation. Publication 2 also gives examples of customer interaction in different innovation process phases of B2B companies. Publication 5 goes deeper than the previous research did and provides new understanding of different social media approaches that can be used in the customer interface of B2B innovation that involves different kinds of external actors.

Third, publications 3, 5, and 7 increased the understanding of how B2B companies have used social media in innovation (RQ3). Publication 3 provided insight into how companies that operate exclusively in B2B markets have used social media for different business functions in the customer interface, as well as the social media tools used in customer interface. Publication 5 provided new and deeper understanding of social media approaches that B2B companies could use to interact with external actors in innovation, thereby both learning from and with customers. Publication 7 provided new understanding of the development of B2B products with external actors via social media. It also provided examples of B2B companies' usage of platforms to crowdsource innovation tasks related to B2B products.

Fourth, Publication 4 synthesizes the previous literature and increases the understanding of benefits of social media in innovation (RQ4). Finally, Publication 7 provided new and deeper understanding of the roles and functions that social media could have in innovation tasks related to the development of B2B products (RQ5).

The figure 6 summarizes the contributions of the publications to answering the research questions.

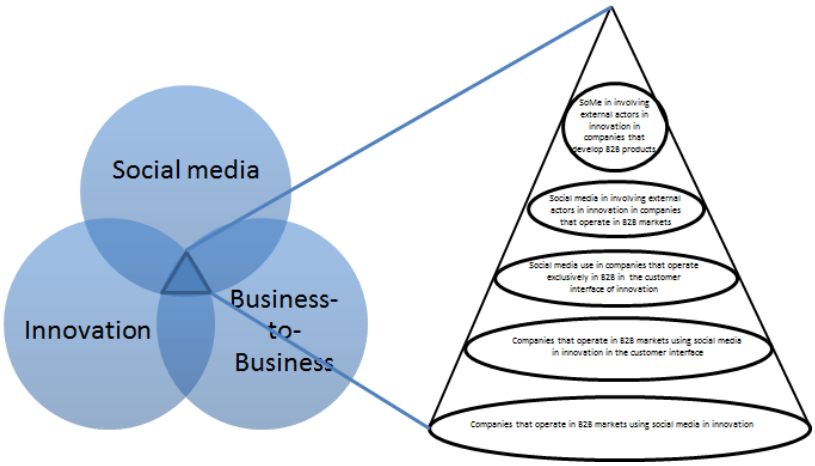


Figure 6. Novelty and contribution of the dissertation

5.1.1 Challenges for social media use in B2B innovation

Regarding the first research question, we have achieved a new understanding of the challenges of using social media in innovation by companies that operate mainly or fully in B2B markets. This was accomplished by two survey studies and case study interviews.

The results from publication 1 concerning the most common important barriers were somewhat in line with an earlier, generic high management-oriented survey on the use

of Enterprise 2.0 (Helfenstein & Penttilä, 2008), which found that the lack of know-how was clearly the most important barrier (49% of respondents) to the adoption of Enterprise 2.0. A survey of social media by Simula et al. (2012) investigated the challenges faced in exploiting digital communication channels for R&D, which found that the most important obstacles were resources, such as time, money, and know-how, as well as customized products. Also in their study, confidential information, and legal matters were expressed as frequent challenges. In Helfenstein and Penttilä (2008), return on investment (ROI) was found to be an important barrier by 31% of the respondents, which was comparable to difficulties in assessing financial gains (48% of the respondents). Information security problems were perceived by 18% of respondents, which indicated an information security barrier.

The second survey in publication 3 supported the findings of the first survey. More than half (55%) of the respondents considered the difficulties of assessing the benefits to business as an important barrier to using social media (compared to 58% in the earlier study); 46% of respondents choose the lack of good case studies, compared to 47% of the respondents in the earlier survey. Information security was considered an important challenge by 44% of the respondents in the first survey and by 33% the second survey. That 43% of the respondents choose the lack understanding of the opportunities of social media in general was comparable to the lack of understanding of the possibilities of the use of social media in innovation, which was chosen by 73% of the respondents in the earlier study.

Three important findings from both surveys (publication 1 and publication 3) in relation to the existing survey studies of the use of social media in B2B were as follows. First, the lack of understanding of the possibilities of social media in innovation was perceived as a greater barrier for B2B companies than the lack of understanding of the possibilities of social media in general (e.g., Helfenstein & Penttilä, 2008) or in marketing context (e.g. Michaelidou et al., 2011). Second, the difficulties of assessing financial gains was perceived as more challenging in innovation context than in general or marketing context. Third, information security was also perceived as more challenging in innovation context than in general or marketing context.

The findings from the case study interviews in publication 6 showed that the social media challenges in lower levels of maturity (social media practices, information security, and innovation process) were similar in B2B and B2C companies. For example, regarding social media practices, B2B and B2C companies had difficulties in evaluating social media benefits or return on investment. However, in higher levels of maturity, we found that B2B companies had different and more complex challenges. The findings from the interview data were in line with Nordlund et al.'s (2011) results regarding the openness of innovation and the new roles of customers and users in the B2B context. The results also highlighted that in many B2B contexts, users compete against each other and that there is still a strong culture in most companies in relation to securing patenting rights and revealing new ideas only after the IPR process is initiated, which poses challenges for sharing ideas in user communities. These findings indicate that some

companies in the B2B context, such as those that produce complex products and systems (e.g., Hobday, 1998; Talonen, 2013), need to deal with user competition and IPR issues, but these challenges may not similarly affect all B2B companies.

The findings from the interviews supported earlier interview studies on marketing-oriented social media, which found that the public communication of B2B companies in social media could contradict confidentiality agreements (Bulearca and Bulearca, 2010). For example, in listed companies all communications should be controlled (Lehtimäki et al., 2009), which in the B2B context limits what can be discussed and with whom in social media. Compared to previous studies, new insights included that B2B companies may be reluctant to use social media as a means of communication because competitors could use the social media data in their business and competitive intelligence processes, such as identifying the customers of competitors or gaining product development and product release-related information about competing companies. In addition, a new and important challenge to internal customer interaction was identified, which highlighted that the lack of social media capabilities and coordination between different departments or business functions creates difficulties for using customer information and knowledge in product development.

5.1.2 Possibilities social media tools provide for B2B innovation

Regarding the second research question, we increased the understanding of the new possibilities that social media provide for B2B company innovation. In publication 2, we summarized and organized a wide picture of the kinds of applications and opportunities that social media approaches currently provide for business-to-business customer interactions and understanding customer needs in the different phases of the innovation process. We introduced a new categorization of how B2B companies could interact with their customers in social media (Table 2) and demonstrated by examples (Table 3) that social media provide new possibilities for interacting with customers in innovation.

We discovered that many uses of social media in the B2B sector are different and unique, compared with the traditional approaches in B2C operations (e.g., dedicated LinkedIn groups). We also found an interesting example of a commercial third-party-enabled community for house decoration called MyDeco, which integrated the use of configurator and design toolkits with online community and social media. MyDeco is interesting in the sense that it can be viewed both from the consumer community perspective and the B2B community perspective, and it usefully integrates both perspectives. We found no earlier B2B-related communities in the academic literature that integrated social media-supported communities with customer configurator and design toolkit characteristics, such as the well-known B2C examples of the Lego and Threadless.com communities. The Lego and Threadless.com approaches cannot be easily adapted to the B2B sector. In contrast, MyDeco offers a useful model for the B2B in building communities and discovering new forms of customer interaction.

In publication 5, we created a model that could support managers and researchers in analyzing the important characteristics of current social media approaches, especially

from the perspective of the B2B customer interface. This model can be used to support the planning and roadmap building of social media use in the customer interface. It shows the major directions that B2B companies can choose in targeting their innovation efforts.

5.1.3 B2B companies social media in innovation

We were able to increase the understanding of how B2B companies have used social media in innovation and customer interface, in general by the results of a survey study and in particular by the findings of case studies.

In publication 3, the survey study of technology industry firms provided insights what social media tools B2B companies have used in customer interface, in which business function social media has been used in customer interface, as well as the correlations between current social media use and perceived potential for customer interface use.

In publication 5, the case study of B2B companies provided examples of different ways making use of social media and user toolkits in learning from and with customers, increasing understanding on how B2B companies have used social media and user toolkits to interact with different stakeholders (direct and indirect customers, end users and external experts).

In publication 7, the multiple case study revealed that B2B companies used both social media-based intermediary platforms (e.g., Atizo, GrabCAD, Kickstarter, and uTest) and company built or maintained platforms (e.g., National Instrument's NI Community, Tecnisa Ideas, Intuit TurboTax Live Community, and Dell IdeaStorm) to crowdsource innovation-related tasks. The findings of the case studies illustrated that not only consumer products but also complex industrial products and components, not only in software industry, could be developed by utilizing social media-based crowdsourcing platforms and communities.

5.1.4 Benefits for B2B companies from the use of social media in innovation

We were able to increase the understanding of benefits and positive impacts of using social media in innovation in the customer interface. In this way, the study clearly demonstrates that not only B2C companies but also B2B companies can benefit from involving their customers into innovation by social media in a variety of ways.

In publication 4, we summarized and organized a wide picture of benefits for B2B companies from the use of social media in innovation in the customer interface. The B2B companies benefiting from social media represented different types of industries (e.g., software, ICT, pharmaceuticals, consulting and various types of B2B services) with different business logics and models, and their size varied from small to very large

companies like Cisco. Concerning the above, the usability and usefulness of social media seem to be transferable also more commonly to different types of B2Bs, not only, e.g., ICT and software companies, which are among the most often referred companies as social media exploiters in the B2B sector. Concerning the benefits of social media use in different innovation process phases, we identified that in the development phase of innovation process, customers did not always operate as co-creators, but also as resources, which contrasted to the catgorisation implied by Nambisan (2002).

Major part of reported benefits were output-related benefits, but these did not directly address the actual business-related outcomes. This is understandable, since it is quite difficult to evaluate and measure which are the actual effects of social media investments, and separate these from the effects of, e.g., other investments, internal changes and changes in the business environment.

5.1.5 Roles and functions of social media in B2B innovation

We were able to provide new and deeper understanding of the roles and functions that social media could have in innovation tasks related to the development of B2B products.

In publication 7, an exploratory multiple revealed that the role of social media was essential and significant in all nine B2B crowdsourcing cases in the study. Some crowdsourcing platforms had built-in social functionalities, such as publishing (e.g., ideas, concepts, software code, and CAD models), commenting, discussions with others (e.g., chats with peers or company experts), rating content (e.g., rating ideas and solutions to customer problems), connecting and networking with others, describing and filtering content (e.g., adding tags to ideas), and combining functionalities (e.g., embedding YouTube videos and drawings of new graphical user interfaces in idea posts). Most of the crowdsourcing platforms that the B2B companies used also took advantage of well-known social media platforms, such as Facebook, Twitter, LinkedIn, and YouTube, to enhance or support the crowdsourcing initiative (e.g., make the crowdsourcing call more visible, recruit new people, or disseminate the results to a wider audience).

We found that the B2B companies used crowdsourcing platforms to crowdsource simple, creative, and complex innovation tasks (see Schenk & Guittard, 2011). Most of the crowdsourced innovation tasks by B2B companies, in contrast to typical B2C crowdsourcing examples, were complex, such as complex problem-solving activities (e.g., solving customers' problems on Intuit's platform) or generating new B2B product ideas, concepts, or designs (e.g., Konecranes' GrabCAD challenge).

From the perspective of the customer interface, customer knowledge creation, and shared contributions to the roles and functions of social media in B2B innovation, publication 2, publication 5, and publication 7 provided a continuum of social media approaches that ranged from the creation of customer understanding to the co-creation of customer understanding in the innovation process (Figure 7). The studies extend the

work of Dahan and Hauser (2002) and Piller et al. (2012) and position the developments along the continuum introduced by Matthing et al. (2004). Along the continuum, examples are provided of the creation and co-creation of customer understanding with social media in the innovation process in the B2B context. In general, this can imply that moving toward the co-creation of customer understanding increases the requirements for information richness and the immediacy of feedback on social media approaches.

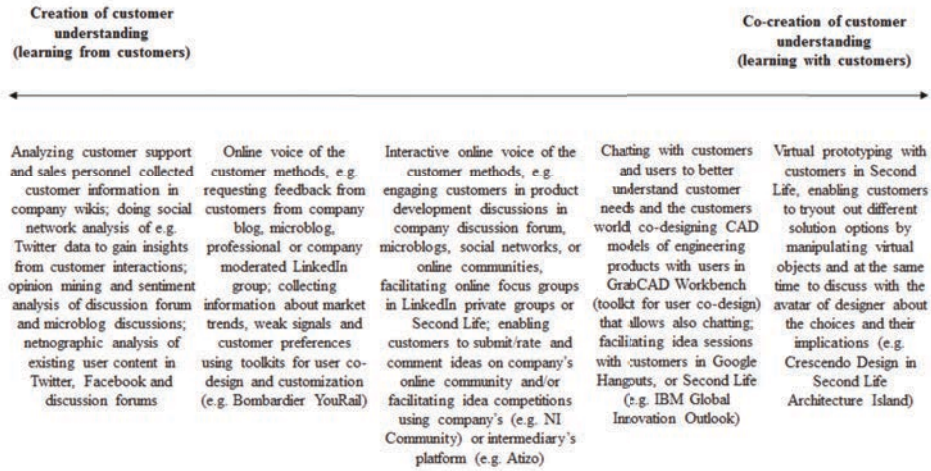


Figure 7. Approaches to using social media in the creation and co-creation of customers' understanding in the product development of B2B companies

Because social media use has been little studied and understood in the specific contexts of B2B and innovation, this study contributed to the understanding of the roles and functions of social media in the B2B innovation context in general and to customer knowledge creation and sharing in particular.

5.2 Contributions to current academic models and theoretical frameworks

5.2.1 Contribution to media richness theory

Drawing from previous literature (cf. Koskinen, 2005; Kohler et al., 2009; Kaplan and Haenlein, 2010a; Oke and Idiagbon-Oke, 2010), the dissertation contributes to the media richness theory. It first argues that virtual face-to-face and virtual cues should be included as a level in the information richness dimension in the media richness theory (Daft et al., 1987; Daft and Lengel, 1983). It then argues that virtual face-to-face communication mimics face-to-face communication. For example, avatars communicate in the virtual world and in certain circumstances are as effective as face-to-face communication in sharing tacit knowledge (e.g., Kaplan & Haenlein, 2010a; Fetscherin & Lattemann, 2008).

Furthermore, challenging the assumption of media richness theory that face-to-face is the richest form of information processing (e.g. Daft & Lengel, 1983), we argue that in certain situations, virtual face-to-face communication supported by virtual cues could be even more effective than face-to-face communication in sharing tacit knowledge about innovation. For example, when communicating with avatars is combined with working collaboratively with virtual objects (Kohler et al., 2009) (e.g., representing a product concept or product prototype) that act as boundary objects between suppliers and customers and their unique world views (Koskinen, 2005). Crescendo Design's social media approach is an example of the latter, where knowledge sharing takes place in a virtual world, making use of both virtual objects, in this case virtual buildings, and virtual face-to-face communication between the avatars of suppliers and customers. In virtual meetings, customers can test different design ideas in real time and see the changes instantly, while both receiving and giving instant feedback as they experience the design in a virtual world environment. Adding virtual face-to-face and virtual cues enhances the information richness dimension (Daft and Lengel, 1983, 1986; Oke and Idiagbon-Oke, 2010; Thomas, 2013; see also Koskinen, 2005).

We also argue that levels of information richness should include the audio and video capabilities provided by "new media" communication channels, such as voicemail and videoconferencing. More importantly, social media communication channels, such as blogs, microblogs, social networking sites, and content sharing sites, can include video and audio messages. Furthermore, we propose that visual 2-D feedback and 3-D feedback should be included in information richness in order to take advantage of the new capabilities provided by social media, such as virtual worlds. A good example of the new capabilities is the user toolkit provided by Roomstyler (roomstyler.com), which allows users to design rooms and their interiors in realistic 2-D and 3-D. It also enables other users in the community to comment and edit these designs.

To summarize, we propose a revised information richness hierarchy (Daft et al., 1987; Daft and Lengel, 1983; Trevino et al., 1990; Oke and Idiagbon-Oke, 2010) that includes the following levels: 1) numerical feedback; 2) textual (written) feedback; 3) textual (written) and visual 2-D and/or audio feedback; 4) visual 3-D and/or video feedback; 5) face-to-face or virtual face-to-face communication. We argue that media richness theory would then cover the new information processing capabilities of social media and consequently would allow the comparison of performances of traditional organizational communication channels (e.g., face-to-face communication and memos), social media (e.g., social networking sites, blogs, microblogs, wikis, and virtual worlds), and pre-social media "new media" communication channels (e.g., electronic mail). Without such modifications, the central idea of media richness theory, which is that managers could improve performance by matching information processing demands with information processing capabilities (e.g. Rice, 1992; Dennis and Kinney, 1998; Fernandez et al., 2013), would not be helpful or useful in the social media context because the new capabilities offered by social media are not covered in the existing conceptualization of information richness.

The distinction between information richness and immediacy of feedback, as suggested by Koskinen (2005), Nöteberg et al. (2003), Dennis and Kinney (1998), and El-Shinnawy and Markus (1997), is considered important because information richness and immediacy of feedback do not always go hand in hand social media. For instance, in contrast to written personal letters (Daft and Lengel, 1983, 1986; Daft et al., 1987), a chat can be a fast way to obtain product-related feedback from customers, whereas social networking sites and discussion forums can provide the same level of information richness, although with typically slow or moderate levels of feedback immediacy. In virtual worlds, where the information richness level is usually very high, the immediacy of feedback can range, depending on whether the user can interact with virtual objects and other avatars. When a user has the skills to interact with virtual objects and other avatars, he or she can get immediate feedback with very high information richness. If other avatars are not available or the user lacks the skills to interact with virtual objects, the immediacy of feedback can range from moderate to slow.

Building on the media richness theory described above, we developed the social customer learning (SCL) model that included the proposed changes.

5.2.2 Contribution to channel expansion theory

The channel expansion theory is a reformulated model of media richness theory, which proposes that media richness is seen to be less an inherent characteristic of the channel being used, and more a perception of the user which is based on experience and familiarity of the medium, experience and knowledge concerning the message topic, as well as experience with co-participants (Carlson and Zmud, 1994). The empirical findings of quantitative survey study in publication 3 supports the channel expansion theory (Carlson & Zmud, 1994) and its previous empirical findings (Carlson & Zmud, 1999; D'Urso & Rains, 2008; Timmerman & Madhavapeddi, 2008; Fernandez et al., 2013).

In the quantitative survey study of social media use in B2B innovation, we found both strong and moderate statistically significant correlations between current social media use and perceived potential for customer interface use. The less the companies used social media in the customer interface (e.g., in discovering customer needs and customer participation in R&D), the less potential they perceived in potential external uses, and vice versa. One explanation for this is that it easily acceptable by anyone who has used various social media approaches. It is often very difficult to understand the true potential of these types of novel and complex organizational innovations and technologies. To appreciate them, it is necessary to have experience in using them (Fulk et al., 1987; Rogers, 2003; Lee & Ma, 2011).

Channel expansion theory identifies experiences that shape how an individual develops rich perception of a given channel. The theory proposes that as communication partners acquire relevant experience (e.g. channel experience), they develop associated knowledge bases that may be used more effectively to both encode and decode rich messages on channels (Carlson & Zmud, 1994). For example, previous findings showed that the experience of "new media" (e.g., e-mail and instant-messaging) affected percep-

tions of their richness (D'Urso & Rains, 2008). E-mail and instant messaging are usually not considered social media (e.g., Vickery & Wunsch–Vincent, 2007; Helms et al., 2012). However, a recent study of discussions forums (Fernandez et al., 2013) supported the findings in one social media tool category. The same logic can be applied to a variety of social media tools, such as the virtual worlds described earlier. It is noteworthy that the channel expansions theory applies to both the selection and use of organizational communication channels.

The multiple case study in publication 7 recognized that innovation tasks in social media in B2B context might require significant expertise and knowledge from various knowledge domains. This has implications for the factors that are relevant for media choice and use. For instance, not only the message topic, but also the knowledge on the specific engineering domain and related skills of communication parties can influence the media choice and use. For example, choosing a social media tool such as GrabCAD Workbench for collaborative conceptual design can be a rational choice for those people that can manipulate CAD-models and have at least some understanding of mechanical engineering domain. It is proposed that expertise and knowledge of participants in the relevant knowledge domains related to the innovation task could be considered as an additional variable in the model of media and information richness perceptions (Carlson & Zmud, 1994), when considering social media channels use in innovation.

5.2.3 Contribution to 5Cs categorization of social media tools

Based on the experience of applying the 5Cs categorization of social media tools in the B2B context, the sub-category of *rating content* is proposed for the completing actions category (Table 5). In the 5Cs model, the communication category includes an idea similar to rating, namely evaluation, which is mentioned in connection with media sharing systems that allow other users to evaluate and comment on content. However, it is argued that *rating content* has more to do with the completing function and increasing the value of content created by others. For instance, in the case of Intuit TurboTax Live Community, users can rate answers to customer problems as either helpful or not helpful. The number of votes for helpful and not helpful could indicate which solutions have worked, making it easier to choose a solution from range of options presented by the users. From the perspective of the focal B2B company, such as National Instruments and Dell, the user votes (or gives kudos to) for ideas, which indicates the ideas that are more desirable to customers and therefore should be prioritized in product development. Furthermore, in some social media tools, content can be filtered by the users, based on user votes, which suggests that *rating content* has more to with the completing function than the communicating function.

5.3 Managerial contributions

The findings of the dissertation help to understand that there are various possibilities for B2B companies to use and benefit from the use of social media in innovation. The insights gleaned from the findings of the studies conducted in the dissertation project help make sense of different social media approaches to innovation, and they could aid B2B companies in planning their own social media experiments. The case studies and developed model could help to overcome the challenges of using social media in B2B company innovation. According to some authors it is difficult or even impossible to consider social media from the perspective of B2B companies and their product development.

Managerially, the forms of social media customer interaction in innovation and the several examples of B2B companies' interaction with customers in the innovation process (publication 2) can be used to help overcome most of the identified major barriers to B2B companies' use of social media in innovation. These barriers include the failure to comprehend the opportunities that social media bring to innovation, the lack of evidence from similar cases using social media in innovation, and to some extent, the difficulties in adopting new mental models and practices. The results helped to gain a better understanding of how social media can be used in innovation-related B2B customer interaction and how social media can facilitate and provide novel ways for the acquisition of customer need-related information and knowledge. The results could also be used to enhance managers' mental models of the usefulness and applicability of social media in B2B innovation. Instead of adhering to the narrow view social media as primarily Facebook, as is often the case in practice, B2B companies could use the findings of this dissertation in the creation of customer understanding. The examples could also lead companies to experiment with and adopt social media.

Management could benefit in several ways from using the SCL model (publication 5) developed in this dissertation. The model could be used to evaluate the major characteristics of existing B2B-related social media approaches in the customer interface of innovation. It could be applied to support the identification of novel social media approaches that might serve as examples and models for creating or facilitating companies' social media approaches. The model could serves as the basis for building a roadmap of social media adoption: all four dimensions are potential directions for extending current approaches and for planning the adoption of social media in reasonably small, manageable steps, using the described levels as a guideline. The model could also help to identify novel possibilities in social media implementation, such as identifying novel combinations of different dimensions and their respective levels.

In addition, the developed maturity model (publication 6) could help companies to coordinate their adoption of social media. The maturity model may help to avoid overly large or unplanned steps. The adoption of complex approaches could take a long time. Moreover, they could require the simultaneous development of a new open culture, incentives, processes, skills, and information security management. These factors are pre-

sumed to increase the probability of the successful adoption and use of social media, thus enabling companies to design intelligent and realistic experiments that facilitate social media adoption. The maturity model could also enables the systematic development of novel social media-related knowledge, capabilities, and competences.

Companies that operate in B2B markets and produce B2B products and services could utilize the recognized and analyzed approaches to the use of social media, including social media-based crowdsourcing as useful models for facilitating their own open innovation activities and experiments (publication 7). These concrete examples provided insight into potential applications of social media-based crowdsourcing approaches in the manufacturing, construction, information technology, and professional service industries. The examples and models provided by the dissertation could assist in the innovation of new products and services, ranging from machine parts to corporate tax solutions.

5.4 Evaluation of the study

The evaluation of the study comprises two parts. First, the quantitative studies (publications 1 to 3) are evaluated for internal validity, external validity (generalizability), and reliability. Second, the qualitative studies (publications 4 to 7) are evaluated for trustworthiness. To evaluate the trustworthiness of qualitative studies, four constructs corresponding to the criteria employed by positivist investigators are proposed: 1) credibility (in preference to internal validity); 2) transferability (in preference to external validity/generalizability); 3) dependability (in preference to reliability); and 4) confirmability (in preference to objectivity) (Guba, 1981; Denzin & Lincoln, 2000; Shenton, 2004). Following the evaluation of the quantitative and qualitative studies, the limitations of the dissertation are presented, and suggestions for further research are provided.

5.4.1 Internal validity

Internal validity, as addressed by positivist researchers, seeks to ensure that studies measure and test what is actually intended (Shenton, 2004; Bryman & Cramer, 2004). Face validity is one such approach to validity. Bryman and Cramer (2004) recommended ensuring face validity before conducting any research (Väisänen, 2010). Face validity is determined by examining the research instrument. In this case, research instruction was the questionnaires used in the survey studies (publications 1 to 3). The examination of face validity determines how well the measures or scales describe what they are intended to describe (Saunders et al., 2009). The examination extends to the wording of the items and the correspondence to the theoretical literature (Bryman & Cramer, 2004).

In the two quantitative survey studies, several steps were taken to improve face validity. Regarding the survey studies (publications 1 and 2), the structural design of the questionnaire and the formulation of individual questions and their scales were based on a review of the social media literature, which included previous social media survey studies (e.g., Helfenstein & Penttilä, 2008; Bughin et al., 2008; Coleman, 2009; Growth

Lab Consulting, 2010) and interview studies (e.g., Lehtimäki et al., 2009). Also expert interviews were utilized that included recognized national level experts, two CEOs in social business design and social media consultancy companies. Prior to the formulation of the questionnaire, the experts were interviewed to obtain background information on social media use in enterprises, as well as the challenges and possibilities of the use of social media in business and innovation contexts. In addition to the information gathered in the literature review, this information was utilized in the development of the preliminary questionnaire. The preliminary questionnaire was pre-tested in several business-to-business companies by individuals with varied levels of expertise and knowledge about social media and innovation. The pre-test was concerned with the content and comprehensibility of the questions, as well as the time needed to complete the questionnaire.

In the design of the survey study in publication 3, the research questions, previous surveys, experiences presented in publications 1 and 2, experts from The Federation of Finnish Technology Industries and social business design and social media consultancy company, and expert interviews were utilized to improve face validity. Based on the feedback from the expert interviews, we refined the questionnaire by adding a definition of social media and providing examples of how they enable new ways of working at the beginning of the survey. We then oriented the respondents by asking them how active their use of social tools were in the customer interface, internally, and with partners, in relation to predefined application categories (blogs, microblogs, wikis, discussion forums, social office tools, social networking sites, social bookmarking sites, video sharing services, photo sharing services, presentation sharing services, and social extranet sites).

The purpose of the questionnaire instruments was to answer the following research questions: RQ1 asked, "What are the challenges of social media in B2B innovation?" (publications 1 and 3); RQ3 asked, "How have B2B companies used social media in innovation?" (publications 2 and 3). Related to the first research question, the results from the questionnaire used in publication 1 were somewhat in line with an earlier higher management-oriented survey of Enterprise 2.0 (Helfenstein & Penttilä, 2008), which was used to formulate the questionnaire items. The results also aligned with those of a later social media survey (Simula et al., 2012), which investigated the challenges faced in exploiting digital communication channels in R&D. This support indicates that the questionnaire was able to measure what was intended. The results from the questionnaire used in publication 3 also supported the findings of the questionnaire used in publication 1. Regarding RQ3, the questionnaire in publication 2 was aimed at a very general level of responses expressing how B2B companies have used social media in innovation. Therefore, case studies were used to gain an in-depth understanding. Furthermore, detailed questions were added to the questionnaire used in publication 3 to measure aspects related to social media use in the customer interface of innovation in B2B companies.

5.4.2 External validity

External validity "is concerned with the extent which the findings of one study can be applied to other situations" (Merriam, 1998). External validity means that the results of the study can be applied to a wider population (Shenton, 2004).

In publications 1 and 2, the sample comprised 1,984 Finnish decision-makers in 1,005 unique companies with more than 50 employees. A total of 122 responses were received, and after removing duplicate responses, 110 unique responses remained. The effective response rate was 11% (110/1005). To ensure the representativeness of the sample, the authors acquired general statistics on Finnish companies employing more than 50 persons. These statistics were obtained through Statistics Finland (http://www.stat.fi), which is the only official authority that produces statistics on Finland. The authors compared the number of personnel and annual revenue between the sample and the data on Finnish companies provided by Statistics Finland. Pearson's Chi-Square test was performed on the data, which rejected the null hypothesis of independence on both occasions at $\alpha<0.001$, which showed that the results from the sample could be generalized to Finnish companies. Thus, the surveyed challenges and uses of social media in B2B company innovation can be considered generalizable to other Finnish companies.

Publication 3 surveyed 2,488 Finnish decision-makers in the Federation of Finnish Technology Industries. The survey was sent to the managing directors of small- and medium-sized businesses, as well as to the business development, product development and communication managers in large companies. A total of 151 responses to the Internet-based survey were received, of which 143 were from separate companies. The effective response rate was 6% (143/2488). A decision was made to exclude companies in the software industry and to focus on companies representing metal products and the machinery sector, electronics and electricity, business planning and consulting and metal refining industries. Hence, the sample is not representative of all companies in the Finnish technology sector, but it can be considered representative of the industrial and B2B companies in Finnish technology industries that were the focus of this study.

5.4.3 Reliability

Regarding reliability, positivist research is concerned with using techniques to ensure that if the research were repeated in the same context and used the same methods and the same data sources, similar results would be obtained (Shenton, 2004) by someone other than the researcher (Yin, 2003; Gummesson, 2006). Easterby-Smith et al. (2012) proposed that reliability can be assessed by answering the following questions:

- Is it possible to see the route from the data to the conclusions?
- Can some other researcher come to the same conclusions?

- Will the same results be achieved if the study is repeated on another occasion?

The survey studies in this dissertation have not been repeated in the same context using the same data sources. However, to enable replication studies, the research instruments are provided in Appendices 2 and 3. Thus, the route from the data to the conclusions should be clearly visible.

5.4.4 Credibility

For qualitative researchers, the concept of internal validity is equivalent to credibility, which concerns the question, "How congruent are the findings with reality?" (Merriam, 1998; Shenton, 2004). The idea of ensuring credibility is to produce findings that are plausible (Guba, 1981). According to Shenton (2004), the following preparations can be made to ensure that they have accurately recorded the phenomena under scrutiny: (a) the adoption of research methods that are well established both in qualitative investigations in general and in the target field in particular; (b) the development of early familiarity with the culture of the participating organizations before the first data collection takes place; (c) random or purposive (Guba, 1981) sampling of individuals to serve as informants; (d) triangulation; (e) tactics to help ensure that honesty in informants that contribute data; (f) iterative questioning; (g) negative case analysis; (h) frequent discussions between the researcher and his or her superiors, such as the project director or steering group; (i) peer scrutiny of the research project; (j) the researcher's "reflective commentary"; (k) background, qualifications and experience of the investigator; (l) member checks; (m) thick description of the phenomenon under scrutiny; (n) examination of previous research findings to assess the degree to which the project's results are congruent with those of past studies. Among these factors, the most important for the credibility of the qualitative studies in this dissertation are (a), (b), (c), (f), and (n). These are outlined in Table 6.

Table 6

Most Important Factors in Increasing the Credibility of the Qualitative Studies

	Case study 1 / Publication 2	Case study 2 / Publication 4	Case study 3 / Publication 5	Case study 4 / Publication 6	Case study 5 / Publication 7
a)	Adoption of research methods (secondary data / qualitative analysis of documents) used in the target field in particular (e.g. Singh et al., 2008; Standing & Kiniti, 2011; Bengs & Wiklund-Engblom, 2012)	Adoption of research methods (secondary data / qualitative analysis of documents) used in the target field in particular (e.g. Singh et al., 2008; Standing & Kiniti, 2011; Bengs & Wiklund-Engblom, 2012)	Adoption of research methods (netnography) used in the target field in particular (e.g., Kozinets et al., 2008; Belz & Baumbach, 2010; Mäläskä & Nadeem, 2012)	Adoption of research methods (semi-structured interview) well established both in qualitative investigation in general (cf. Bryman, 2006) and in the target field in particular (e.g. Lehtimäki et al., 2009; Simula et al., 2012, 2013)	Adoption of research methods (netnography) used in the target field in particular (e.g. Kozinets, 2002; Hemetsberger & Reinhardt, 2006; Füller et al., 2007; Kozinets et al., 2008; Jawecki et al., 2009; Belz & Baumbach, 2010; Mäläskä & Nadeem, 2012)

b)	N/A	N/A	Participating in the activities on the online communities such as generating new ideas, commenting on ideas, creating concepts and designs, as well as creating and manipulating virtual objects	Developing familiarity with culture of participating companies by co-operation in company social media pilots and during meetings with the company as well as steering group meetings of the research project involving the companies	Participating in the activities on crowdsourcing platforms, such as generating new ideas, commenting on ideas, creating concepts and designs and crowdfunding projects
c)	N/A	N/A	N/A	Purposive sampling of individuals to serve as informants	N/A
f)	Data collection and data analysis was frequently discussed and iterated with the project director.	Data collection and data analysis were frequently discussed and iterated with the project director	In addition to the discussions with project director, the data analysis was discussed with the companies and in a workshop with steering group members	In addition to the discussions with project director, the data analysis was discussed with the companies and in a workshop with steering group members	Data collection and data analysis were frequently discussed and iterated with the project director
n)	Based fully on previous finding	Based fully on previous findings	Examination of previous research findings related to the cases was done (Haller et al., 2011; Leino, 2011); however, comparison was not possible.	Comparison with previous research findings (Lehtimäki et al., 2009; Bulearca & Bulearca, 2010; Nordlund et al., 2011)	Examination of previous research findings related to the cases was done (Bernardino, 2010; Di Gangi et al., 2010; Frey et al., 2011; Haller et al., 2011; Leino, 2011; Noble, 2012; Simula et al., 2012); however, comparison was not possible.

5.4.5 Transferability

Based on the results of the quantitative survey study (publication 1), it can be argued that because the perceived challenges of social media use in B2B companies' innovation can be generalized to a population of Finnish companies, the increased understanding of the challenges and how to overcome them are of potential interest to at least all B2B companies in Finland, regardless of their size (e.g., number of employees) or industry type. The findings related to the challenges of social media use in B2B company innovation were from both quantitative and qualitative studies. Bryman (2006) argued that one justification for combining quantitative and qualitative research is the combination of qualitative research that provides contextual understanding coupled with generalizable, externally valid findings obtained through a survey. This was done regarding the challenges. Because the case studies were conducted using B2B companies in different countries (e.g., the US, Brazil, the UK, Germany, and Finland), it can be argued that the findings related to the use, benefits, and functions of social media in B2B companies' innovation can be transferred to similar sample populations in other countries.

With regard to transferability, it does not mean that the findings of the study are generalizable in all times and all places. It concerns working hypotheses that could be transferred from one context to another, depending on the degree of fit between con-

texts. If the findings are transferable, they are context-relevant (Guba, 1981). Thus, when practitioners believe that their situations are similar to that described in the study, they may relate the findings to their own positions (Bassey, 1981). The investigator is responsible to ensure that sufficient contextual information about the fieldwork is provided to enable the reader to make such a transfer (Lincoln, 1985; Firestone, 1993; Shenton, 2004). It is important to convey the boundaries of the study (Cole et al., 1979; Marchionini & Teague, 1987; Pitts, 1994). In considering the transferability of the study Shenton (2004), proposed that the following information should be given at the outset: (a) the number of organizations taking part in the study and where they are based; (b) any restrictions in the type of people who contributed data; (c) the number of people involved in the fieldwork; (d) the data collection methods that were employed; (e) the number and length of the data collection sessions; (f) the period over which the data were collected. Table 7 shows the relevance of (a), (b), (c), (d), (e), and (f) for the transferability of the findings from the qualitative case studies.

Table 7

Factors Increasing the Transferability of the Qualitative Studies

	Case study 1 / Publication 2	Case study 2 / Publication 4	Case study 3 / Publication 5	Case study 4 / Publication 6	Case study 5 / Publication 7
a) Number and location of organizations taking part in the study	More than 15 companies operating in B2B sector mainly from USA	More than 15 companies operating in B2B sector mainly from USA	4 companies operating in B2B sector from USA, Germany, UK and Brazil	4 fully B2B sector companies from Finland	9 companies developing B2B products from USA, Germany, Finland and Brazil
b) Restrictions on the type of people who contributed data	Restricted to informants in secondary data	Restricted to informants in secondary data	Access limited to data in the online communities	People responsible for company social media strategy were interviewed (CEO's)	Access limited to data in the online communities
c) Number of people involved in fieldwork	2	2	2	2	2
d) The data collection methods employed	Secondary data	Secondary data	Netnographic observation	Interviews	Netnographic observation
e) The number and length of data collection sessions	Approx. 4 weeks researching the articles, books and authoritative blogs used as secondary data	Approx. 4 weeks researching the articles, books, white paper reports and blogs used as secondary data	Half day spent in the data collection of each case with subsequent revisits to the online communities to confirm the findings	One data collection session for each company, lasting 1-2 hours	1-2 hours spent in the data collection of each case with subsequent visits to the online communities to confirm findings
f) The period during which the data were collected	2011	2011	2012	2011	2013

This dissertation aimed to be as specific as possible regarding the contextual factors that would enable the transferability of the results to other contexts. It started from a broad perspective and then developed specific understanding.

Transferability is the most challenging requirement of this dissertation. It used studies that on companies operating in B2B markets using social media in innovation from a

broad perspective (e.g., not excluding using social media internally in innovation or for purely marketing purposes). Originally, this was the case with an article (Jussila et al., 2011) related to the dissertation, which was published in the proceedings of an ISPIM conference that included the presentation of case studies of social media approaches in B2B companies' internal and external innovation, as well as marketing applications. Based on feedback received, which led to increased understanding, the case study was then redone to focus on social media use in B2B companies' customer interactions in the innovation process. Particular care was taken not to include purely marketing oriented social media approaches. This revision resulted in publication 2.

We argue that the results presented in publication 2, which deals with different forms of customer interactions with social media in innovation process, are transferable to B2B companies in different industries. The results could increase the understanding of how social media could be used in innovation-related B2B customer interaction and in supporting customer knowledge creation and sharing, both of which address the major challenges identified in the survey (publication 1): the "lack of understanding of the possibilities of social media in innovation" by 73.3% of the respondents; and the "lack of evidence of similar cases using social media in innovation," which was identified by 46.9% of the respondents.

We argue that the results presented in publication 4, which deals with the benefits and effects of using different social media tools in the innovation process, are transferable to B2B companies in different industries. In particular, these results could increase the understanding of how companies could benefit from social media in the customer interface of innovation. The results address important challenges: the "difficulties in assessing financial gains from social media," which were identified by 58.0% of the respondents; and the "lack of evidence of similar cases using social media in innovation," which were identified by 46.9% of the respondents in the survey (publication 1). We acknowledge that from the perspective transferring benefits of social media use in innovation, as described in the case study, further contextual description may be needed in order for the results to be transferable to a different setting. It could be debated that some companies that operate both in B2B and B2C markets use social media only with consumers and in relation to their B2C products, which limits the transferability of some of the described social media approaches to B2B relationships and development of B2B products.

The insight gained in publication 3 was that in studying companies that operate exclusively in B2B markets (publication 3 and publication 6), the challenge of transferability related to B2B relationships and development of B2B products can be avoided. However, although studying companies that operate exclusively in B2B markets would improve the transferability of the findings, other contextual factors should be considered. In terms of transferability, it may not be necessary or logical to limit the research to companies that operate exclusively in B2B markets. The development of B2B products (instead of the development of B2C products) was found to be even more important differentiator than the general orientation towards B2B or B2C markets.

The insight gained from publication 5 was that it is important to identify the external actors involved in the use of social media in B2B company innovation. Therefore, in publication 5, the B2B company and the specific case of social media in relation to the external customers, users, and stakeholders involved in innovation were described in much detail in order to improve transferability. We argue that the findings in publication 5 can be transferred to B2B companies that wish to include external actors in innovation by using social media, and that the presented model could also assist in building a roadmap for social media adoption. All four dimensions serve as potential directions for extending current approaches and for planning the adoption of social media in reasonably small, manageable steps, using the descriptions of the levels as a guideline. The results of the qualitative study increased the understanding of two important challenges identified in the survey (publication 1): the "lack of understanding of the possibilities of social media in innovation," by 73.3% of the respondents; and the "difficulties in adopting new mental models and practices needed for the adoption," by 48.1% of the respondents.

We argue that the results presented in publication 6 can be transferred to B2B companies representing different industries and levels of maturity in social media adoption, and that the results increase the understanding of the challenges of involving different customer types and segments in B2B companies' innovation in the use of social media. This can be also referred to as putting "meat on the bones" of "dry" quantitative findings (Bryman, 2006), that is, qualitative data from interviews (publication 6) were used to illustrate quantitative findings from surveys (publications 1 and 3).

In publication 7, additional contextual factors were identified as important for ensuring transferability, which were related to the characteristics of B2B products. First, knowing the developed B2B product/service in the case is important in identifying similar situations where social media could be used in innovation. Second, knowing the innovation task in which social media were used and the complexity of the task affects the transferability of the study to other situations. Many studies on the use of social media in B2B company innovation have not paid attention to these contextual factors, which are important from the perspective of the transferability and comparison of findings. The factors that were considered important in terms of transferability are shown in the hierarchy provided in Figure 8.

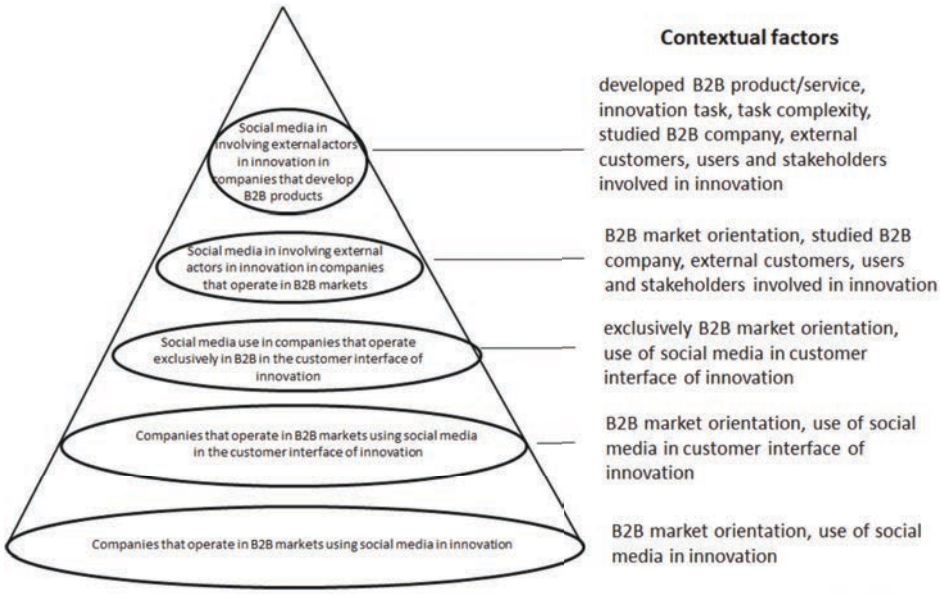


Figure 8. Factors increasing the transferability of studies on the theme of this dissertation

The greatest contribution of this dissertation is in the higher levels illustrated in Figure 8. The existing research on the intersection of social media, innovation, and B2B has ignored important contextual factors that limit both the transferability of the existing research and what can be learned from it regarding the topic of this dissertation. Based on the knowledge gained from individual publications and discussions of the results with steering group members, the factors were iteratively clarified.

5.4.6 Dependability

In addressing reliability, positivist research is concerned with using techniques to ensure that if the research was repeated in the same context using the same methods and participants, that similar results would be obtained (Shenton, 2004). On the other hand, dependability acknowledges that similar results may not be obtained but emphasizes the need for the researcher to account for the ever-changing context within which the research occurs, as well as any changes in the design of the study that were needed to obtain a better understanding of the context. The idea of dependability is to produce findings that are stable (Guba, 1981). The process through which findings are derived should be made as explicit and repeatable as possible (Morrow, 2005).

According to Guba (1981), two steps parallel the replication steps typically performed in positivist research: 1) overlapping methods, where two or more methods are teamed in such a way that the weakness of one method is compensated by the strengths of another method; and 2) stepwise replication, in which two separate research teams (the original team split into halves) deal separately with data sources that have also been divided into halves.

Overlapping methods were used in publication 2, where a quantitative survey was complemented by qualitative analysis of case studies. Quantitative and qualitative research methods were combined to achieve complementarity, that is, the clarification of the results of one method (survey) with the results from another (case analysis) (Greene et al., 1989; Bryman, 2006). Hence, the strengths of the two methods are combined to produce better results than the methods could offer separately (Greene et al., 1989; Morgan, 1998; Creswell & Clark, 2007). Security issues in the use of social media in innovation (44.4% of respondents, N = 110) and information security problems (33.0% of respondents, N=125) are barriers against using social media were found to be significant challenges for B2B companies in the two survey studies (publication 1 and publication 3). These challenges were further elaborated using semi-structured interviews in the case studies presented in publication 6.

We recognize that the netnographic case studies presented in publication 5 and publication 7 could have benefitted from using overlapping methods, either method complementarity (e.g., Greene et al., 1989) or method triangulation (Denzin, 1971; Guba, 1981; Shenton, 2004; Bryman, 2006). However, because of the limited resources of the research project and the limited access to the studied B2B companies, overlapping methods were not used. For example, the interviews could have complemented the netnographic observations by confirming the results from the companies' perspective (method triangulation) or by gaining deeper insight into the roles and functions of social media from the perspective of B2B company hosting or administering an online community (publication 7).

Regarding the second step proposed by Guba (1981), stepwise replication was utilized in all the qualitative studies (see Table 7). Two researchers independently performed the data collection and data analysis, communicated the findings to each other at important milestones, and cross-checked the findings and the insights gained from the data analysis. When the two researchers disagreed on the results, the collected data and analysis were discussed with a third researcher and appropriate next steps were jointly decided. For instance, in the netnographic observations (publication 7), there were some differences in the interpretation of the roles of social media in the case studies and the crowdsourcing platforms. The application of the 5C framework also required further discussion and corrective actions. Using stepwise replication and a third researcher as "auditor" enabled the identification and resolution of conflicting interpretations. For example (publication 7), the roles of social media in crowdsourcing innovation tasks could be interpreted differently, depending on whether they are observed from the perspective of the user or from the perspective of the administrator of the crowdsourcing platform. The "auditor" also recognized ways to improve the "audit trail," which allows readers to trace the course of the research from the data collection to the interpretation. For example (publication 4), based on suggestions, the following explanations were added to the findings from the secondary data to improve the "audit trail": "Those academic sources mentioning benefits and found positive impacts in B2B context are indicated by reference '(1)'; reference '(2)' indicates identified B2B benefits found from

authoritative blogs, books and white papers or other reports as sources of information, and reference '*' is used to indicate that the innovation process phase where the benefits are realized is not explicitly described."

5.4.7 Confirmability

Confirmability refers to the degree to which the results could be confirmed by others. The idea of confirmability is to produce findings that are free of investigator bias (Guba, 1981). Shenton (2004) proposed that confirmability can be increased by the following: (a) triangulation to reduce effect of investigator bias; (b) admission of the researcher's beliefs and assumptions; (c) recognition of shortcomings in study's methods and their potential effects; (d) in-depth methodological description to allow integrity of research results to be scrutinized; and (e) use of diagrams to demonstrate the "audit trail."

In this dissertation, (a) the triangulation of investigators (Denzin, 1971; Guba, 1981; Mathison, 1988) was used in all the qualitative studies to reduce the effect of investigator bias. The researcher's assumptions (b) are provided mainly in Chapter 1 and Chapter 2; (c) the recognition of the shortcomings of the research methods of the dissertation and its individual publications are discussed in the above description of dependability and in the section describing limitations of the study. Each publication describes the research methods used. In Chapter 3.3, this discussion is expanded to the research strategies used in the entire dissertation. In addition, because in the individual articles, there is a limited amount of space for methodological discussions, Chapter 3.4, on netnography research, approach, and method, describes in detail the research method used in publications 5 and 7.

5.5 Limitations of the study

The aim of the study was to open new, interesting areas for further research by increasing the understanding of phenomena that have received scant attention in the literature and have not been considered from multiple perspectives. On the other hand, this aim limited the depth of the research because it did not focus on a single perspective or conduct an in-depth empirical inquiry in a very specific area.

The quantitative survey studies focused on B2B companies in Finland. The results from the chi-square test performed on the sample and the population of Finnish companies provided by Statistics Finland indicated that the survey results (publications 1 and 2), for example, regarding the challenges of social media use in B2B companies' innovation, could be generalized to Finnish companies. National culture and culture-bound communication patterns (e.g., Hall et al., 1987, 1990; Lewis, 2010) are key factors (Aramo-Immonen et al., 2015) that limit the generalizability of results from one country to another. It can be assumed that the results can be generalized to countries with similar national cultures and culture-bound communication patterns. Lewis (2010) divides cultures into three groups (linear-actives, reactives, and multi-actives) according to their

nature and sense of time. In this respect, the countries that most resemble Finland include Sweden, Canada, and Singapore, followed by the United Kingdom, Hong Kong, Germany, Switzerland, and Japan on the same linear-active to reactive continuum. Thus, it can be assumed that the challenges of social media use in B2B companies can be generalized to these countries that are close to Finland in relation to communication patterns.

In order to improve and extend the generalizability of quantitative survey studies, replication studies should be performed in countries with differing national cultures and culture-bound communication patterns. For enabling replication studies, the survey questionnaires are provided in the appendices (appendices 2 and 3).

The focus of the qualitative studies was not limited to companies in Finland but included companies in the United States, Brazil, UK, and Germany. However, access to different data sources was limited, which restricted the variety of data that could be collected for the case studies. It was not possible to provide at least two data sources to support every claim, as recommended by Guba (1981). For instance, in publications 5 and 7, the data were limited to the user-generated content in the community. This limited the number of perspectives that could be taken into account and the variety of methods that could be used. For instance, member checks using online informants could have improved the trustworthiness of the study, and interviews with community members and company representatives could have been a valuable additional source of information. An additional challenge in studying innovation activities in social media is that many innovation challenges and events organized by B2B companies and innovation intermediaries are open for a limited amount of time, after which the community and the data are no longer accessible.

5.6 Suggestions for further research

The research process yielded several issues that require further research that would generate interesting knowledge and clarify the use of social media in B2B innovation. Most importantly, three directions to go deeper from the initial findings are proposed: 1) creating interventions by designing and validating maturity model(s) on the use of social media in innovation in the context of B2B companies; 2) conducting a deeper analysis of the challenges and opportunities and their relations in using social media in innovation; and 3) investigating the links between social media use, the nature of innovation, tasks, and innovation outcomes in inter-organizational networks.

Regarding the first proposed direction, creating an intervention by constructing a maturity model for social media adoption in B2B innovation was an early goal of the researcher, and the direction in which the researcher was heading. However, the constructed maturity model was not empirically validated within the scope of this thesis, which, according to a recent review of maturity model development, is the situation with many IS studies that have used and/or cited the design-oriented approach while developing a maturity model (Lasrado et al., 2015). Thus, the empirical validation of the

maturity model remains a future research direction. The logic for including a seemingly in-progress study on the development of the maturity model for the thesis was that constructing the maturity model using interviews as a data collection method, nevertheless, revealed important insights about the challenges that B2B companies face in using social media in innovation. Some challenges were similar to B2C companies with lower levels of maturity (e.g., using social media internally in innovation), whereas at the higher levels of maturity (e.g., using social media in ideation and product development with customers), differences emerged in B2B companies' challenges from the interviews compared to those reported earlier in studies of B2C companies. This direction is worth pursuing by other researchers. Depending on the execution, access to such companies may be required for a long period of time if the maturity model is going to be validated. Based on the researcher's experience and estimation, it can take about 1-2 years from start to finish, if, for example, design science (Gregor & Hevner, 2013; Hevner, 2007; Hevner et al., 2004) or action design (Purao et al., 2013; Sein et al., 2011) is going to be used as the research method.

Conducting a deeper analysis of challenges and opportunities and their relations in using social media in innovation could be investigated with a further quantitative study to establish or confirm a quantitative model. The quantitative model could include evaluating the impacts of different challenges, for example, understanding the possibilities of using social media in innovation, the difficulties of assessing financial gains from social media, information and knowledge security issues, and lack of social media skills, on the use of social media tools in interacting with customers (customer interaction forms) in innovation. Further, it could be investigated how the challenges impact customer interaction in the ideation, concept and development, and product testing and support phases of the innovation process. Going beyond social media use, it would also be interesting to evaluate the impacts of various methods of interacting with customers in social media on the benefits or perceived benefits of social media use.

A deeper investigation of the links between social media use, nature of innovation tasks, and innovation outcomes in inter-organizational networks would be a third natural step in moving the research forward. Oke and Idiagbon-Oke (2010) investigated the link between innovation task analyzability and richness of communication channels, and their mediating role on product development time and social ties. However, the study included web-based tools such as blogs and wikis as one category of communication channel richness without distinguishing between the two and omitted several social media tools, such as virtual worlds, social networking sites, microblogs, and discussion forums. A future study could compare the performances of different social media tools used as communication means to e-mail and face-to-face communication in performing innovation tasks and their link to innovation outcomes. Information richness, feedback immediacy, and task complexity (e.g., Campbell & Gingrich, 1986; Sheer & Chen, 2004) are proposed as the most important independent variables in testing media richness theory in the innovation context. The new dimensions, the interaction level and the number of actors, introduced in the SCL model are proposed as potential new independ-

ent variables that remain to be tested in social media research. Other possible independent variables that could tested include task equivocality, task uncertainty, and task analyzability, which have often been used in empirical tests of media richness theory. However, task complexity is a better predictor of choosing a medium that is information rich and able to provide immediate feedback (Sheer & Chen, 2004). In addition, variables such as channel experience and communication partner experience that have received empirical support from several studies (Carlson & Zmud, 1999; D'Urso & Rains, 2008; Fernandez et al., 2013; Timmerman & Madhavapeddi, 2008) could be interesting to test in this context.

Furthermore, thematically two additional interesting areas for further research were identified from the empirical studies: knowledge and information security of social media and the business benefits and value creation of social media.

The interviews with the B2B companies revealed that information and knowledge security is an issue that can affect the choice and use of communication media. For example, customer confidentiality was seen to limit certain discussions to only face-to-face or telephone communication. In addition, both surveys showed that information security issues are a major barrier to the use of social media in innovation by B2B companies. These findings are supported by the literature on critical success factors in social media adoption (Fuchs-Kittowski et al., 2009; Jacobs & Nakata, 2010; Pfaff & Hasan, 2006), as identified in publication 6. Research on how companies can overcome information security challenges in social media, particularly in the innovation context, is therefore an important area for future studies. The recent literature on the topic has also acknowledged that research is scarce in the area of social media security risks (e.g., He, 2012, 2013), information security in social media (Hekkala et al., 2012), and knowledge protection (Väyrynen et al., 2013) in social media.

Both surveys also indicated that the business benefits of social media and their measurement are still substantial issues for companies. Although the challenge of measuring business benefits or the return on investment of social media has been identified in the literature (e.g., Gilfoil & Jobs, 2012; Helfenstein & Penttilä, 2008; Hoffman & Fodor, 2010), measuring these business benefits was perceived as especially difficult in the B2B innovation context.

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Appendix 1. Crowdsourcing platforms

CASE	CROWDSOURCING	INNOVATION	B2B
99Design	X	X	X
AirRun	X	-	X
Amazon Askville	X	-	-
Atizo (e.g. Baden-Chemie)	X	X	X
Ben and Jerry's - Suggest-a-Flavor	X	X	-
Big Idea Group	X	X	X
Bombardier YouRail	X	X	X
Brainfloor	X	X	X
Cisco i-Prize	X	X	X
CreateaFund	X	X	-
CrowdEngineering	X	X	X
Crowdflower	X	-	X
Crowdsourcer	X (internal)	X	X
CrowdSpirit	X	X	?
crowdSPRING	X	X	X
DARPA Fang	X	X	X
Dell Ideastorm	X	X	X
"Delta" MyIdea	X (internal)	X	?
Designenlassen.de	X	X	?
Ducati	X	X	?
Experts Exchange	X	-	X
Fellowforce	X	X	?
Fiat Mio	X	X	-
Fixya	X	-	-
Fundable	X	X	X
"Gamma" Idea Factory	X (internal)	X	X
GE Solar power community	X	X	X
GetSatisfaction	X	X	X
Gigwalk	X	-	X
Go4fundingN	X	X	X
GrabCAD (e.g. Konecranes)	X	X	X
HP Online Support Forums	X	-	X
Humangrid -> Klickworker	X	-	-
IBM Innovation Jam	X	X	X
Iceland Constitution	X	X	-
Idea Bounty	X	X	X
Idea Market	X	-	-
Ideamax	X (internal)	X	X
Ideas To Go	X	X	X
InnoCentive	X	X	X
Internet Eyes	X	-	?
Intuit (e.g. TurboTax Live Community)	X	X	X
Iowa Electronic Market	X	-	-
iStockphoto	X	-	X
Kapipal	X	-	-
Kickstarter (e.g. Formlabs)	X	X	X
Lánzanos	X	?	?
Lego	X	X	-
Lego Mindstorms	X	X	-
Lemminkäinen idea competition	X	X	X
Mechanical Turk (Mturk)	X	-	-

Microworkers	X	-	-
Mob4Hire	X	X	X
ModCloth	X	X	-
Motorola Thinktank	X (internal)	X	X
My SAPiens	X	X	X
My Starbucks / Starbucks Idea	X	X	-
MyBar	X	-	?
Mycroburst.com	X	X	X
Nesta	X	X	-
National Instruments Developer Zone (e.g. LabVIEW)	X	X	X
NI Community Challenges (e.g. NI Awards)	X	X	X
Nike Nikeidea	X	X	-
NineSigma	X	X	X
Nokia Betalabs	X	X	X
Nokia -Calling All Innovators	X	X	X
OpenStreetMap	X	-	X
Owela	X	X	X
PeerToPatent	X	?	-
PeopleCloud	X (under developmentt)	X	?
PeoplePerHour	X	X	X
Peugeot Design Contest	X	X	X
Philoptima	X	X	X
Planet Hunter	X	-	?
Predictify	-	-	-
Procter & Gamble Connect + Develop	X	X	?
Quora.com	X	X	?
ReCaptcha	X	-	X
Salesforce Ideaexchange	-	X	X
Sellaband	X	-	?
Spot.us	X	-	X
Starmind	X (internal)	X	X
Swarovski Design Contest	X	X	X
Taskcn	X	-	-
TaskRabbit	X	-	X
Tecnisa Ideias	X	X	X
The Goldcorp Challenge	X	-	X
The Hallmark Idea Exchange	X	X	-
The X Prize Foundation	X	X	X
Threadless	X	X	-
Top Coder	X	X	X
Trampoline Systems	X	-	X
Txt Eagle	X	-	-
Ushahidi	X	-	-
uTest (e.g. Numerex)	X	X	X
Verizon Communications (insufficient information)	-	-	-
Wilogo	X	X	X
Witkey	X	-	-
Volvo Concept Lab	X (internal + B2C)	X	-
Xerox Eureka	X (internal)	X	X
Yet2	X	X	X
YourEncore	X	X	X
Zazzle	X	X	X

Appendix 2. Social media in innovation process in the customer interface

Definition of social media

Social media means applications that are either based entirely on user-created content, or in which user-created content or user activity have a significant role in increasing the value of the application or service. Social media is build on technological foundations of Web 2.0, user-created content and communities.

Respondents background information

1) Your age

- under 20 years
- 20-29 years
- 30-39 years
- 40-49 years
- 50-59 years
- over 60 years

2) Your working experience related to innovation

- 1 -5 years
- 6-10 years
- 11-15 years
- 16-20 years
- over 20 years

3) Function

- Sales
- Marketing
- Product development
- Management
- HR
- IT
- Other, what?

Company background information

4) Industry

- Mining an quarrying
- Manufacturing
- Construction
- Wholesale and retail trade
- Transportation and warehousing
- Accommodation and food services
- Information and communication
- Financing and insurance
- Real estate
- Professional, scientific and technical acvitivies
- Administration and support services
- Government
- Education
- Human health and social work activities
- Other, what?

5) Turnover

- below 2 MEUR
- 2 -10 MEUR
- 10 - 50 MEUR
- over 50 MEUR

6) Number of employees

- 1-10
- 11-50
- 51-250
- 251-500
- 501-1000
- 1000-5000
- over 5000

7) Competitive strategy of the company

- Technology leader
- Cost leader
- Market leader
- Follower
- Other, what?
- Cannot say

8) How systematic is your company's innovation activity in the following areas? (1 = very poor, 5 = very good)

	1	2	3	4	5
In my company the development needs for innovation have been recognized					
In my company the recognized developmend needs are systematically developed					

9) The orientation of the company is mainly towards

- B2C-commerce (consumer or end-user as customer)
- B2B-commerce (company as customer)
- Other, what?

Social media

10) How actively are the following social media tools used in your company (1 = very little, 5 = very much)

	1	2	3	4	5
Instant messaging (Instant messanger, Skype)					
Blogs					
Microblogs (Twitter,...)					
Wikis					
Pod-/webcasts					
Content aggregators (RSS,...)					

Mashups					
Social networking sites (LinkedIn, Plaxo,...)					
Social bookmarks (Delicious,...)					
Social office tools (GoogleDocs,...)					
Virtual worlds (Second Life,...)					
Social workspace (SharePoint,..)					

11) Evalute the following statements about social media based on your earlier choice (either B2B, B2C, or other) perspective (1 = very little, 5 = very much)

	1	2	3	4	5
Social media offers significant new opportunities to develop organizations operations in general					
Social media offers significant new opportunities to develop innovation activity					
Social media offers significant new opportunities in discovering customer needs					

12) Evaluate the following statements from the perspective (B2B/B2C/other), that you considered most important for your company (1 = very poor, 5 = very good):

	1	2	3	4	5
How well does your company understand the usability and benefits of social media in general (from B2B/B2C/other)?					
How well does your company understand the usablity and benefits of social media in customer interface (from B2B/ B2C/ other)?					
How significant opportunities does social media offer for getting customers to participate in innovation? (from B2B/ B2C/ other)?					
How significant opportunities does social media offer for getting customers to participate in service development? (from B2B/B2C/other perspective)?					
How well does your company know examples and case studies from social media use? (from B2B/B2C/ other perspective)?					

13) How do the following statements describe social media use in your company? (1 = totally disagree, 5 = totally agree)

	1	2	3	4	5
The use of social media is allowed in my company	○	○	○	○	○
Social media is used in my company	○	○	○	○	○
Training or guidance has been provided for social media use	○	○	○	○	○
My company has social media guidelines	○	○	○	○	○
My company has skilled staff to support social media use	○	○	○	○	○
The use of social media is encouraged in my company	○	○	○	○	○
My company has a clear social media strategy	○	○	○	○	○
Social media strategy has been communicated understandably in my company	○	○	○	○	○

Social media and innovation

14) How large potential does social media have in the different innovation process phases in your company? (1 = very small, 5 = very large)

	1	2	3	4	5
Phases before product concepting (e.g. opportunity identification and analysis, ideation and analysis of product concepts)	○	○	○	○	○
Phases from product concepting to launch (selection of product concept, testing)	○	○	○	○	○
Phases after launch (e.g. commercialization, after sales, maintenance and service)	○	○	○	○	○

15) In which innovation process phases do you perceive the following social media tools can bring signifcant benefits for your company?

	The front-end phase	The product development phase	The commercialization phase
Instant messaging (Instant messanger, Skype)	☐	☐	☐
Blogs	☐	☐	☐
Microblogs (Twitter,...)	☐	☐	☐
Wikis	☐	☐	☐
Pod/webcasts	☐	☐	☐
Content aggregators (RSS,...)	☐	☐	☐
Mashups	☐	☐	☐

Social networking sites (LinkedIn, Plaxo,...)			
Social bookmarking (Delicious,...)			
Social office tools (GoogleDocs,...			
Virtual worlds (Second Life,...)			
Social office spaces (SharePoint,..)			

16) Evaluate the opportunities of social media in development of innovation activities in your company from the following perspectives (1= very small, 5 = very large)

	1	2	3	4	5
Social media can save costs					
Product development time can be shortened with the help of social media					
Social media can be used to increase customer orientation					
Social media can help in improving quality					

17) How much social media is used in the following areas in your companies innovation activities? (1 = very little, 5 = very much)

	1	2	3	4	5
Social media use in internal innovation					
Social media use in collaboration with customers					
Social media use in collaboration with product development / innovation partners					
Social media use in collaboration with other outside organizations					

18) What are the most important reasons why social media has not been used in your company's innovation activity as extensively as it could be used? (choose 3-5 most important reasons)

- Lack of understanding of the possibilities of social media in innovation
- Lack of case evidence
- Failed experiments or bad experiences
- Information security issues
- Inadequate time resources
- Inadequate personnel resources
- Inadequate financial resources
- Difficulties in applying to current innovation processes
- Difficulties in integration to existing information systems
- Difficulties in adopting new mental models and practices
- Difficulties in assessing financial gais

Social media supporting innovation process in the customer interface

19) How significant do you consider the following customer knowledge related challenges from the perspective of your company's innovation? (1 = very little, 5 = very much)

	1	2	3	4	5
It is difficult to acquire customer need related information					
Customer need related information is not trustworthy					
Filtering essential information is difficult					
Customer need related information is fragmented					
Product/service development staff do not have the skills in acquiring customer need related information					
Customer need related information is collected but not used in innovation					

20) How significantly social media can support the following customer need related information acquisition? (1 =very little, 5 = very much)

	1	2	3	4	5
Weak signals					
Trends					
Visionary and radically new product concepts					
Customer needs and requirements					
New product features					
Feedback from product concepts that have not been launched yet					
User experiences from products after launch					

21) How large potential does social media have in the following customer interaction forms in your company? (1 = very small, 5 = very large)

	1	2	3	4	5
Passing product or service marketing related information to customers					
Collecting customer information to support product development					
The company's and it's customers mutual interaction					
The company's and it's customer communities mutual interaction					

Offering products and services to customers to develop products

Appendix 3. Social media in technology industry survey

* Required

1. **Your name**

2. **Your email address**

3. **Your age** *
   Mark only one oval.
   - under 20 years
   - 20-29 years
   - 30-39 years
   - 40-49 years
   - 50-59 years
   - over 60 years

4. **Your organisational function** *
   Mark only one oval.
   - Sales
   - Marketing
   - Product development
   - Business development
   - Management
   - Human resources
   - IT
   - Other:

5. **Name of the company**

6. **Industry** *
Mark only one oval.

- ◯ Electronics and electricity
- ◯ Metal products and machinery
- ◯ Business planning and consulting
- ◯ Refining of metals
- ◯ Other: _____

7. **Sales turnover** *
Mark only one oval.

- ◯ below 2 MEUR
- ◯ 2-10 MEUR
- ◯ 10-50 MEUR
- ◯ more than 50 MEUR

8. **Number of employees in the company** *
Mark only one oval.

- ◯ 1-10
- ◯ 11-50
- ◯ 51-250
- ◯ 251-500
- ◯ 501-1000
- ◯ 1001-5000
- ◯ more than 5000

9. **Emphasis of business: How much of your business is focused on business-to-business markets?** *
Business-to-business (B2B) describes commerce transactions between businesses, such as between a manufacturer and a wholesaler, or between a wholesaler and a retailer.
Mark only one oval.

- ◯ 0 %
- ◯ 25 %
- ◯ 50 %
- ◯ 75 %
- ◯ 100 %

10. **How actively the following digital media tools are used internally in your company?** *
Mark only one oval per row.

	Not at all	Somewhat	Moderately	Actively	Very actively	Cannot say
Meeting tools (e.g. Adobe						

	Not at all	Somewhat	Moderately	Actively	Very actively	Cannot say
Connect Pro, Lync, Google Hangouts)						
Webcasts						
Shared storage space (e.g. Dropbox)						
Document Management Systems (e.g. SharePoint, Lotus Notes, Documentum)						
Instant Messaging (e.g. Skype, Windows Live Messanger)						
Services for finding suitable meeting times (e.g. Doodle)						
Intranet sites (e.g. SharePoint)						
Extranet sites						
Project spaces (e.g. Basecamp)						

11. **How much the following digital media tools are used in customer interface (with customers) in your company?** *

Mark only one oval per row.

	Not at all	Somewhat	Moderately	Actively	Very actively	Cannot say
Meeting tools (e.g. Adobe Connect Pro, Lync, Google Hangouts)						
Webcasts						
Shared storage space (e.g. Dropbox)						
Document Management Systems (e.g. SharePoint, Lotus Notes, Documentum)						
Instant Messaging (e.g. Skype, Windows Live Messanger)						
Services for finding suitable meeting times (e.g. Doodle)						
Intranet sites (e.g. SharePoint)						
Extranet sites						
Project spaces (e.g. Basecamp)						

12. **How much the following digital media tools are used in partner interface (with partners) in your company?** *

Mark only one oval per row.

	Not at all	Somewhat	Moderately	Actively	Very actively	Cannot say
Meeting tools (e.g. Adobe Connect Pro, Lync, Google Hangouts)						
Webcasts						
Shared storage space (e.g. Dropbox)						
Document Management Systems (e.g. SharePoint, Lotus Notes, Documentum)						
Instant Messaging (e.g. Skype, Windows Live Messanger)						
Services for finding suitable meeting times (e.g. Doodle)						
Intranet sites (e.g. SharePoint)						
Extranet sites						
Project spaces (e.g. Basecamp)						

13. **How much the following social media tools are used internally in your company?** *

Mark only one oval per row.

	Not at all	Somewhat	Moderately	Actively	Very actively	Cannot say
Blogs (e.g. Blogger, TypePad, WordPress)						
Microblogs (e.g. Twitter, Yammer)						
Wikis (e.g. Confluence, MediaWiki)						
Social Networking (e.g. Facebook, LinkedIn, Google+)						
Discussion forums (e.g. phpBB)						
Extranet with social media features						
Social office tools (e.g. Google Docs)						
Social Bookmarking (e.g. Delicious, Diigo)						
Open and closed online communities (e.g. Ning)						
Virtual worlds (e.g. Second Life)						
Video sharing (e.g. Youtube)						

	Not at all	Somewhat	Moderately	Actively	Very actively	Cannot say
Image sharing (e.g. Flickr)						
Presentation sharing (e.g. Slideshare, Prezi)						

14. **How much the following social media tools are used in the customer interface (with customers) in your company?** *

Mark only one oval per row.

	Not at all	Somewhat	Moderately	Actively	Very actively	Cannot say
Blogs (e.g. Blogger, TypePad, WordPress)						
Microblogs (e.g. Twitter, Yammer)						
Wikis (e.g. Confluence, MediaWiki)						
Social Networking (e.g. Facebook, LinkedIn, Google+)						
Discussion forums (e.g. phpBB)						
Extranet with social media features						
Social office tools (e.g. Google Docs)						
Social Bookmarking (e.g. Delicious, Diigo)						
Open and closed online communities (e.g. Ning)						
Virtual worlds (e.g. Second Life)						
Video sharing (e.g. Youtube)						
Image sharing (e.g. Flickr)						
Presentation sharing (e.g. Slideshare, Prezi)						

15. **How much the following social media tools are used in partner interface (with partners) in your company?** *

Mark only one oval per row.

	Not at all	Somewhat	Moderately	Actively	Very actively	Cannot say
Blogs (e.g. Blogger, TypePad, WordPress)						
Microblogs (e.g. Twitter, Yammer)						
Wikis (e.g. Confluence, MediaWiki)						

	Not at all	Somewhat	Moderately	Actively	Very actively	Cannot say
Social Networking (e.g. Facebook, LinkedIn, Google+)						
Discussion forums (e.g. phpBB)						
Extranet with social media features						
Social office tools (e.g. Google Docs)						
Social Bookmarking (e.g. Delicious, Diigo)						
Open and closed online communities (e.g. Ning)						
Virtual worlds (e.g. Second Life)						
Video sharing (e.g. Youtube)						
Image sharing (e.g. Flickr)						
Presentation sharing (e.g. Slideshare, Prezi)						

16. **How extensively social media is used in the following internal business functions in your company?** *

Mark only one oval per row.

	Not at all	Somewhat	Moderately	Extensively	Very extensively	Cannot say
Communication and collaboration						
Management and leadership						
Induction and orientation to work (for new employees and employees changing work roles)						
Transfer of tacit knowledge						
Corporate communication (e.g. internal news)						
Project communication						
Improving efficiency of project work						
Preserving knowledge (e.g. in the event of employee leaving the company)						
Utilizing expert know-how and reducing workload						

	Not at all	Somewhat	Moderately	Extensively	Very extensively	Cannot say
Sharing best practices						
Change management and communication						

17. **How large potential do you perceive in social media use in the following internal business functions in your company?** *

Mark only one oval per row.

	No potential	Some potential	Moderate potential	Much potential	Very much potential	Cannot say
Communication and collaboration						
Management and leadership						
Induction and orientation to work (for new employees and employees changing work roles)						
Transfer of tacit knowledge						
Corporate communication (e.g. internal news)						
Project communication						
Improving efficiency of project work						
Ensuring preservation of knowledge in the company (e.g. in the event of employees leaving the company)						
Utilizing expert know-how and reducing workload						
Sharing best practices						
Change management and communication						

18. **How extensively social media is used in business functions in the customer interface (with customers) in your company?** *

Mark only one oval per row.

	Not at all	Somewhat	Moderately	Extensively	Very extensively	Cannot say
Marketing						
Communication						

	Not at all	Somewhat	Moderately	Extensively	Very extensively	Cannot say
Product demos (videos, photos, blogs)						
Building thought leadership						
Gathering customer leads						
Sales support						
Improving customer service						
Discovering customer needs						
Customer participation in R&D						
Employer branding and recruitment						

19. **How large potential do you perceive in social media use in business functions in the customer interface (with customers) in your company?** *

Mark only one oval per row.

	Not at all	Some potential	Moderate potential	Much potential	Very much potential	Cannot say
Marketing						
Communication						
Product demos (videos, photos, blogs)						
Building thought leadership						
Gathering customer leads						
Sales support						
Improving customer service						
Discovering customer needs						
Customer participation in R&D						
Employer branding and recruitment						

20. **How extensively social media is used in business functions in the partner interface (with partners) in your company?** *

Mark only one oval per row.

	Not at all	Somewhat	Moderately	Extensively	Very extensively	Cannot say
Communication and collaboration						
Network management						

	Not at all	Somewhat	Moderately	Extensively	Very extensively	Cannot say
Induction and orientation to work (new network members)						
Transfer of tacit knowledge						
Communication (e.g. network news)						
Project communication						
Improving efficiency of project work						
Preserving knowlege (e.g. member leaving the network)						
Utilizing expert know-how and reducing workload						
Sharing best practices						
Change management and communication						

21. **How large potential do you perceive in social media use in business functions in the partner interface (with partners) in your company?** *

Mark only one oval per row.

	Not at all	Some potential	Moderate potential	Much potential	Very much potential	Cannot say
Communication and collaboration						
Network management						
Induction and orientation to work (new network members)						
Transfer of tacit knowledge						
Communication (e.g. network news)						
Project communication						
Improving efficiency of project work						
Preserving knowledge (e.g. member leaving the network)						
Utilizing expert know-how and reducing workload						
Sharing best practices						
Change management and communication						

22. **Prequisites. How well do the statements describe current social media status in your company?** *

Mark only one oval per row.

	Does not describe at all	Describes somewhat	Describes moderately	Describes well	Descrives very well	Cannot say
The use of social media is allowed in my company						
My company has instructions for social media use that have been communicated to staff						
Training has been provided or is provided for social media use						
Help and training material is available for social media use in my company						
My company has support personnel that can be asked advice related to social media use						
Management understands and supports social media implementation						
My company has clear owner for social media						
My company has social media team representing people from several units						

23. **Connection to business. How well do the statements describe current social media status in your company?** *

Mark only one oval per row.

	Doest not describe at all	Describes some what	Describes moderately	Describes well	Describes very well	Cannot say
Social media use is linked to achieving business goals						

	Doest not describe at all	Describes some what	Describes moderately	Describes well	Describes very well	Cannot say
Business metrics have been defined for social media projects and the metrics are monitored						
Our company has social media plan or strategy for customer interface						
Our company has internal social media plan or strategy						
Our company has social media plan or strategy for partner use						
We have achieved measurable business benefits from social media projects						
Our company hosts its own online community						
We have achieved measurable business benefits from social media use						

24. **Monitoring and interactivity. How well do the statements describe current social media status in your company?** *

Mark only one oval per row.

	Does not describe at all	Describes some what	Describes moderately	Describes well	Describes very well	Cannot say
We follow social media discussions about our company and product areas regularly						
We have a tool for social media monitoring						
Social media monitoring is linked to other business processes (e.g. product						

	Does not describe at all	Describes some what	Describes moderately	Describes well	Describes very well	Cannot say
development, customer service, marketing)						
Our marketing is interactive, and not only one directional knowledge sharing						
We participate in discussions about our product area also outside our own web pages (e.g. blogs, discussion forums, Twitter)						
We build our own community and participate actively in other communities						
Our company has internal news service that has commenting option						
We know how to have constructive discussions inside our company using social media						

25. **Evaluate the following statements about social media from your personal perspective** *
Mark only one oval per row.

	Totally disagree	Partly disagree	Neutral	Partly agree	Totally agree	Cannot say
Social media is a waste of time						
Social media provides significant new opportunities for developing the competitiveness of companies						
Social media provides significant new opportunities for developing companies marketing and communication						
Social media provides significant new opportunities for						

Appendix 3. Social media in technology industry survey

	Totally disagree	Partly disagree	Neutral	Partly agree	Totally agree	Cannot say
B2B-marketing						
Social media provides significant new opportunities for companies internal development						
Social media provides significant new opportunities for developing partner networks						
Social media provides significant new opportunities for developing companies innovation activities						

26. **Evaluate the current situation in your company regarding the following statements** *
Mark only one oval per row.

	Are not at all understood	Are badly understood	Are moderately understood	Are well understood	Are very well understood	Cannot say
In my company the opportunties provided by social media are generally understood						
In my company the opportunities provided by social media in customer interface (marketing, communication, customer service, ...) are understood						
In my company the opportunities provided by social media internally (communication and collaboration, management and leadership, induction and orientation to work, ...) are understood						

	Are not at all understood	Are badly understood	Are moderately understood	Are well understood	Are very well understood	Cannot say
In my company the opportunities provided by social media in partner network (communication and collaboration, network management, induction and orientation to work, ...) are understood						

27. **How important are the following business goals for your company?** *

Mark only one oval per row.

	Not at all important	Less important	Moderately important	Important	Very important	Cannot say
Domestic growth						
International growth						
Increasing market share in current markets						
Strong growth in the near future						
Improving efficiency of operations						
Focusing on developing better products						

28. **How do you perceive the potential of social media in achieving the above business goals?** *

Mark only one oval per row.

	Not at all important	Less important	Moderately important	Important	Very important	Cannot say
Domestic growth						
International growth						
Increasing market share in current markets						
Strong growth in the near future						
Improving efficiency of operations						
Focusing on developing better products						

29. **How significant are the following bottlenecks or development needs in your organization?** *

Mark only one oval per row.

	Very insignificant	Insignificant	Neither insignificant or significant	Significant	Very significant	Cannot say
Experts in our company have to spend much time on answering to questions that are largely similar						
The training of new employees takes too much time and effort						
It is difficult to know what is happening in other projects or other parts of the organization						
We do not have good enough tools to support project work						
Information flow is restricted in the company						
Lack of conversation, things are not discussed sufficiently and genuinely in our company						
There are challenges in the transfer of tacit knowledge - the information is only in the head of employees and in emails						
Risk management - the unavailability of key employees (e.g. due to sickness), would endanger important projects and the continuity of business						

	Very insignificant	Insignificant	Neither insignificant or significant	Significant	Very significant	Cannot say
Collaboration and co-authoring of documents is a challenge, it is difficult to co-write documents, e.g. offers and quotations, because of versioning, commenting and making changes						
Too much email, too much time goesto answering to emails and it is difficult to make conversations in email						
People meet each other far too little, and it is difficult to get a big group together even if it would be useful						
Organizing meeting times is difficult, can cause a lot of email exchanges and take too much time						
Customer services is overloaded with similar questions from customers by email and phone						
Sharing of knowledge on markets and customers is challenging, information is not transferred from marketing to production, and the sales personnel do not get information						

	Very insignificant	Insignificant	Neither insignificant or significant	Significant	Very significant	Cannot say
about opportunities for additional sales						
Getting feedback from customers is difficult - we do not get enough feedback and product development ideas from our customers or the infromation does not reach product development						
Knowledge sharing and collaboration with our partners and subcontractors is challenging						

30. **Perceived potential of social media in helping the problem** *

Mark only one oval per row.

	Very insignificant	Insignificant	Neither insignificant or significant	Significant	Very significant	Cannot say
Experts in our company have to spend much time on answering to questions that are largely similar						
The training of new employees takes too much time and effort						
It is difficult to know what is happening in other projects or other parts of the organization						
We do not have good enough tools to support project work						
Information flow is restricted in the company						

	Very insignificant	Insignificant	Neither insignificant or significant	Significant	Very significant	Cannot say
Lack of conversation, things are not discussed sufficiently and genuinely in our company						
There are challenges in the transfer of tacit knowledge - the information is only in the head of employees and in emails						
Risk management - the unavailability of key employees (e.g. due to sickness), would endanger important projects and the continuity of business						
Collaboration and co-authoring of documents is a challenge, it is difficult to co-write documents, e.g. offers and quotations, because of versioning, commenting and making changes						
Too much email, too much time goesto answering to emails and it is difficult to make conversations in email						
People meet each other far too little, and it is difficult to get a big group together even if it would be useful						

	Very insignificant	Insignificant	Neither insignificant or significant	Significant	Very significant	Cannot say
Organizing meeting times is difficult, can cause a lot of email exchanges and take too much time						
Customer services is overloaded with similar questions from customers by email and phone						
Sharing of knowledge on markets and customers is challenging, information is not transferred from marketing to production, and the sales personnel do not get information about opportunities for additional sales						
Getting feedback from customers is difficult - we do not get enough feedback and product development ideas from our customers or the infromation does not reach product development						
Knowledge sharing and collaboration with our partners and subcontractors is challenging						

31. **How significant are the following barriers against using social media?** *

Mark only one oval per row.

	Not at all important	Less important	Moderately important	Important	Very significant	Cannot say

	Not at all important	Less important	Moderately important	Important	Very significant	Cannot say
Lack of understanding the possibilities of social media						
Lack of relevant case studies						
Failed experiments or bad experiences						
Other projects are more important or urgent						
Inadequate personal resources						
No need - our customers do not search information from the web						
No need - things are done with emails and meetings						
Information security problems						
Difficulties of integrating social media to company business processes						
No financial resources to invest in tools and or consulting						
Difficulties in integration of social media in the company's current processes						
Tools are missing						
Difficulties of adopting new mental models and practices related to social media						
We have been unable to demonstrate the benefits to business						
Insufficient top management support						

32. **How useful would the following approaches be to receive help for the use of social media approaches for your company (during this and the next year)?** *

Mark only one oval per row.

	Not useful at all	Not very useful	Moderately useful	Useful	Very useful	Cannot say
Seminars and other events to deal with social media use in industrial companies						
Seminars and other events outside the capital city area?						
Studies and reports about the topic						
Case descriptions about industrial companies in Finland and elsewhere						
Benchmarking events with other industrial companies						
Internet forums to provide information about the topic and to participate in discussions about the topic						
Supported company-specific consulting to make use of social media						
Receiving information about different tools and their vendors						
Information about social media consulting companies and their offerings in the topic						

Publication 1

Social Media Use and Potential in Business-to-Business Companies' Innovation

By

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Social Media Use and Potential in Business-to-Business Companies' Innovation

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ABSTRACT

The use, potential and challenges of social media in innovation have received little attention in the literature, especially from the standpoint of the business-to-business sector. Therefore, this paper focuses on bridging this gap. The purpose of this paper is to study the use and potential of social media in the innovation context, especially from the perspective of business-to-business companies. The paper starts by defining of social media and Web 2.0, and then characterizes social media in business, social media in the business-to-business sector and social media in the business-to-business innovation process. The paper also studies the essential differences between business-to-consumer and business-to-business in the given respects. Finally the authors present and analyze the results of their empirical survey of 110 respondents from Finnish companies. The results suggest that there is a significant gap between the perceived extensive potential of social media and current social media use in innovation in business-to-business companies. They have also identified potentially effective ways to reduce the gap, and clarify the found differences between B2B's and B2C's.

Keywords: Business-to-Business, Innovation, Innovation Management, Social Media, Survey

1. INTRODUCTION

The recent innovation management literature has recognized a new increasingly important innovation paradigm, which is based on an open innovation model (Chesbrough, 2003; Gassmann, 2006; Von Hippel, 2005). This paradigm, "open innovation," emphasizes the importance of the efficient use of all existing and available knowledge and information. Besides the knowledge available inside the company, it particularly emphasizes the knowledge located outside the company borders. In this paradigm it is recognized that valuable innovation-related knowledge is being increasingly widely distributed to different actors, organizations (e.g.,

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companies, customers, suppliers, universities etc.) and communities (Chesbrough, 2003). In addition, the significance of knowledge creation by e.g., open communities of peers is also emphasized. Various types of collaborative web tools and approaches, such as social media, can enable and significantly increase the use of the distributed knowledge both inside and outside the company (Levy, 2009; McAfee, 2006), and also support the transition to more open innovation processes.

The significance of innovation-related collaboration is reflected in the many so-called "success factor studies" that investigate the factors affecting the success and failure of innovations. According to these, successful inter-organisational and intra-organisational cooperation are major success factors in innovation (Read, 2000). Some studies even claiming cooperation to be the most important detected success factor (Muffatto & Panizzolo, 1996). Social media provides quite novel and useful ways of interacting and collaborating in the innovation process, and also for creating new information and knowledge for innovations (e.g., Barker, 2008; Bernoff & Li, 2008; Cachia, Compano, & Dacosta, 2007). These novel ways and approaches have been little investigated because of the novelty of social media concepts and approaches, and because the possibilities of social media are not fully understood in the context of innovation.

Social media utilization in enterprises is a current and popular research topic. Although there do exist studies and information about how companies currently use social media, knowledge about social media use in innovation activity is relatively scarce, both the theoretical and empirical research is quite fragmented, and the empirical research is mainly based on individual, often not too systematically and analytically reported fragmented cases. Furthermore, little is known about how companies see the potential benefits of using social media in enhancing innovation efforts and customer involvement. In addition, the use of social media in different specific contexts, such as the business-to-business sector and in different types of industries, is not well understood. The aim of this research is to illustrate both the current state and potential of social media use in innovation as perceived by Finnish business-to-business (B2B) companies.

The purpose of our paper is to study the use and potential of social media in the innovation context, especially from the perspective of business-to-business companies. We also wanted to ascertain what kinds of important challenges there are currently in implementing social media in the innovation activities of B2B's. On the basis of the literature available, it can be assumed that the challenges, benefits and useful approaches are at least somewhat different from those of business-to-consumer companies. It has been a relatively common assumption (Eskelinen, 2009; Lehtimäki, Salo, Hiltula, & Lankinen, 2009) that it is much more difficult to utilize social media in business-to-business innovation and customer interface, for instance, because of the many significant differences in the business-to-business products, markets and product development. In addition, it is assumed that the objectives and applications of social media differ in many significant respects between these two sectors, e.g., due to the given differences (e.g., Gillin & Schwartzman, 2011; Kho, 2008). These B2B characteristics and differences are described and analyzed later in this study in more detail.

2. SOCIAL MEDIA IN BUSINESS-TO-BUSINESS

2.1. Definition of Social Media and Web 2.0

Web 2.0 refers to technologies that enable users to communicate, create content and share it with each other via communities, social networks and virtual worlds, making it easier than before both to have real life experiences in virtual worlds and to organize content on the internet with content aggregators (Lehtimäki et al., 2009). Such tools and technologies emphasize the power of users to select, filter, publish and edit information, as well as to participate in the creation of content in social media (Tredinnick, 2006). According to

Constantinides and Fountain (2008), "Web 2.0 is a collection of open-source, interactive and user-controlled online applications expanding the experiences, knowledge and market power of the users as participants in business and social processes. Web 2.0 applications support the creation of informal users' networks facilitating the flow of ideas and knowledge by allowing the efficient generation, dissemination, sharing and editing / refining of informational content."

According to Kaplan and Haenlein (2010), social media is defined as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content." Furthering this, social media is referred to as applications that are either based entirely on user-created content, or in which user-created content or user activity have a significant role in increasing the value of the application or the service (Kangas, Toivonen, & Bäck, 2007). Lietsala and Sirkkunen (2008) suggest using social media as an umbrella term, under which various and very different types of cultural practices take place related to the online content and the people who are involved with that content. Some of the practices are relatively stable, such as participating in wikis and social networking while others are still developing, such as microblogging or virtual worlds. A large number of different generic types of social media applications can be identified (Cooke & Buckley, 2008; Dewing, 2010; Jäkälä & Pekkola, 2011; Warr, 2008), such as wikis (e.g., Wikipedia), blogs (e.g., company newsrooms), microblogs (e.g., Twitter, Yammer), social networking (e.g., LinkedIn, Facebook), social content communities (e.g., YouTube, Flickr, Digg), social workspaces (e.g., SharePoint), social tagging (e.g., Delicious), virtual social worlds (e.g., Second Life), mashups and prediction markets. The functionality and rules of utilization of the applications vary (e.g., Twitter tweets/posts can be no more than 140 characters). Also, there is variation in how people use these applications (e.g., bloggers tend to post at most once per day, and their posts tend to be up to one page in length).

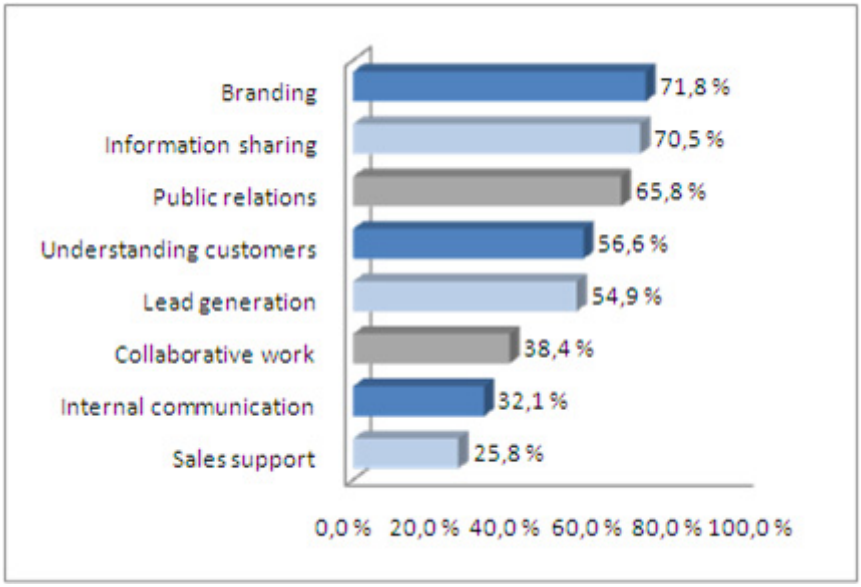
2.2. Social Media in Business

Social media is a relatively novel concept, and its fast wider adoption and public interest has its roots at least partly in the originally non-commercial public social media applications such as Facebook and blogs. In the white paper study by Coleman (2009), still only 15% of the general population reported using social networks (technologies) at work, while others used them only outside the work context. The adoption of and attitudes to social media in the business context seem to be affected by the phenomena: in practice, managers often seem to strongly associate social media especially with Facebook and Twitter, which are only a very minor part of the social media genre in business.

Even if some individual Web 2.0 tools, such as wikis, have been used occasionally in the business and enterprise contexts for almost a decade, the general adoption and understanding of social media in the business context is quite limited. In a Finland-based survey (Helfenstein & Penttilä, 2008) targeted mainly at CEO's, CIOs and strategic management, 25.4% reported that Web 2.0 applications and services were in active use in their organizations, and 16.4% said they would take introduce them in the near future, while the rest had no plans or no resources to adopt them, or thought it was better to wait before making adoption decisions. The adoption may be very fast in certain business areas, and there are significant differences in the adoption depending on the business or function asked: contrary to the previous research, e.g., in the white paper by Stelzner (2009), as many as 88% of surveyed marketers were using social media in their marketing, but 72% had only been doing so for a few months or less. These fast changes emphasize the need to monitor and study the social media possibilities and adoption rates in various business contexts.

Considering the different business-related areas in companies, the white paper survey by Gordon (2009) showed (Figure 1) that social media is used to varying extents in different business functions.

Figure 1. Social media use in different business functions



Very few recent academic studies were found that studied the adoption of social media in organizations in general, or the adoption in different business functions. The academic survey-type studies found reported practically no recent studied adoption rates, especially in the innovation context or business-to-business context, not to mention their combination. This emphasizes the relevance of our study aiming precisely to study the combination empirically.

2.3. Social Media in Business-to-Business Sector

Markets, products and product development differ significantly between the business-to-business and consumer product sectors (Hanna, Ayers, Ridnour, & Gordon, 1995; Holt, Geschka, & Peterlongo, 1984; Kotler, 1996; Kärkkäinen, 2002; Urban & Hauser, 1993; Webster, 1995). For instance, generally speaking, products produced by business-to-business organizations are more complex, the development of new products takes significantly longer, and the customers are large organizations rather than single persons, which is the case in the consumer (business-to-consumer) product sector. In industrial business-to-business markets, there are normally fewer customers compared to consumer markets, and the co-operation with customers is generally more direct and more intense than in the consumer sector. Industrial products are usually purchased by professional buyers who consider a large number of different criteria when making the buying decisions. They tend to acquire plenty of information about the industrial products to be purchased, and they normally evaluate the different alternatives objectively. The demand for industrial products is derived from the demand for the company's industrial customers' products and finally the end-user demand (Kotler, 1996; Webster, 1995). In industrial products, more emphasis is on physical performance and personal selling than in consumer products, where psychological attributes and advertizing are critical for success (Urban & Hauser, 1993).

Taking the differences into consideration, it is fair to assume that the various types of innovation-related managerial approaches, e.g., collaborative approaches and customer needs assessment activities, such as those carried out

by means of social media and Web 2.0, should take these differences carefully into account when planning and implementing approaches for the business-to-business sector companies. First, since the number of customers is generally much smaller in B2B's, the use of "crowdsourcing," which is quite commonly utilized in B2C's, is limited. The concept "crowdsourcing" refers to outsourcing certain tasks normally performed by company's employees to an undefined - and generally large - network of people in the form of an open call, either carried out by individuals or collaboratively (Howe, 2011). Second, in the context of innovations and B2B's, legal contracts and IPR issues can become challenges in the free revealing of product or business ideas in inter-organizational innovation collaboration (Luoma, Paasi, & Nordlund, 2008), and may thus seriously limit the utilization of social media between B2B- companies and their customers. Third, various issues concerning information security have already been raised in individuals' use of social media, but due to the nature of business-to-business communication, the business-to-business context includes severe information security risks potentially limiting the use of social media in ways that are not necessarily equally problematic in B2C social media applications: for instance, while most employees may be aware that it is not a good idea to respond unthinkingly to emails, such forethought is not necessarily applied to social media sites. This means that staff may inadvertently disclose sensitive corporate information without thinking (for instance concerning future product launches or violating customer confidentiality agreements), or leak information that can be aggregated to data gleaned from elsewhere to build up a useful corporate picture, not realizing that it may be stored online indefinitely and is searchable (Everett, 2010; Langheinrich & Karjoth, 2010). Fourth, the incentives that motivate individual consumers or hobbyists to participate in social media –based user-communities can also be very different from those of professional (B2B sector) customers: for instance, while the aspects of recognition and sense of community or self-esteem are undoubtedly also important for employees in business-to-business sector firms, it is to be doubted whether they are sufficiently important motivators to become drivers for them to act as a user-innovator.

The factors suggest that the usefulness and potential of social media should be empirically studied especially in the context of business-to-business companies trying to assess the significance of the expected challenges and benefits of social media in innovation from the specific standpoint of business-to-business companies. Even if clearly most of the available empirical studies have been done from the B2C standpoint or a fairly generic standpoint, some empirical social media studies have noticed and taken into consideration the specific nature of business-to-business (Cameron, 2008; Carabiner, 2009; Eskelinen, 2009; Lehtimäki et al., 2009). However, most of the empirical studies found were not academically implemented and reported, and importantly, no empirical survey-based studies with innovation standpoint were found, despite extensive literature review, in the business-to-business context.

2.4. Social Media in Business-to-Business Innovation Process

In the strategic management literature and quality management literature five main roles have been identified for customers in value creation: resource, co-producer, buyer, user and product (Finch, 1999; Kaulio, 1998; Lengnick-Hall, 1996). Of these roles three (resource, co-producer, user) are most relevant for specifically the innovation process (Nambisan, 2002).

In several studies in the innovation management literature, the authors have found it useful to divide the innovation process into three parts: the (fuzzy) front end (phases before product concept), the product development phase (phases between concept and launch), and commercialization (phases during / after launch) phase (Desouza et al., 2008; Fuller & Matzler, 2007; Nambisan, 2002). Thus, we find it relevant to study social media use in the customer interface of the innovation process in

more detail from the perspective of the different customer roles and the different innovation process phases. We have not been able to find earlier B2B-related studies that have carried out such analysis, and will take this into consideration in our own analysis.

In the first innovation process phase customers can be regarded as a resource, i.e., the source of ideas or need–related information, in the second phase customers can be regarded as co-creators (or co-producers), and in the final phase customers can be regarded as (end)users (Bartl, Jawecki, & Wiegandt, 2010; Chan & Lee, 2004; Fuller & Matzler, 2007; Nambisan, 2002). These roles bear a very close resemblance to the three main phases of the innovation process described, and support the division of the innovation process accordingly in the context of this study. This enables us to better analyze the different roles and benefits of social media in the creation of new customer insights, understanding and knowledge in more detail than has been achieved so far.

3. RESEARCH DESIGN

3.1. Literature Review

A literature survey on social media in business-to-business and innovation was conducted to gain an understanding of the state-of-the-art. Five databases: ABI Inform, ACM Digital Library, Emerald, ISI Web of Knowledge, and ScienceDirect, were included in the survey of articles related to social media, innovation and B2B.

A total of 1357 articles were discovered, of which 60 were chosen for further examination based on the titles. The selection criteria were that the article must address social media or Web 2.0, and relate to innovation in general, or to some or to all innovation process phases. Individual tool–related studies in the given context (wikis, blogs, etc.) also emerged but these were not included, because we were interested in getting an overall picture of social media use, possibilities and challenges instead of narrow snapshots of individual approaches. 25 of selected articles matched these criteria. In addition, we made a systematic study of both backward and forward references of the selected 25 articles that brought some more articles into our attention, the number of articles totaling 30. The articles were analyzed especially from the standpoint of social media in B2B and innovation contexts, and current empirical knowledge was synthesized.

3.2. Questionnaire

We wanted to study how B2B companies perceive the potential, opportunities and challenges in using social media in their innovation process. In addition, we wanted to gain further understanding from the technological and organizational points of view of how business-to-business organizations currently utilize social media. We utilized the research questions, the generic social media related literature, the survey-type of empirical social media studies, as well as expert interviews in the structural design of the questionnaire and the formulation of individual questions.

First of all, the respondents were given a brief definition of social media utilizing the available common definitions in the literature found. The definition was a relatively brief one: "By social media we mean applications, which are based either fully on user-created content, or in which user-created content and user activities have a significant role in increasing the value of the application or service. Social media is built on Web 2.0 technologies, content and communities." This definition was complemented at the beginning of the questionnaire by providing the respondent with a list of Web 2.0–based application categories.

To elicit the necessary background information about the respondents which might affect their opinions, the respondents were first asked about their age, their experience in innovation in years, and the function they belonged to. To elicit the necessary background information on the companies studied, the respondents were asked to choose to which class they belonged to regarding turnover, number of employees and

industry type from the classifications made by Statistics Finland. We ascertained the emphasis of business, the alternatives being business-to-consumer (consumer or end user as customer), business-to-business (company as customer) or other markets, by asking which alternative would best describe the respective companies' main focus. We also elicited the competitive strategy of the companies by presenting four different generic alternatives to choose from (some important literature sources for the task being Porter (1985)) and McGrath (1995). In order to better understand the innovation activity in the companies we asked them to assess how systematic the innovation activity was in terms of identifying the development needs in their innovation activities, also their development stage in innovation on a five-point scale (ranging from very poor to very good).

To orient the respondents to think about social media holistically, as well as to give a better picture of social media, we first asked how actively they used social media-related tools in the company related to predefined application categories (instant messaging, blogs, microblogs, wikis, pod/webcasts, content aggregators, mashups, social networking tools, social bookmarks, social office tools, virtual worlds, and social workspaces) on five-point scale ranging from very little to very much. We studied the maturity level of social media adoption in the companies by asking the respondents to evaluate statements regarding this maturity on a five-point scale ranging from completely disagree to completely agree (see the results for more detail on the questions). Social media use in innovation was assessed similarly by statements regarding social media use in internal innovation, in collaboration with customers, in collaboration with product development / innovation partners, and in collaboration with other outside organizations on a five-point scale ranging from very little to very much.

Social media potential was evaluated in terms of the opportunities it offered for product or service development and involving customers in development, and the potential of social media use in different phases of the innovation process. The respondents were asked to evaluate how much potential social media had in the three innovation process phases, that is the front-end phase, the product development phase and the launch/commercialization phase, on a five-point scale ranging from very little to very much. The content of the phases was illustrated with the main subtasks related to them. We studied the potential of social media in customer interaction by asking the respondents to evaluate the potential of social media in different types of customer interaction modes (in the order of growing depth of customer involvement in innovation) on a five-point scale ranging from very little to very much (see results for more detailed questions). Social media opportunities for product or service development were evaluated by asking the respondents to rate the opportunities offered by social media for cost cutting, reducing product development time, increasing customer orientation and in improving quality on a five-point scale ranging from very little to very much.

The questionnaire was also designed to study customer knowledge -related challenges in innovation, and the possibilities of social media to support the acquisition of customer knowledge, but as these were not in the main focus of this study and its research questions, their results will be reported separately. Prior to formulating the questionnaire, a few forerunners in social media adoption and social media experts in Finland were interviewed to obtain background information of social media use in enterprises in general, as well as the challenges and possibilities of social media in business and innovation contexts. This information was utilized in the development of the preliminary questionnaire, together with the literature found. The preliminary questionnaire was pre-tested in several business-to-business companies by individuals with varied levels of expertise and knowledge in social media and innovation concerning the content, and comprehensibility of the questions, as well as the time needed to complete the questionnaire.

3.3. Sample

A sample of 1984 Finnish decision-makers from companies with more than 50 employees were surveyed (the contact info sent to the product development and innovation experts concerned was obtained from a commercial company JM Tieto). There were 1005 unique companies in the sample. The contact information was selected based on persons working in companies employing more than 50 employees in either research and development or product design role. The respondents were selected on the basis of their position regarding product development and innovation. Smaller companies, which generally can be presumed to possess less resources and thus less interest for social media specifically in the innovation context were excluded from the study scope (contrary to this, the marketing context would probably be considered a much more relevant application area for social media in the small companies, however, and marketing communication has been practiced rather commonly even by small and micro companies). Invitations to participate to the survey including a covering letter explaining the focus of the survey were sent to the contact addresses obtained with two weeks to complete the survey. After two weeks an email reminder was sent offering one week more time to complete the survey. To improve the response rate telephone calls were made to contacts including in the titles product and manager, developer or designer, a total of 262 people were contacted of whom 132 were reached within two weeks.

A total of 122 responses were received to the Internet-based survey. Duplicate responses from same responding companies were removed, this resulting to 110 unique responses from individual companies. The effective response rate was thus 11% (110/1005). Of the responding firms, 77% were manufacturing, 8% construction, information and communication and wholesale and retail trade each 2%, 1% were mining and quarrying, professional, scientific and technical activities, and human health and social work activities, 8% were industries classified as "other." The majority (74%) of the respondents were oriented towards business-to-business markets and a minority (23%) towards business-to-consumer markets. The responses concerning the respondent's position held within the firm were product development (68%), management (16%), IT (4%), sales (2%), marketing (4%), and 6% were in positions classified as "other."

To ensure the representativeness of the sample, the authors acquired general statistics on Finnish companies employing more than 50 persons. These statistics were obtained through Statistics Finland (http://www.stat.fi), the only official authority for producing statistics in Finland. The authors compared the number of personnel and annual revenue between the sample and the Figures provided by Statistics Finland (Figure 2 and Figure 3).

As can be seen in Figure 2 and Figure 3, the annual revenue and number of personnel from the sample seem to represent the general figures from the Finnish companies fairly well. Pearson's Chi-Square testing was performed on the data, which rejected the null hypothesis of independence on both occasions at $\alpha<0.001$, giving further evidence that the results from the sample could be generalized to Finnish companies.

4. RESULTS

4.1. Literature Review Results

The empirical studies found included an online survey of consumer empowerment through internet-based co-creation (Füller, Mühlbacher, Matzler, & Jawecki, 2009), survey of technology start-ups and early adopters to identify rules for creating and capturing value from innovative technologies (Porta, House, Buckley, & Blitz, 2008), interview of marketing personnel and Web 2.0 experts to compare their views regarding Web 2.0 and industrial marketing in the Finnish context (Lehtimäki et al., 2009), a survey of enterprise social collaboration (Coleman, 2009), social media business use survey (Gordon, 2009), B2B social media benchmarking study (Hanna, 2009), a web questionnaire

Figure 2. Comparison of number of personnel

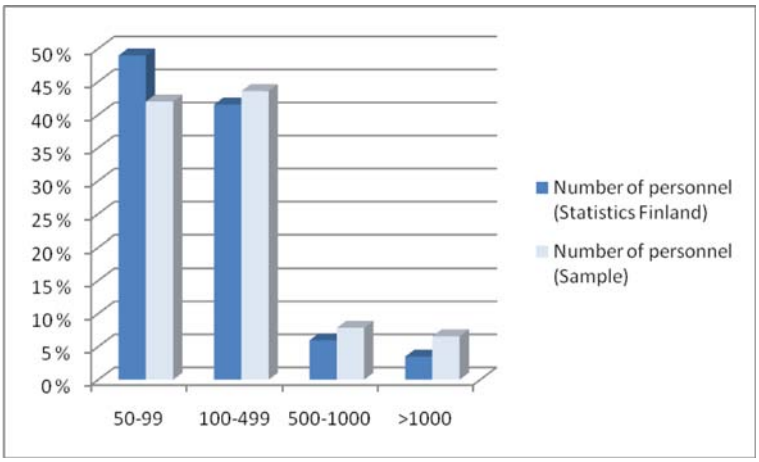
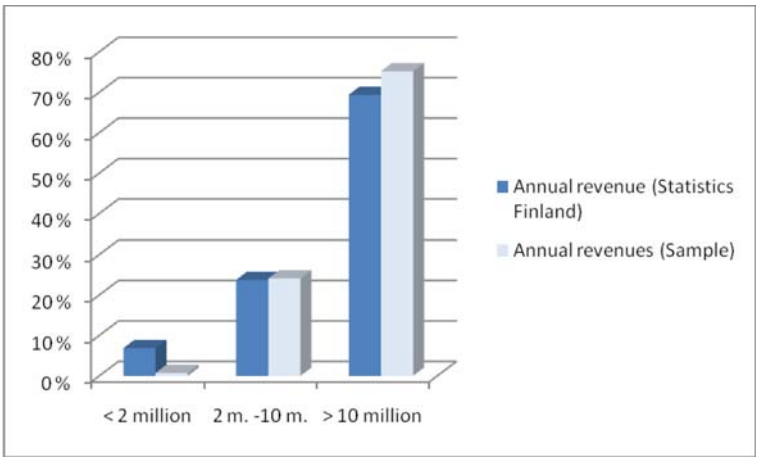


Figure 3. Comparison of revenues



about Finnish industrial leaders' appraisal and strategy concerning Enterprise Web 2.0-related topics (Helfenstein & Penttilä, 2008), and survey on business use of Web 2.0 technologies – including wikis, blogs, social networks, and mash-ups (Bughin, Chui, & Miller, 2008).

The multiple-case based studies found were about motivating and supporting collaboration in open innovation (Antikainen, Mäkipää, & Ahonen, 2010), a case study of two companies on experience management aimed at enhancing customer involvement (Lamberti & Noci, 2009), a case study on how two innovative firms had gained competitive advantage by using the co-creative business concept to generate sustainable growth (Ramaswamy, 2010), six case studies on collaborative customer co-design in online communities (Piller, Schubert, Koch, & Möslein, 2005), and two exploratory case studies that illustrate the integrated and systemic usage of internet-based collaborative innovation mechanisms (Sawhney, Verona, & Prandelli, 2005).

In brief, the literature survey revealed that the knowledge about social media use in innovation activity is currently fragmented

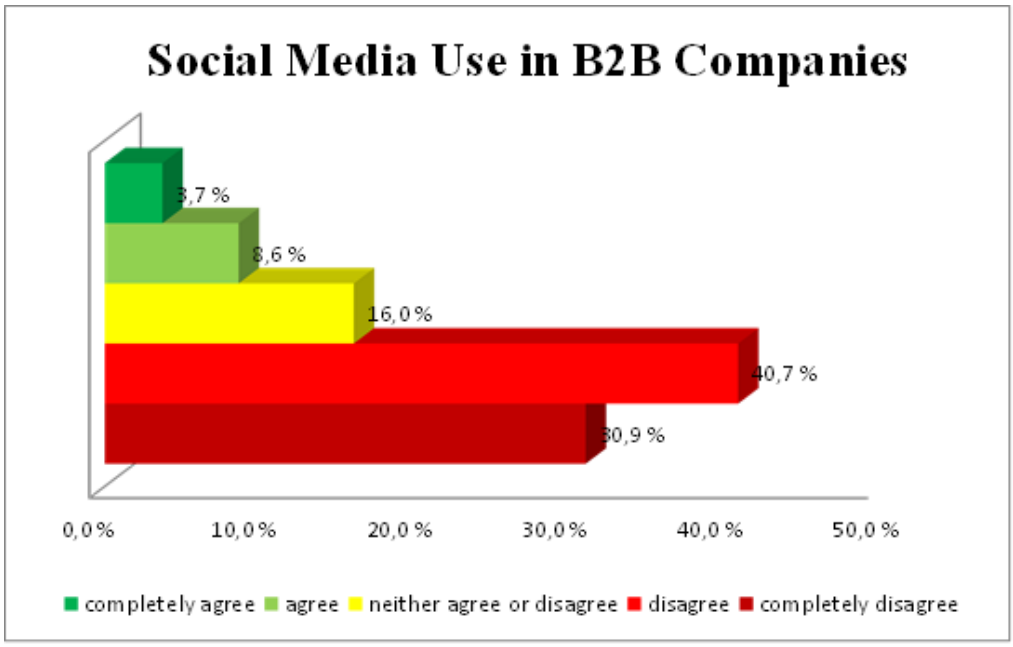
into studies of individual tools and technologies with little focus on the big picture, and it is mainly based on individual cases. The very few studies combining social media and B2B standpoint have been approached primarily from a marketing perspective, and little attention is paid to innovation. Moreover, research is virtually nonexistent in the area where social media, B2B and innovation intersect. Empirical academic studies at the intersection, especially survey-based ones, are practically non-existent.

4.2. Survey Results

Regarding social media use in the B2B companies studied, 12.3% of B2B companies agreed (either completely agreed or agreed) that social media was used in their companies, while 71.6% disagreed (completely disagreed or disagreed) that it was used. There were descriptive level differences on how social media was used in B2B and B2C companies. The respective percentages of B2C companies agreeing on the use were 20.9% agreeing on the use (4.2% completely agreed, 16.7% agreed) against 41.0% (23.5% completely disagreed and 17.5% disagreed). Therefore on the descriptive level, B2C companies used social media slightly more. These results also have implications for how social media was or was not used in innovation (Figure 4).

Concerning the important prerequisities affecting the adoption of social media in companies, in the order of growing "adoption maturity" and challenge, in the B2B companies studied almost half, 45.7%, reported that the use of social media was allowed in their companies, while around one third (32.1%) stated that the use was not allowed. Only 2.6% of the respondents stated that training was provided for social media use, and 6.8% stated that guidelines for the use were provided. 15.0% stated that the company had skilled staff to support social media use. 3.8% claimed that the use of social media was encouraged in the company. Compared to B2C companies, all the aspects of social media prerequisities were rated descriptively lower (there were no statistically significant differences), except that

Figure 4. Social media use in B2B companies



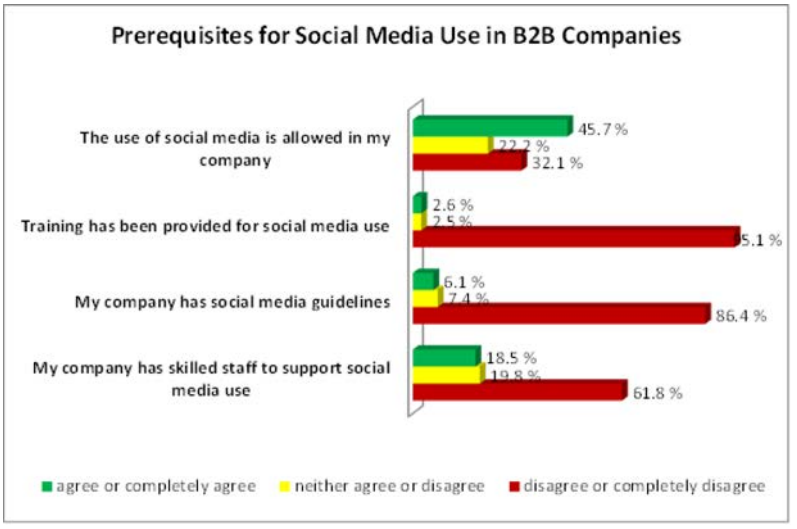
social media use was allowed more often in B2B companies than B2C companies, where 41.7% of the studied companies allowed the use of social media (Figure 5).

The most used (rather much or very much used) social media-related application categories in B2Bs were wikis (8.8%), instant messaging (8.1%), social office tools (7.6%) and social workspaces (6.4%). None of the B2B companies reported using microblogs or social bookmarking rather much or very much. Concerning the application categories most often associated with social media, rather surprisingly, on the descriptive level, social media tools were used more actively in B2B companies than in B2C companies in almost all the application categories studied. Only blogs, microblogs, social office tools and virtual worlds were used more actively in studied B2C companies. Social workspaces were used statistically significantly (sig. 0.041) more in B2B companies (6.4% rather much or very much) than in B2C companies, where 0% used social workspaces rather much or very much and only 4.2% used somewhat.

In the B2B companies studied, social media use in innovation was most active in collaboration with innovation partners (6.4%) and customers (5.1%). In internal innovation the use was least active with (2.5%). We found no statistically significant differences in the use between the B2Bs and B2Cs studied, but at the descriptive level, there were slight non-statistical differences: 5.6% used social media much or very much in B2B companies compared to 8.0% in B2C companies. Social media was used actively in collaboration with product development or innovation partners in 6.4% of B2B companies compared to 4.2% of B2C companies. It is peculiar, however, that social media was less actively used in B2B companies' internal innovation (2.5%) than in collaboration with other outside organizations (5.1%), as well as customers and partners, when literature mainly suggests that organizations should first adopt social media in the internal use, e.g., due to risks in opening up innovation processes and not being able to control the innovation activities and knowledge sharing in the open innovation environments.

The greatest potential (the respondents selecting rather much or very much) for social media use in B2B companies' innovation process was seen in the launch/commercialization phase (18.5%) and closely following this in importance the front-end phase (17.3%). A

Figure 5. Prerequisites of social media use in B2B companies

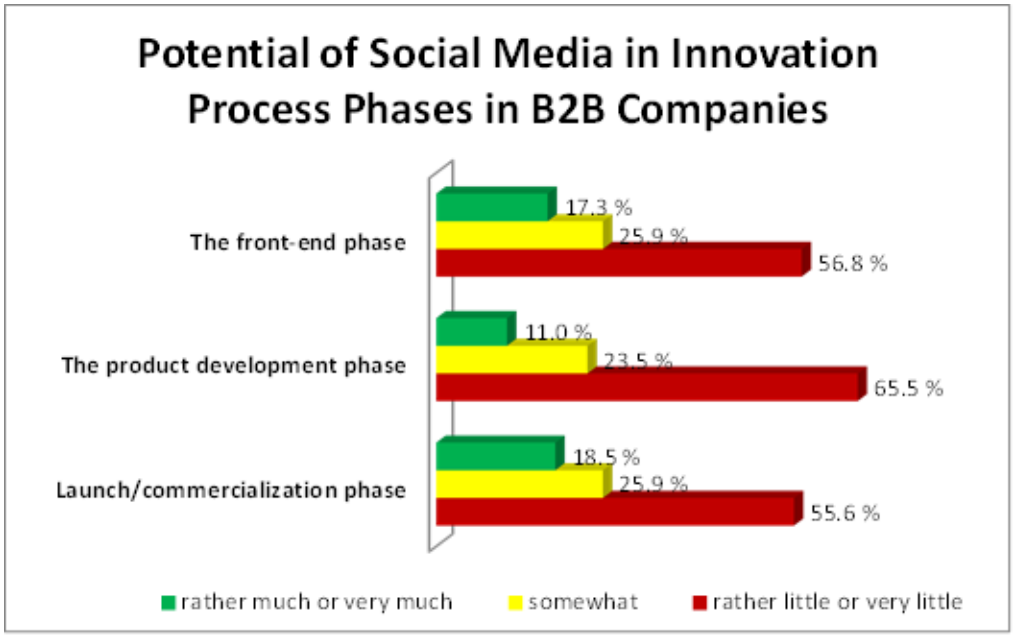


smaller part of B2B companies recognized the potential of social media in the actual product development phase (11.0%). There were statistically significant differences in how well B2B and B2C companies perceived the potential of social media in the innovation process, in the front-end of the innovation process (sig. 0.020) 34.7% of B2C companies recognized rather much or very much potential, and in product development (sig. 0.036) 34.7% of B2Cs also recognized rather much or very much potential, whereas in the launch/commercialization phase there was no statistically significant difference (sig. 0.138, below sig. 0.05 being statistically different). However, at descriptive level clear differences were found, as 30.4% of B2C companies perceived a clear potential (rather much or very much) in the use of social media in the launch/commercialization phase (Figure 6).

Social media potential in customer interaction in B2B companies followed a marketing oriented pattern: most frequently the companies studied perceived potential (rather much or very much) in merely passing product or service marketing-related information to customers (one-way interaction). Concerning the other modes of customer interaction studied, the frequency of the companies studied perceiving (rather much or very much) potential from social media decreased somewhat in every further interaction mode that required more intense customer involvement in product or service development. The pattern was similar in this respect for B2C companies, although B2C companies recognized more potential in every mode of customer interaction. Social media was considered to offer rather much or very much potential in passing product or service marketing related information to customers in 32.1% of the B2B companies studied and 52.1% in B2C companies, while about 25.6% of B2B companies and 34.7% of B2C companies perceived that social media provided rather much or very much potential in offering products and services (e.g., toolkits) for customers to develop products.

Concerning the perceived generic opportunities of social media, the majority of B2B

Figure 6. Potential of social media in innovation process phases in B2B companies



companies reported that social media provided important opportunities (rather much or very much) in discovering customer demands (48.1%), which was descriptively slightly less than considered in B2C companies (56.5%). Opportunities in the development of innovation activity were found to be much or very much by 29.7% of B2B companies and 30.4% of B2C companies. Furthermore, opportunities to develop organizations in general were recognized much or very much by 18.8% of the B2B companies studied and 21.7% of B2C companies.

Regarding the perceived impact of social media on innovation activity, half (50.0%) of B2B companies claimed that social media could increase customer orientation rather much or very much. 24.7% of B2B companies reported that social media provided important opportunities (rather much or very much) in shortening product development time and 21.5% in saving costs. Social media opportunities in improving quality were rated rather much or very much by 20.5% of B2B companies. In B2C companies significantly (sig. 0.026) more opportunities were perceived in increasing customer orientation (clear majority, 66.6% of B2C companies perceived rather much or very much opportunities). While not statistically significant, B2C companies perceived more opportunities in other categories as well (33.4% reported that social media can achieve quite large or very large cost savings, and 29.2% considered that social media can shorten product development time and improve quality rather much or very much).

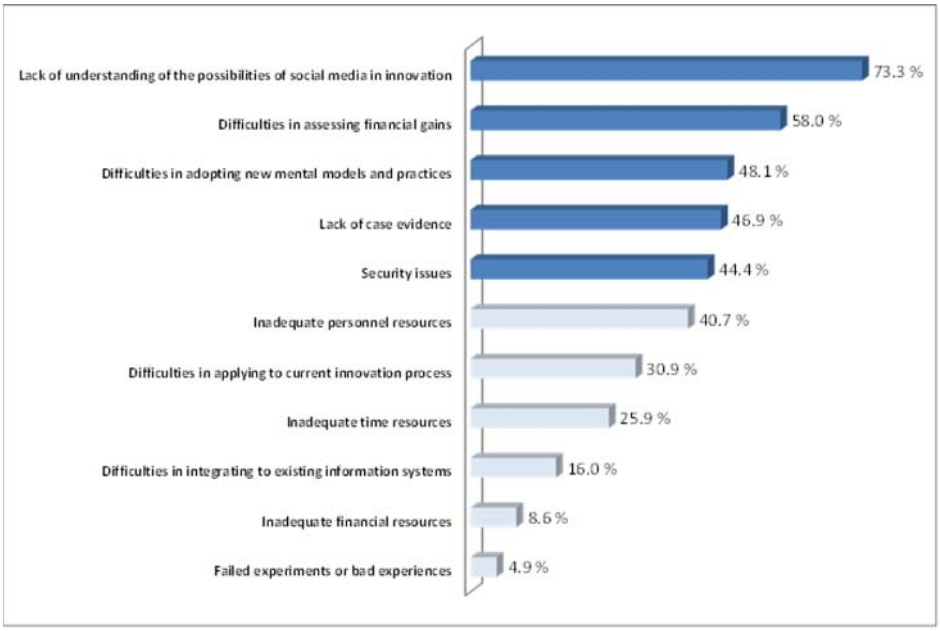
The top five major challenges in adopting social media in innovation, which were rated important or very important by more than 40% of the B2B companies studied (Figure 7), were lack of understanding the possibilities of social media in innovation (73.3%), difficulties in assessing the financial gains from social media (58.0%), difficulties in adopting new mental models and practices needed for the adoption (48.1%), lack of evidence of similar cases using social media in innovation (46.9%), and security issues in social media use (44.4%). Inadequate personnel resources were also considered tough challenges by a little over 40% of B2B companies.

5. DISCUSSION AND CONCLUSION

In general, on the basis of the results, the B2Bs studied seemed to see a perhaps even surprisingly large potential in the use of social media in innovation and in clarifying the customer needs in particular: about half of the B2B companies studied perceived important new possibilities for customer needs. This was surprising, especially with the regard to the doubts often expressed by managers of B2Bs as well as in the literature, about utilizing social media in B2B's, as well as with regard to B2B's general characteristics, e.g., the relatively small number of customers compared to B2C markets, which affect the uses and usefulness of social media. Concerning the various types of results for improving the innovation, increasing customer orientation was by far the most common (according to 50% of companies) important innovation-related benefit, shortening the product development time being the next. However, when comparing the potential to actual use, there seems to be a significant gap, because only 12.3% of B2Bs reported that social media was used in general in their companies, and in the context of innovation, as few as 5.6% of B2Bs, according to the respondents, used social media significantly with their customers or innovation partners, and even less in other innovation collaboration types.

Our study discovered several potential factors at least partly explaining the limited use, which were deemed very often, by about half or more of the respondents, important reasons for not utilizing social media in innovation: the lack of understanding the possibilities of social media in innovation, difficulties in assessing the financial gains from social media, difficulties in adopting new mental models and practices needed for adoption, as well as the lack of evidence of similar cases using social media in innovation. No innovation or B2B-related barriers for social media adoption were reported in earlier studies covered in our social media- related literature review. The results concerning the most common important barriers are somewhat in line with an earlier

Figure 7. Challenges of adopting social media in innovation



generic higher management-oriented social media survey by Helfenstein (Helfenstein & Penttilä, 2008), which found lack of know-how to be clearly the most important barrier (48.8% of respondents) to the adoption of Enterprise 2.0. For comparison, the four most common barriers in the found generic management or marketing–oriented survey –based studies (BtoB Magazine, 2011; Growth Lab Consulting, 2010; Helfenstein & Penttilä, 2008; Ramsey, 2010) were lack of knowledge or understanding, measurement of ROI or performance, and lack of generic resources or time. In our own study in general, it seemed that the lack of knowledge was the most important factor impeding the adoption of social media in innovation, whereas inadequate resources (personnel, time, or financial) were not so important, and neither was the integration of social media in the current innovation process and information systems. Failed experiments or bad experiences were not deemed very important challenges impeding the adoption of social media, which can be explained, of course, at least partly by the generally rare use and related experiments. To increase social media use in B2B innovation, at least the mentioned most important social media adoption barriers should be addressed in companies, and academic research should be carried out to produce a more systematically organized, more holistic and less fragmented picture of the issues.

Concerning the use of social media in B2Bs, it was surprising, for instance, that social media was less actively used in B2B companies' internal innovation (2.5%) than in collaboration with other outside organizations (5.1%), as well as customers and partners, when the literature mainly suggests that organizations should first adopt social media in internal use, e.g., due to risks with opening up innovation processes and not being able to control the innovation activities and knowledge sharing in the open innovation environments.

As anticipated, we found clear differences between the B2Bs and B2Cs studied on the basis of our results. Some of the differences were not statistically significant, and should

be studied for further confirmation, but there were also differences that were statistically significant. In general, B2C companies used social media slightly more. This is in line with the few studies that compare the use, such as the marketing oriented study of CMO (Moorman, 2011). However, social media use was, according to our study, allowed more often in B2B companies than in B2C companies, which contrasts interestingly with the above, as well as the general expectations about social media use.

We found no statistically significant differences in the actual usage patterns of social media between studied B2Bs and B2Cs, except that concerning social media-related tools, social workspaces were used statistically significantly more in B2B companies than in B2C companies. This does not, however, mean that no differences exist, but with the study sample, questions and measures, no statistically significant differences were found. However, while not statistically significant, many differences did indeed emerge, e.g., that B2Bs used social media more often with innovation partners than did B2Cs. Also, rather surprisingly, even if not statistically confirmed, social media tools were used more actively in B2B companies than in B2C companies in almost all the application categories studied, except for blogs, microblogs, social office tools and virtual worlds. However, the usage was generally so low that the results do not provide very conclusive evidence about the differences, and this area should be further investigated.

There were statistically significant differences in how well B2B and B2C companies perceived the potential of social media in the innovation process, in the front-end of the innovation process and in product development phases B2C's recognized significant potential significantly more often, whereas in the launch/commercialization phase there was no significant difference. Concerning the challenges of social media adoption, no clear differences were discovered.

Academically, we have achieved new understanding about the usage, perceived potential and challenges of social media in innovation especially in B2Bs, which to the best of our knowledge has not so far been studied academically with survey approaches. We have discovered that there is a significant gap between the perceived social media potential and actual use in B2B's. We have also created new understanding of the differences between B2Bs and B2Cs.

Managerially, the results can be used, for instance, to better understand the special challenges and features of B2B-related social media, and especially the various types of possibilities of social media to support and facilitate innovation in B2Bs. However, the main focus of this study was not on the managerial implications, but on the facilitation of social media research. Also, due to the low current usage of social media implied by the results, the companies that first experiment with and develop social media-based ways to support B2B innovation might benefit greatly from these investments. In addition, consultants might benefit from these results by developing ways to avoid the important social media adoption challenges and facilitate the adoption.

This study opens up several areas for further research. First of all, in order to facilitate the adoption of social media and to fill the gap between perceived social media potential and actual use in B2Bs discovered in this study, it seems apparent that academic as well as pragmatic research should be carried out. Having discovered B2B companies' emphases, special characteristics and patterns of social media use, this research provides important starting points for such further research. Most importantly, the academic research should focus on gathering and organizing the fragmented empirical research to provide a systematic and holistic picture of the possibilities of social media in B2B innovation, developing ways to present a better analyzed picture of the financial benefits of social media, as well as to gather more organized and varied types of case studies, examples and case evidence into a good overall picture of how social media may facilitate B2B innovation.

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Publication 2

Social media's opportunities in business-to-business customer interaction in innovation process

By

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Social media's opportunities in business-to-business customer interaction in innovation process

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Abstract: In the paradigm of open innovation, it is recognised that valuable innovation-related knowledge is being increasingly widely distributed to various actors, organisations and communities. Social media can provide novel and useful ways of interacting and collaborating in innovation, likewise for creating new information and knowledge about customers for innovations. These have not so far been much investigated because of the novelty of social media concepts and approaches. Furthermore, the opportunities of social media are not yet well understood in the contexts of innovation and customer interaction, and importantly, while the business-to-consumer sector standpoint has been more researched and understood, the business-to-business sector standpoint has been very little studied in the above contexts. With the help of a literature review and a survey in Finnish companies, we studied the current situation regarding the opportunities of social media in facilitating customer interaction in the innovation process.

Keywords: social media; business-to-business; customer interaction; customer understanding; innovation; innovation process; open innovation; customer knowledge management; co-creation.

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1 Introduction

One of the most frequently recognised and crucial drivers of success in innovation and new product development is a good, in-depth understanding of customer and market needs (e.g., Barclay, 1992; Rothwell et al., 1974; Cooper, 1993; Hart et al., 1999). Successful inter-organisational and intra-organisational cooperation is a further major success factor in innovation (Read, 2000; Muffatto and Panizzolo, 1996). In the increasingly important paradigm of open innovation, it is recognised that valuable innovation-related knowledge is being distributed ever more widely to various actors, organisations (such as users, customers and partners) and communities (Chesbrough, 2003). Various types of collaborative web tools and approaches, such as social media, can enable and significantly increase the use of the distributed knowledge both within and outside the company borders, and also facilitate the related customer interaction.

Social media can provide novel and useful ways of interacting and collaborating in innovation, an also for creating new information and knowledge about customers for innovations (Barker, 2008; Bernoff and Li, 2008; Cachia et al., 2007). This has not so far been much investigated because of the novelty of social media concepts and approaches. Furthermore, the opportunities of social media in the contexts of innovation and customer interaction are only little understood, and importantly, according to our exhaustive literature review, while the business-to-consumer sector standpoint is much better researched and understood, the business-to-business sector standpoint has been very little studied in the above contexts.

Concerning the use of social media in customer interaction, there are studies that consider individual social media-related approaches, such as wikis, blogs, virtual worlds (e.g., Kohler et al., 2009) or customer communities, in customer interaction and the creation of understanding about customer needs. A clear majority of these are case studies. There are also studies considering the marketing aspect and marketing opportunities of social media in customer interaction, but the majority were found to concentrate decidedly on the one-sided company-to-customer aspect of marketing, instead of more interaction-related approaches. However, no studies were found on the opportunities of social media at large in customer interaction, and especially not from the innovation perspective. More specifically, no academically reported empirical survey

studies were found in this area. Furthermore, according to several studies, it has been a rather common assumption in B2B-companies that social media is something belonging almost solely to business-to-consumer sector, and that it has little to offer for B2B-companies (Isokangas and Kankkunen, 2011; Lehtimäki et al., 2009; Eskelinen, 2009). There is especially a lack of research on how social media is used by B2B companies (Michaelidou et al., 2011).

Previous research has established the importance of understanding customers' needs in innovation, and while various social media approaches have been identified useful in innovation, research on how B2B organisations use social media in innovation remains limited. This study addresses the gap by focusing on social media opportunities in B2B companies' innovation.

Due to the significant novelty of social media research in B2B customer interface, and the very fragmented and non-organised picture of the current use and opportunities of social media in this area, the purpose of this study is to develop insight and deeper understanding of the application opportunities and the role of social media in understanding B2B customers' needs. Because of the current lack of the larger picture of the role and opportunities of social media in B2B sector, this study is partly exploratory and partly descriptive, aiming to screen and organise the knowledge and understanding of this currently little known territory. The aim of this research is to explore and map the current various ways of using social media, as well as the perceived opportunities of social media in facilitating customer interaction in the innovation process. First, we want to understand how B2B companies have currently applied social media approaches in customer interaction in the innovation process. Second, we want to understand how large opportunities social media is perceived to provide in involving customers in innovation, and in facilitating different forms of customer interaction. We aim to answer the above research questions by using both current literature on social media and an empirical survey. Literature is utilised in two ways: first, to gain an understanding of the state-of-the-art of current social media in B2B innovation and customer interaction contexts, to verify the research gap and to design the empirical survey. The survey was conducted in Finnish companies with more than 50 employees to study perceived social media opportunities and use in the above mentioned context. Second, it was used as a way to collect and organise data by screening existing various types of cases, examples and approaches of social media use in B2B innovation and customer interaction contexts.

In this study, we summarise and analyse, in an organised way not provided in earlier literature, various types of applications and opportunities the social media approaches currently provide for business-to-business customer interaction and for understanding customer needs in the different phases of the innovation process. In addition to giving examples of social media tools in different forms of customer interaction, the related novel opportunities offered by social media are analysed and discussed in more detail.

2 Social media in business-to-business innovation

2.1 Definition of social media

To define the central concept of this study, social media, we start by clarifying a related concept, Web 2.0, which is often used synonymously, despite conceptual differences. Web 2.0 refers to technologies that enable users to communicate, create content and share

it with each other via communities, social networks and virtual worlds, making collaboration easier than before. These technologies also make it easier to have real life experiences in virtual worlds and to organise content on the internet with content aggregators (Lehtimäki et al., 2009). Such tools and technologies emphasise the power of users to select, filter, publish and edit information (Tredinnick 2006), as well as to participate in the creation of content in social media. According to Constantinides and Fountain (2008), "Web 2.0 is a collection of open-source, interactive and user-controlled online applications expanding the experiences, knowledge and market power of the users as participants in business and social processes. Web 2.0 applications support the creation of informal users' networks facilitating the flow of ideas and knowledge by allowing the efficient generation, dissemination, sharing and editing/refining of informational content."

Social media can be defined as "a group of internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user generated content" (Kaplan and Haenlein, 2010). Further to this, social media are often referred to as applications that are either fully based on user-created content, or in which user-created content or user activity play a significant role in increasing the value of the application or the service. Lietsala and Sirkkunen (2008) suggest using social media as an umbrella term under which various and very different types of cultural practices take place related to the online content and people who are involved with that content. They continue by defining social media being built on the combination of Web 2.0 technologies, content and communities, this definition emphasising the social aspects, instead of Web 2.0 technologies that may or may not be used in an interactive and social manner.

A large number of generic types of social media-related applications can be identified (e.g., Warr, 2008; Cooke and Buckley, 2008; Dewing, 2010), such as wikis (e.g., Wikipedia), blogs (e.g., company newsrooms), microblogs (e.g., Twitter, Yammer), social networking sites (e.g., LinkedIn, Facebook), social content communities (e.g., YouTube, Flickr, Digg), intermediaries (e.g., InnoCentive), mash-ups, prediction markets, and virtual social worlds (e.g., Second Life). Some of the practices are already relatively well established in private and business use, such as participating in wikis, blogging, and social networking, and some are still developing, such as microblogging, or using add-ons to build new types of hybrid sites, etc.

Academically, however, little is currently known specifically about the opportunities of social media in the B2B context, which, for several reasons explained below, is a very different environment, especially concerning the objective of understanding business-to-business customers, users and their needs, comparing it to the already relatively well understood business-to-consumer standpoint.

2.2 Requirements and challenges for social media use in the business-to-business sector

Markets, products and product development differ significantly between the business-to-business and consumer product sectors (e.g., Kotler, 1996; Von Hippel, 1988; Webster, 1995; Holt et al., 1984; Urban and Hauser, 1993; Hanna et al., 1995). For instance, generally speaking, products produced by business-to-business organisations are more complex, the development of new products takes significantly more time, and the

customers are large organisations instead of individuals, which is the case in the consumer (business-to-consumer) product sector. In industrial business-to-business markets, there are normally fewer customers than in consumer markets, and the cooperation with customers is generally more direct and more intense than in the consumer sector. Industrial products are usually purchased by professional purchasing people who consider a large number of different criteria when making the buying decisions. They tend to acquire ample information about the industrial products to be purchased, and they normally evaluate the different alternatives objectively. The demand for industrial products is derived from the demand for the company's industrial customers' products and finally the end-user demand (Kotler, 1996; Webster, 1995). In industrial products, there is more emphasis on physical performance and personal selling than in consumer products, where psychological attributes and advertising are critical for success (Urban and Hauser, 1993).

Concerning the topic of this study, it is significant that in general, customer information and knowledge are more complex in business-to-business markets than in consumer markets, for instance, because it comes from many levels and from numerous sources inside and outside of a company (Rollins et al., 2011). It is also highly relevant that according to recent research, information utilisation differs significantly between the two aforementioned markets: marketing research suggests that customer and market information utilisation in business-to-business markets is inherently different from that in consumer markets (e.g., Srinivasan and Lilien, 1999; Latusek, 2010; cf. Rollins et al., 2011).

Compared to the generally reported use of social media, or their use in the B2C sector there are certain restrictions that may affect or restrict the usability and usefulness of social media in the specific B2B context. As a consequence, this, too, may lead to different usage patterns and different applicability of social media in the B2B sector than in other environments. First, since the number of customers is generally much smaller in the B2B sector, the use of crowdsourcing (outsourcing certain tasks normally performed by a company's employees to an undefined – and generally large – network of people in the form of an open call, either carried out by individuals or collaboratively (Howe, 2011), which is quite commonly used in B2C operations, is limited. Second, in the context of innovations and the B2B sector, legal contracts and IPR issues can become challenges in the free disclosure of product or business ideas in inter-organisational innovation collaboration (e.g., Nordlund et al., 2011), and may thus seriously limit the usability of social media between B2B companies and their customers. Third, various issues concerning information security have been raised already in individuals' use of social media, but due to the nature of business-to-business communication, the business-to-business context includes severe information security risks potentially limiting the use of social media in ways that are not necessarily similarly problematic in B2C social media applications: for instance, while most employees may be aware that it is not a good idea to respond unthinkingly to e-mails, such forethought is not necessarily applied to social media sites. This means that staff may unintentionally disclose sensitive corporate information without thinking (for instance, concerning future product launches or violating customer confidentiality agreements), or disclose information that can be combined with data gleaned from elsewhere to build up a useful corporate picture, not realising that it is stored online indefinitely and is searchable (Everett, 2010; Langheinrich and Karjoth, 2010).

Taking the above differences into consideration, it is fair to assume that the various types of innovation-related managerial approaches, e.g., collaborative approaches and customer needs assessment activities, such as those carried out by means of social media, should also take these differences carefully into account when planning and implementing approaches for the business-to-business sector companies.

2.3 Customers' role in innovation process phases

A number of authors have found it useful to divide the innovation process into three parts, especially regarding the viewpoint of innovation process-related customer interaction. According to Nambisan (2002), the phases are as follows: ideation, design and development, and product testing and support phase (see also Fuller and Matzler, 2007; Desouza et al., 2008).

In the strategic management literature and quality management literature, five roles have been identified for customers in value creation: resource, co-producer, buyer, user and product (Finch, 1999; Gersuny and Rosengren, 1973; Kaulio, 1998; Lengnick-Hall, 1996). Of these roles three (resource, co-producer, user) are most relevant for the innovation process and its main phases (Nambisan, 2002). Because our aim is to understand the role of customers and B2B customer interactions in the creation of customer understanding, the division of the innovation process accordingly seems relevant, making it possible to analyse the roles and opportunities of social media in a useful and sufficiently detailed way. In the first phase, customers can be regarded mainly as a resource, i.e., for ideas, in the second phase customers can be regarded as co-creators (or co-producers), and in the final phase customers can be regarded as (end)users (Nambisan, 2002; Chan and Lee, 2004; Fuller and Matzler, 2007; Bartl et al., 2010).

2.4 Customer interaction forms in B2B innovation

In both the B2C and B2B sectors, the role of customers and/or users as a source of innovation has grown rapidly (e.g., Von Hippel, 2005; Von Hippel and Katz, 2002; Piller and Walcher, 2006). Moreover, customer involvement in the co-creation of value has gained strongly in importance (e.g., Bartl et al., 2010; Sawhney et al., 2005). Novel modes of interaction have also emerged with internet-based collaboration and social media (Sawhney et al., 2005; Piller and Walcher, 2006). Business-to-business companies have been slowly adopting such new ways, for instance, in marketing-related activities (e.g., Gillin and Schwartzman, 2011) but in many potential areas of application the new interaction and related knowledge creation possibilities are not yet widely well known and well understood.

Even though customer involvement and interaction are important in both B2C and B2B sectors, there are many factors which make the interaction and emphases different in several ways. Excessive generalisation should also be avoided, because the interaction is obviously dependent, for instance, on the industries in question. However, certain key emphases affecting the interaction can be found (Gillin and Schwartzman, 2011; Bernoff and Li, 2008; Kho, 2008; Salz, 2009):

- fewer customers and closer customer relationships in B2B
- interconnected buyers in B2B

- longer-term customer relationships in B2B
- gatekeeper persons between customers and B2B.

The above topics mean, first of all, that since the above issues have to be taken into consideration, customer interactions often take very different shapes in B2B than in B2C. Second, these topics create both opportunities and challenges for B2B customer interaction. Third, social media has been already seen to offer totally new opportunities in avoiding some of these challenges (e.g., overcoming gatekeeper persons in B2B) and strengthening the existing and creating even quite novel interaction forms concerning the opportunities (e.g., Gillin and Schwartzman, 2011; Bernoff and Li, 2008).

In addition to the above topics, the customer interaction forms in B2B are heavily dependent on the phases of the innovation process (e.g., Hemetsberger and Godula, 2007; Desouza et al., 2008). Customer roles vary in different innovation phases, and so also in the related forms of interaction. The main roles of customers are as a resource, as co-creators and users (Nambisan, 2002; Fuller and Matzler, 2007). Concerning the new opportunities of social media in facilitating the interaction in the above roles, the customer's role as co-creator is likely a particularly interesting issue with novel yet not fully researched possibilities. Concerning the creation of customer knowledge as the result of the supported interaction, according to Nambisan (2002) and Sawhney and Prandelli (2000) new (internet-based) technologies enable "a shift from a perspective of merely exploiting customer knowledge by the firm to a perspective of knowledge co-creation with the customers". Due to the above, it can be argued that the related forms of customer interaction – as well as the roles of social media enabling these interactions – should be taken into consideration and studied specifically in the context of at least the different major phases of the innovation process (see e.g., Sawhney et al., 2005).

It is possible to categorise the major customer interaction forms in various ways. We have listed firstly the most common major interaction forms used in social media – supported customer communication and interaction. Secondly, we have added an option for 'no direct interaction', because first, B2B customer information and knowledge can be shared and created internally, e.g., by wiki-based tools and communities, and second, various analysis tools can be utilised for creating customer information and knowledge from social media supported communities even without direct interaction with customers. These include, for example, data mining and social network analyses. Thirdly, we have also taken into consideration the more novel, e.g., community-related interaction opportunities afforded by social media and other forms of internet-based novel applications. One interesting novel interaction form added is user toolkits for innovation, such as configurators and design tools (Von Hippel, 2001; Von Hippel and Katz, 2002; Piller and Walcher, 2006). We have included this type of interaction because user toolkits have been used in the context of communities, as well as social media, and they allow customers to design or co-design mass-customised, tailored or even totally new concepts themselves, as well as enabling manufacturers to actually abandon attempts to understand user needs in detail in favour of transferring needs-related aspects of product and service development to users (Von Hippel, 2001; Piller and Walcher, 2006), we have ended up by categorising the interaction forms as follows:

- *no direct interaction* (see above)
- *one-way interaction* (we define this as *mainly* one-way interaction, even though occasional feedback may be received)
  - a one-way; company to customers (passing on product or service marketing-related information to customers)
  - b one-way; customers to company (collecting customer information to support product development)
- *two-way interaction* (interaction is essentially company's and customers' reciprocal interaction with little or no interaction between customers)
- *community-interaction* (we define this as a company using or participating in reciprocal interaction in various types of customer communities, where important feature is interaction between customers)
- *user toolkit – supported interaction* (user toolkits are an essential part of co-creation and allow new ways for customers as well as the company or companies to interact with each other).

3 Research approach

First, a systematic literature review was conducted:

a to increase our understanding on the current state-of-the-art of B2B social media research especially in the customer interface of innovation process (outlined in Sections 1 and 2)

b to increase understanding on the various ways, examples and cases by which B2B companies have currently applied social media in customer interaction in the innovation process.

Second, a survey was conducted to increase the understanding on the perceived opportunities and the current use of social media in facilitating customer interaction in the innovation process.

3.1 Literature review

The following search term combinations: business-to-business and social media/Web 2.0, B2B and social media/Web 2.0, customer interaction and social media/Web 2.0, customer understanding and social media/Web 2.0, customer knowledge and social media/Web 2.0, co-creation and social media/Web 2.0, and customer knowledge management were used to search articles from Scirus, ABI, Emerald, ScienceDirect and EBSCO databases. A total of 928 of articles were found. In addition, we made searches concerning individual social media tools, such as wikis, blogs, Twitter, LinkedIn, etc. in the specific context of B2B and the customer interface, using various combinations of search terms and the above research databases. We searched and discovered some additional references by searching forward and backward referencing of the most relevant discovered articles. Authoritative blogs and books were used as additional sources to supplement the

literature review to include more business-to-business examples that were relatively rare in the existing academic literature.

3.2 Survey

At the beginning of the questionnaire, the respondents were given a brief definition of social media: "By social media we mean applications which are based either fully on user-created content, or user-created content and user activities have a significant role in increasing the value of the application or service. Social media is built on Web 2.0 technologies, content and communities."

We clarified the emphasis of business, the alternatives being business-to-consumer, business-to-business, and other markets, by asking which alternative would best describe the respondent companies' main focus.

Social media generic opportunities were evaluated by asking the respondents to rate how much opportunity does social media provide in increasing customer orientation, in involving customers in innovation and service development on a five-point scale ranging from very little to very much. Social media use was evaluated by asking the respondents how much social media was used in collaboration with customers. Furthermore, we studied the perceived opportunities of social media in customer interaction by asking the respondents to evaluate the opportunities of social media in different types of customer interaction modes on a five-point scale ranging from very little to very much.

3.2.1 Sample

The sample consisted of 1984 Finnish decision-makers in companies with more than 50 employees. The contact information was selected on individuals working in companies employing more than 50 employees in either research and development or product design capacities. The respondents were selected on the basis of their position in relation to product development and innovation. Invitations to participate in the survey including a covering letter explaining the focus of the survey were sent to the addresses obtained with two weeks time to complete the survey. After two weeks, an e-mail reminder was sent offering one week more to complete the survey. To improve the response rate telephone calls were made to contacts whose titles included product and manager, developer or designer in title, a total of 262 individuals were contacted of whom 132 (50%) were reached in two weeks.

A total of 122 responses to the internet-based survey were received. The effective response rate was thus 6% (122/1984). Of the responding firms, 78% were concerned with manufacturing, 8% construction, information and communication and wholesale and retail trade both 2%, 1% with mining and quarrying, professional, scientific and technical activities, and human health and social work activities, 7% were industries classified as 'other'. The majority (76%) of the respondents were oriented towards business-to-business markets and a minority (26%) towards business to consumer markets. The responses concerning the respondent's positions within the firm were product development (67%), management (16%), IT (5%), HR and sales (2%), marketing (1%), 8% were in positions classified as 'other'.

To ensure the representativeness of the sample, the authors acquired general statistics on Finnish companies with more than 50 employees. These statistics were obtained through Statistics Finland (http://www.stat.fi). The authors compared the number of

personnel and annual revenue between the sample and the figures provided by Statistics Finland. The annual revenue and number of personnel from the sample seemed to accurately represent the general figures from the Finnish companies. Pearson's Chi-square testing was performed on the data, which rejected the null hypothesis of independence on both occasions at $\alpha < 0.001$, giving further evidence that the results from the sample could be generalised to Finnish companies.

4 Results

4.1 Literature review results

We present the condensed main results of the literature study in Table 1. The table describes the different examples identified of the current use of social media in the customer interface of B2B companies. We categorised the examples according to the different forms of customer interaction already introduced, as well as the phase of the innovation process. In all cases, the categorisation, however, was not entirely straight-forward, because the cases or examples identified did not report the usage patterns and tasks in full detail. On the basis of the table, we were able to find examples of use in almost all the table subcategories. Some categories, however, proved to be more challenging: despite various user toolkits and community user toolkits (see e.g., Ahonen et al., 2007) being used in B2C companies with and without the direct support of social media, we were able to find little evidence of their use in B2B community/social media-related contexts. One potentially interesting B2C example was commercial third-party-enabled MyDeco community for house decoration, which integrated the use of configurator and design toolkits, various companies and consumers collaborating and participating in the community, as well as social media support for community stakeholder interaction.

Considering solely the number of different social media use examples, application areas with a relatively wide array of different examples, especially the after-launch phases had significantly more case examples than the other phases. About half of the case examples were reported in academic journals.

4.2 Survey results

According to the results on the Finnish B2B sector presented in Figure 1, there was a wide gap between the perceived generic opportunities afforded by social media use with customers and the use of social media in collaboration with customers: of the B2B companies studied, almost half (48.9%) perceived important opportunities (rather much or very much) for social media to increase customer orientation, 16.6% stated that social media could offer important opportunities (rather much or very much) in involving customers in innovation, and slightly more (21.1%) reported that social media can offer important opportunities (rather much or very much) in involving customers in service development. However, only 5.6% actually reported making significant use of social media in collaboration with their customers (rather much or very much).

Table 1 Examples of social media use in B2B companies' customer interaction in innovation process

		Ideation (idea generation) phase	*Concept and development phase*	*Product testing and support phase*
1	No direct interaction	Detecting weak signals from Second Life data and from observing changes in search behaviour (Cachia et al., 2007), Social bookmarking tools in discovering weak signals of future needs (Näkki and Antikainen, 2008)	Using Twitter in marketing research – to read what customers have to say (Kaplan and Haenlein, 2011)	Using social networking profiles and their links to other groups to scope out customers interests (Gillin and Schwartzman, 2011), use of web analytics to see what keywords users are searching (Barlow and Thomas, 2011)
2	One-way interaction	Sharing and discussing about industry trends with customers (e.g., IBM Partner World Community)	Keeping customers informed of upcoming product features and products (e.g., NI Labs)	Automating sales proposals using mashups (Ogrinz, 2009), using LinkedIn to get past gatekeepers, (Gillin and Schwartzman, 2011), sales promotions in Twitter (Kaplan and Haenlein, 2011)
3	One-way interaction	Customers can vote for conference themes (Barker, 2008), tags and tag clouds can be used in discovering weak signals and trends (Cachia et al., 2007), customers can express their ideas online (Prandelli et al., 2006)	Blogs can provide customer need information for product development (Singh et al., 2008)	Using mashups to push customer enhancement requests from customer service to product managers (Ogrinz, 2009), using blogs to get feedback and to understand customers' perceptions of new product features (Singh et al., 2008)
4	Two-way interaction	Using professional customers as 'credible private focus groups' in LinkedIn (Gillin and Schwartzman, 2011)	Design of items in virtual collaborative spaces (Ondrejka, 2005), using virtual prototypes to choose best of several new concepts (Dahan and Srinivasan, 2000)	Answering product questions and troubleshooting technology challenges and in Twitter (Barlow and Thomas, 2011), listening to customers and fixing customer problems (Kaplan and Haenlein, 2011)
5	Community-interaction	Using wikis to share ideas (inside and outside of organisation) , also enabling asynchronous distributed brainstorming (Standing and Kiniti, 2011), idea competitions to screen for ideas and solutions from communities (Haller et al., 2011)	Online test laboratory for discussing about feedback from prototypes, blog based tool where users may suggest needs and development ideas for new products and services, also the rating and commenting of ideas by other users (Näkki and Antikainen, 2008)	Enabling public customer complaints (Warr, 2008), YouTube channel where customers can upload videos explaining how solutions have helped their business, providing links to product tweets on website, thus allowing prospects to see what other customers are saying (Pergolino, 2010)
6	User toolkit – supported interaction	Users can apply toolkits to design products and services to fit their own needs (Von Hippel and Katz, 2002), e.g., MyDeco provides home design configurators that bridge consumers, designers and home decoration companies, enabling them, e.g., to discover market trends and weak signals (mydeco.com)	User toolkits for innovation, e.g., software design tools for customers to perform design (Von Hippel, 2001), user design through web interfaces that enable customers to select interactively the features they prefer in their ideal product (Dahan and Hauser, 2002)	MyDeco uses configurator and design tools, combined with social media and communities that are used by consumers in household room design and decoration. This provides customer understanding for architects, designers and manufacturers. (mydeco.com)

Figure 1 Social media use with customers vs. perceived generic opportunities (see online version for colours)

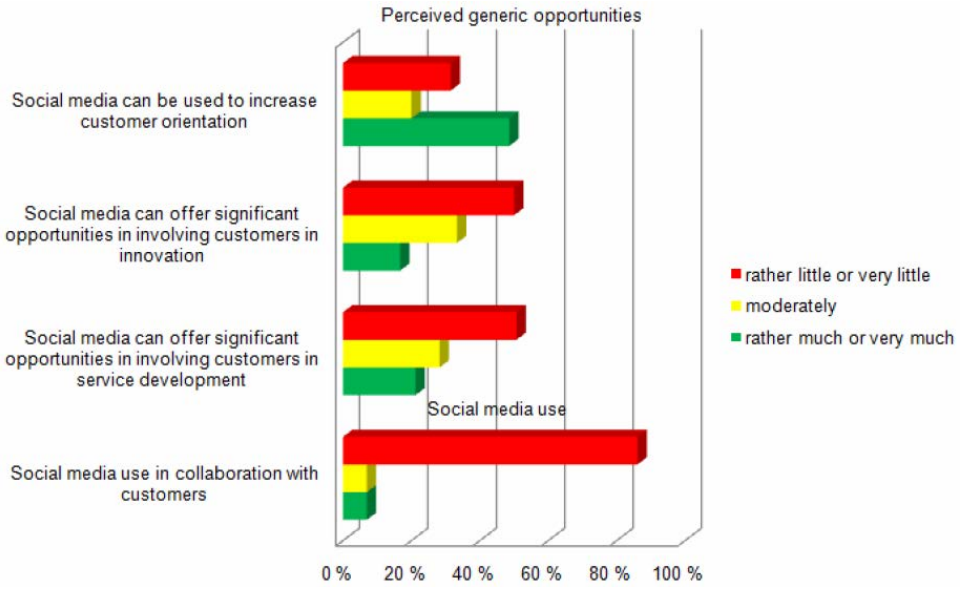
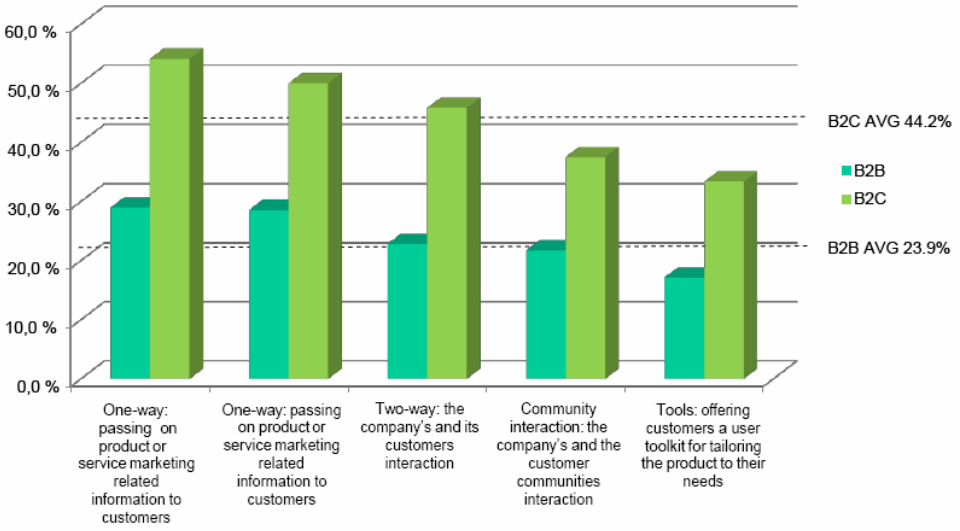


Figure 2 Perceived opportunities of social media in different types of customer interaction in innovation in B2C and B2B sectors (see online version for colours)



According to results seen in Figure 2, the B2B companies studied perceived significant opportunities most frequently (rather much or very much) in the one-way forms of customer interaction: passing on product or service marketing-related information to customers, and collecting customer information (almost a third of respondents). Concerning the other more interactive forms of customer interaction, the frequency of the companies studied perceiving (rather much or very much) opportunities in social media

decreased somewhat in every further interaction mode that required more intense customer involvement in product or service development. The pattern was similar in this respect for B2C companies, although B2C companies recognised more opportunities in every mode of customer interaction: in addition, to gain an overall picture of the B2B vs. B2C companies, we calculated the average of rather much and very much responses in all interaction categories from B2B and B2C companies (shown in the Figure 2). This shows that, on the average, B2C companies perceived considerably more opportunities in all the customer interaction forms studied.

5 Conclusions

According to our literature review, academic B2B-oriented research in general is very rare. Even if the use and applications of social media in B2C and B2B companies do have some commonalities, and excessive generalisations should be avoided because of the heterogeneity of the B2B sector, we have demonstrated in our study that concerning the above, the B2B environment does indeed differ significantly from the B2C environment in several ways, especially regarding the contexts of innovation management, customer interaction and creation of customer knowledge and understanding. In addition to the managerial viewpoint, this difference should be considered in future research: more especially B2B-oriented empirical and theoretical research should be carried out to gain more insight into the more extensive usability of social media in various B2B industries and contexts. The above context-dependability was not the focus of this study, but needs to be further studied due to the heterogeneity of the B2B sector.

The results of our literature review presented in Table 1 summarised and organised the larger picture of what kind of applications and opportunities the social media approaches currently provide for business-to-business customer interaction and understanding customer needs in the different phases of the innovation process. The review of the Table 1 shows, first of all, that despite the often expressed doubts about the applicability of social media in B2B operations (see Introduction), social media has been already utilised in a wide variety of ways and purposes in the B2B sector, even if the general adoption rate is still quite low as regards the topics of this study. In light of the results, social media truly seem to offer very novel and innovative ways to intensify B2B-related customer interaction, for the sharing of customer-related information, as well as for the resulting new customer information and knowledge. Many uses of social media in the B2B sector are different and unique compared to the traditional approaches in B2C operations (e.g., dedicated LinkedIn groups). We also found an interesting example of a commercial third-party-enabled MyDeco community for house decoration, integrating the use of configurator and design toolkits with community and social media. MyDeco is interesting in the sense that it can be viewed both from consumer community perspective and B2B community perspective, and it usefully integrates both angles. We found no earlier B2B-related communities reported in academic literature that integrate social media-supported communities with customer configurator and design toolkit characteristics in the manner of well-known B2C examples of Lego and Threadless.com communities. Lego and Threadless.com approaches cannot be easily adapted in the B2B sector. Contrary to this, MyDeco offers an example which could also be used as a useful

model for B2B community building purposes and for new ways of B2B customer interaction.

Interestingly, concerning the experienced opportunities of social media in different types of customer interaction forms in the B2B respondents of our survey, the experienced highest opportunities (much or very much potential) were found in one-way customer interaction (both company to customer and customer to company). Fewer opportunities were seen in the more social and collaborative types of interaction forms, which are considered characteristically to be the core of social media. This may indicate for instance that:

a in the B2B environment, the less interactive solutions really do offer more opportunities for B2B companies in general than the more social and interactive ones

b it is more difficult for companies to appreciate the real opportunities of social media in the more novel and the more interactive collaboration forms.

This is an avenue we will explore in greater detail in future research.

In our earlier study, we found that the major reasons for B2B companies not to use social media in innovation, despite the perceived extensive opportunities, were:

a failure to comprehend the opportunities of social media in innovation

b the difficulties of assessing the financial gains from social media

c the difficulties in adopting new mental models and practices needed for adoption

d the lack of evidence from similar cases using social media in innovation.

Managerially, our results especially concerning the various types of B2B-related social media approaches can be used to help to overcome most of the above barriers, especially (a), (d) and into some extent, also (c). The results help to gain a better understanding of how social media can be used in innovation-related B2B customer interaction and how social media can facilitate and provide novel ways for the acquisition of customer needs-related information and knowledge. The results can be used to enhance managers' mental models of the usefulness and applicability of social media in B2B innovation and the creation of customer understanding, instead of maintaining in seeing social media narrowly as Facebook and Twitter, as is often the case in practice. In light of the above, the examples described can also help companies to more easily experiment with and adopt social media.

Furthermore, given the low current B2B adoption of social media seen in the results of this study and of our earlier survey, and the wide variety of useful opportunities, the companies that first experiment with and develop social media-based ways to support B2B customer interaction might benefit greatly from these investments. In addition, consultants might benefit from these results by taking advantage of the B2B companies' examples of social media approaches described.

Even though B2B companies could also use and benefit from consumer or end-user related communities in increasing their understanding of their customers and their needs, we did not study this option in this paper, but focused on the companies' and their business customers' interaction and the related customer understanding. This issue could be studied in further research.

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Publication 3

Social media utilization in business-to-business relationships of technology industry firms

By

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Social media utilization in business-to-business relationships of technology industry firms

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ABSTRACT

Even today, it is a fairly common argument in business-to-business companies, especially in traditional industrial companies, that social media is only useful in the business-to-consumer sector. The perceived challenges, opportunities and social media use cases in business-to-business sector have received little attention in the literature. Therefore, this paper focuses on bridging this gap with a survey of social media use cases, opportunities and challenges in industrial business-to-business companies. The study also examines the essential differences between business-to-consumer and business-to-business in these respects. The paper starts by defining social media and Web 2.0, and then characterizes social media in business, and social media in business-to-business. Finally, we present and analyze the results of our empirical survey of 125 business-to-business companies in the Finnish technology industry sector. This paper suggests that there is a significant gap between the perceived potential of social media and social media use with customers and partners in business-to-business companies, and identifies potentially effective ways to reduce the gap.

1. Introduction

Social media utilization in enterprises is a current and popular research topic. Despite the popularity of the topic, social media research is limited, and focuses largely on the consumer in a business-to-consumer (B2C) domain (Michaelidou, Siamagka, & Christodoulides, 2011). Even though anecdotal evidence about the importance of social media for B2B companies exist (e.g., Shih, 2009; Safko, 2010; Wollan & Smith, 2010; Barlow & Thomas, 2011; Hinchcliffe & Kim, 2012), the interest in and adoption of social media by B2B organizations has been slow compared to B2C organizations (Michaelidou et al., 2011). Both the theoretical and empirical research is quite fragmented and the empirical research is mainly based on individual, often not too systematically andanalytically reported cases. Furthermore, the use of social media in companies that operate wholly in business-to-business sector and develop products for other companies is not well understood. The aim of this research is to illustrate both the current state and potential of social media use and challenges as perceived by Finnish industrial companies that operate wholly in business-to-business markets.

Despite the relative novelty of social media in business and lack of academic research, social media has already been demonstrated to open many new opportunities for the B2B sector due to its features that can enhance communication, interaction, learning and collaboration (see e.g., Jahn & Nielsen, 2011; García-Peñalvo, Colomo-Palacios, & Lytras, 2012), which can bring significant benefits to organizations. For instance, according to a study by McKinsey consultants (Bughin, Manyika, & Miller, 2009) "69 percent of respondents report that their companies have gained measurable business benefits, including more innovative products and services, more effective marketing, better access to knowledge, lower cost of doing business, and higher revenues." According to a recent McKinsey study (McKinsey,2013) the social media benefits from customer use include for example average improvement of 20% in increasing number of successful innovations, 20% in reducing time to market, and 15% increase in revenue, and average improvement in partner use include e.g., 30% in increasing speed to access external knowledge and experts, 20% in increasing number of successful innovations, reducing time to market, reducing product development costs and in increasing revenue.

Further, social media can be utilized to identify new business opportunities and new product ideas, to deepen relationships with customers and to enhance collaboration not only inside but also between companies and other parties (Barker, 2008; Lehtimäki, Salo, Hiltula, & Lankinen, 2009; Hoffman & Fodor, 2010; Gillin & Schwartzman, 2011).

On the basis of available literature, it can be presumed that the challenges and useful approaches of social media in B2B sector are

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at least somewhat different from those of business-to-consumer (B2C) companies (Lehtimäki et al., 2009; Gillin & Schwartzman, 2011; Geehan, 2011). Even though social media challenges and approaches may be rather similar in internal use between B2B and B2C companies, especially the external use with customers and partners has supposedly important differences due to many special characteristics of B2B markets and products, and should be studied separately. It has been a relatively common assumption (e.g., Eskelinen, 2009; Lehtimäki et al., 2009) that it is much more difficult to utilize social media in business-to-business relationships for instance because of the many significant differences in thebusiness-to-business products, markets and product development. Concerning the above reasoning, thus, we find a clear need for empirical research of social media in the specific context of companies that operate wholly in B2B markets, even if some practices might be transferrable from B2C markets to B2B markets. Although B2B companies have been studied in previous survey studies (Helfenstein & Penttilä, 2008; Bughin et al., 2009; Coleman, 2009; Kärkkäinen, Jussila, & Väisänen, 2013; McKinsey, 2013) of social media in enterprises, the previous studies do not either specify or address business-to-business relationships in companies that operate wholly in B2B markets.

2. Definitions of Web 2.0 and social media

Although the concepts Web 2.0 and social media are often used synonymously, it is useful to differentiate them from each other (Kaplan & Haenlein, 2010). Web 2.0 can be defined as technologies that enable users to communicate, create content and share it with each other via communities, social networks and virtual worlds more easily than before. Such tools and technologies emphasize the power of users to select, filter, publish and edit information (Tredinnick, 2006) as well as to participate in the creation of content in social media. Social media can be defined as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content" (Kaplan & Haenlein, 2010). Taking this one step further, social media are often referred to as applications that are either fully based on user-created content, or in which user-created content or user activity have a significant role in increasing the value of the application or the service (Kangas, Toivonen, & Bäck, 2007).

Social media are certainly not a unified and well-defined set of approaches, and thus, this should be taken into consideration when studying the use and potential of social media in selected contexts, such as in our study. From a technology perspective, the platforms vary and, correspondingly, so do the rules of utilization and functionality (e.g., Twitter tweets/posts can be no more than 140 characters). In turn, there is variation in how people use these platforms and/or associated applications (e.g., bloggers tend to post at most once per day, and their posts tend to be up to one page in length). A large number of generic different types of social media related applications can be identified (Cooke & Buckley, 2008; Warr, 2008) such as wikis (e.g., Wikipedia), blogs (e.g., company newsrooms), microblogs (e.g., Twitter, and Yammer), social networking sites (e.g., LinkedIn, and Facebook), social content communities (e.g., YouTube, SlideShare, and Flickr), intermediaries (e.g., InnoCentive), and virtual social worlds (e.g., Second Life).

Lietsala and Sirkkunen (2008) suggest using social media as an umbrella term, under which various and very different types of cultural practices take place related to the online content and the people who are involved with that content. Some of the practices are relatively stable, such as participating in wikis, blogging, and social networking, and some are still developing, such as microblogging, or using add-ons to build new types of hybrid sites.

2.1. Social media in business

Social media is a relatively novel concept, and its fast wider adoption and public interest has its roots at least partly in the originally non-commercial public social media applications such as Facebook and blogs. In the white paper study by Coleman (2009), only 15% of the general population said they used social networks (technologies) at work, while others used them merely outside the work. The adoption and attitudes towards social media in the business context seem to be affected by the above phenomena: in practice, managers often seem to associate social media strongly with especially Facebook and Twitter, which are only a very minor part of the social media genre in business.

Even if some individual Web 2.0 tools, such as wikis, have been used to some extent in the business context for almost a decade, the general adoption and understanding of social media in the business context is still quite low. In a Finland-based survey (Helfenstein & Penttilä, 2008) targeted mainly at CEOs, CIOs and strategic management, 25.4% stated that Web 2.0 applications and services were in active use in their organizations, and 16.4% said they would adopt them somewhere in the near future, while the remainder had no plans or no resources to adopt them, or thought it was better to wait before making adoption decisions. Adoption of social media may be very fast in certain business areas, and there are significant differences in adoption depending on the business or function surveyed: contrary to the previous research, e.g., in the white paper by Stelzner(2009), as many as 88% of surveyed marketers were using social media in their marketing, but 72% had been doing so only for a few months or less. These rapid changes emphasize the need for monitoring and studying the social media possibilities and adoption rates in various business contexts.

Very few recent academic studies were found that studied the adoption of social media in organizations in general, or in different business functions. The found recent studies discussed for example social media adoption in customer relationship management (García-Crespo, Colomo-Palacios, Gómez-Berbís, & Ruiz-Mezcua, 2010), and knowledge management (Pirkkalainen & Pawlowski, 2012). The academic survey-type studies that were found reported practically no recent studied adoption rates especially in the industrial business-to-business context.

2.2. Social media in the business-to-business sector

2.2.1. Characteristics of the business-to-business sector

The markets, products and product development exhibit significant differences between the business-to-business and consumer product sectors (Holt, Geschka, & Peterlongo, 1984; Kotler, 1996; Urban & Hauser, 1993; Webster, 1995). For instance, generally speaking, products produced by business-to-business organizations are more complex, the development of new products takes significantly more time, and the customers are large organizations instead of single persons, which is the case in the consumer (business-to-consumer) product sector. In industrial business-to-business markets, there are normally fewer customers compared to consumer markets, and the co-operation with customers is generally more direct and more intense than in the consumer sector. Industrial products are usually purchased by professional purchasing personnel who consider a large number of different criteria when making buying decisions. They tend to acquire plenty of information about the industrial products to be purchased, and they normally evaluate the different alternatives objectively. The demand for industrial products is derived from the demand for the company's industrial customers' products and finally end-user demand (Kotler, 1996; Webster, 1995). In industrial products, there is more emphasis on physical performance and personal sell-

ing than in consumer products, where psychological attributes and advertising are critical for success (Urban & Hauser, 1993).

2.2.2. Challenges for social media use in business-to-business interrelationships

Taking the above differences into consideration, it is fair to presume that the various types of managerial approaches, such as those carried out by means of social media, should also take these differences into account carefully when planning and implementing practices, especially for inter-organizational use and for more specific use in B2B interrelationships. For instance, it can be presumed that the incentives that motivate individual consumers or hobbyists to participate in social media based user communities may, despite some possible similarities, be very different from those of professional (B2B sector) customers: for instance, while the aspects of recognition and sense of community or self-esteem are undoubtedly important also for employees in business-to-business sector firms, it is doubtful whether they are, as such, sufficiently important incentives to become drivers for them to act as a user-innovator for the benefit of other companies, for example. On the other hand, in the context of such innovation, legal contracts and IPR issues can become challenges in the free disclosure of product or business ideas in inter-organizational innovation collaboration (e.g., Nordlund, Lempiala, & Holopainen, 2011) and may thus seriously limit the usability of social media between B2B companies, their customers and partners. Furthermore, various issues concerning information security have already been raised in individuals' use of social media, but due to the nature of business-to-business communication, the B2B context includes severe information security risks, potentially limiting the use of social media in ways that are not necessarily similarly problematic in B2C social media applications.

The above factors lead us to believe that the usefulness and potential of social media should be studied empirically, especially in the context of business-to-business companies, in an attempt to assess the significance of the expected challenges and benefits of social media use with customers and partners from the specific standpoint of B2B companies. Even though most of the available empirical studies are clearly carried out from either the B2C standpoint or quite a generic standpoint, some empirical social media studies have noticed and taken into consideration the specific nature of business-to-business (Carabiner, 2009; Lehtimäki et al., 2009; eMarketer, 2010; BtoB magazine, 2011).

3. Research design

We wished to study how industrial B2B companies perceive the potential, opportunities and challenges in using social media with customers and partners. In addition, our aim was to gain further understanding from the technological and organizational points of view of how B2B organizations currently utilize social media. We utilized research questions, the generic social media related literature, the survey-type of empirical social media studies (e.g., Kärkkäinen et al., 2013), as well as expert interviews in the design of the questionnaire structure and individual questions.

3.1. Questionnaire

First of all, the respondents were given a brief definition of the social media utilizing the available common definitions found in the literature. The definition was a relatively brief one: "Social media in this study refers to the use of social tools in the customer interface, internally and with partners. Social tools are for example wikis, blogs and discussion forums." This definition was complemented at the beginning of the questionnaire by providing the respondent with a list of social tool-based application categories.

In order to obtain the necessary background information about the respondents which might affect their opinions, the respondents were first asked about their age and the function they belong to. To obtain the necessary background information about the companies being studied, the respondents were asked to choose the class they belong to regarding turnover, number of employees and industry type from the classifications defined by the Federation of Finnish Technology Industries. We clarified the emphasis on the market, the alternatives being 0%, 25%, 75%, or 100% business-to-business (company as customer).

In order to orient the respondents to think about social media holistically, as well as to give a better picture of social media, we first asked how active their use of social tools is in the customer interface, internally and with partners in relation to predefined application categories (blogs, microblogs, wikis, discussion forums, social office tools, social networking sites, social bookmarking sites, video sharing services, photo sharing services, presentation sharing services, and social extranet sites). We also asked the respondents to evaluate how much social media was used in different business functions in the customer interface (marketing, communications, product demos, building thought leadership, gaining customer leads, sales support, finding out customer needs, customer participation in product development, employer branding and recruitment), in internal use and with partners (communication and collaboration, management, induction, transfer of tacitknowledge, communications, project communication, improving the efficiency of project work, preserving information, utilizing expert know-how and reducing workload, sharing best practices, and change management and communication).

Social media potential was evaluated in terms of the opportunities it offers for various business functions in the customer interface, internally and with partners.

3.2. Sample

A sample of 2488 Finnish decision-makers were surveyed from the Federation of Finnish Technology Industries. The survey was sent to managing directors of small- and medium-sized businesses and to business development, product development and communication managers in large companies. A total of 151 responses to the Internet-based survey were received, of which 143 came from separate companies. Duplicate answers from the same company were removed on the basis of the completeness of the answers. The effective response rate was thus 6% (143/2488). From the answers of 143 different companies, 125 companies represented wholly (100%) business-to-business markets, which were chosen as the focus of this study. The survey was carried out in May 2011.

Of the responding firms, 56% were from the metal products and machinery sector, 15% electronics and electricity, 9% business planning and consulting, 7% refining of metals and 9% were industries classified as "other", 5% of the respondents did not report the industry (see Table 1 for more details). The responses concerning the respondent's position within the firm were management (66%), IT (18%), R&D (7%), marketing (6%), HR (2%), and 1% were in a position classified as "other".

4. Results – social media use, functions, potential and challenges in business-to-business

4.1. Extensiveness of social media use in different B2B's

Chi-square tests were conducted to uncover any differences among companies in terms of external utilization of social media based on sales turnover and between small and medium and large sized businesses. No differences were found in the external utiliza-

Table 1
B2B firm characteristics.

	N	%
Industry		
Metal products and machinery	70	56
Electronics and electricity	19	15
Business planning and consulting	11	9
Refining of metals	9	7
Other	11	9
Undefined	4	5
Size (sales turnover)		
<€2 m	17	13
€2–10 m	42	34
€11–50 m	44	35
>€50 m	21	17
Size (number of employees)		
Small (*N* < 50)	60	48
Medium (50 < *N* < 250)	48	38
Large (>250)	17	14

tion of social media based on sales turnover ($\chi^2 = 2.62$, $p > .005$) and between small and medium and large sized businesses ($\chi^2 = 1.71$, $p > .005$). The results highlight that the external use of social media does not differ, at least with this sample size, with respect to small/medium vs. large size and sales turnover.

In all of the studied B2B technology industry sectors, social media was used more internally than externally (Table 2). More than 50% of the industries categorized as other, mostly software development companies, used social media internally at least moderately. Social media was used internally almost as often in the electronics and electricity industry. Social media use in the customer interface and with partners was far less common, for example, 17% in machinery and metal products used social media internally, but only 4% used social media with customers and 3% with partners. The ratio of internal vs. external use was similar in other industries, as well.

The most commonly used social tools in the customer interface were, in order of popularity (percentage of at least moderate use), social networking sites (8.8%), discussion forums (4.8%), blogs (3.2%) and microblogs (3.2%) (Fig. 1). Social networking sites were clearly the most commonly used approach, with at least double the commonality compared to the next most popular approach.

The top most commonly used approaches in the partner interface were, similarly to the customer interface, social networking sites and discussion forums, which were used at least moderately by about 5% of the responding firms (Fig. 2). The pattern of use with partners was similar to customer interface, but in general used less in each category.

4.2. Purposes that social media was currently used for in business-to-business relationships

The three most active types of current usage when measured by percentage of respondents using social media at least to some degree in the customer interface were communications, marketing,

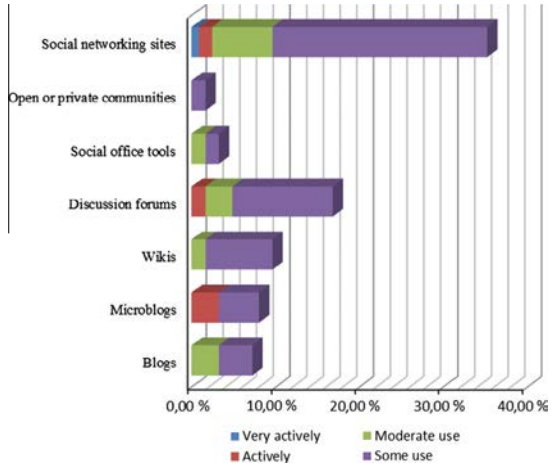

Fig. 1. Use of social tools in the customer interface in technology industry firms.

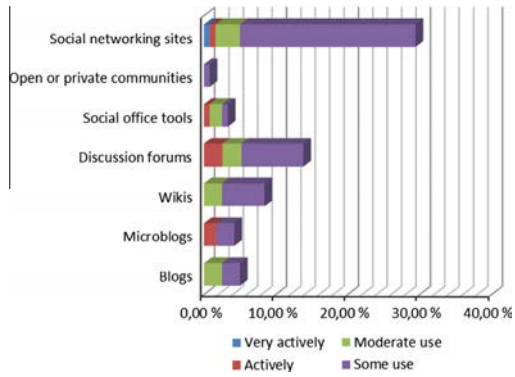

Fig. 2. Use of social tools with partners in technology industry firms.

and employer branding and recruitment with around 40% usage (Fig. 3). Only a very minor part of the B2Bs studied used social media actively or very actively in different business functions with customers. Social media was used actively or very actively in employer branding (4%), communication (3.2%), sales support (3.2%), and customer participation in R&D (3.2%).

The three items in the partner interface most commonly perceived as very important were communication and collaboration, general communication, and project communication, which were considered very important by about 15% of the B2Bs studied (Fig. 4). Partner-oriented use was even less active than in the case of customer interface use, with a maximum of 1.7% of very active users (using social media in partner network management). In

Table 2
Social media internal and external use in technology industry firms (at least moderate use).

Industry	Use internally (%)	Use in customer interface (%)	Use with partners (%)	Number and percentage of all answers
Electronics and electricity	47	21	26	*n* = 19 (15%)
Refining of metals	36	11	11	*n* = 9 (7%)
Metal products and machinery	17	4	3	*n* = 70 (56%)
Business planning and consulting	36	0	27	*n* = 11 (9%)
Other (e.g., software development)	54	11	11	*n* = 11 (9%)
Undefined	20	0	0	*n* = 5 (4%)

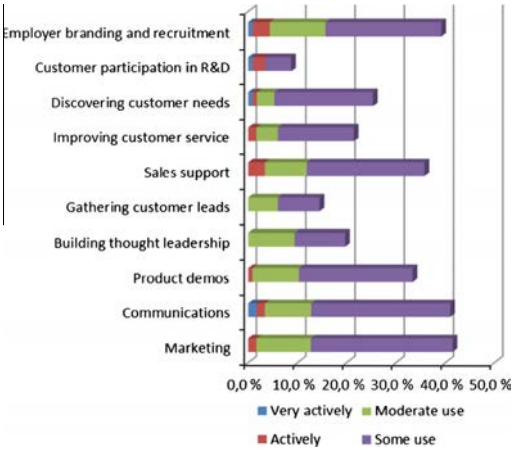

Fig. 3. Social media functions in the customer interface of technology industry firms.

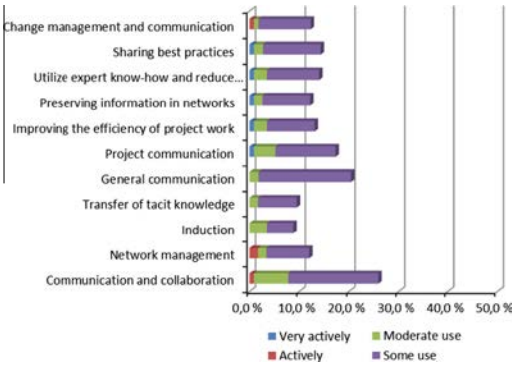

Fig. 4. Social media functions with partners.

the customer interface, seven out of ten studied use items had at least some usage by more than 20%, while in partner-oriented use, only two out of eleven studied items (communication and collaboration, and general communication) had at least some usage by more than 20%.

4.3. Experienced potential of social media use in business-to-business interrelationships

We analyzed the use and perceived social media potential in the customer interface by performing a non-parametric Kendal rank correlation coefficient test using variable pairs of use and perceived potential to determine whether social media use in the customer interface correlates with the perceived potential in the customer interface (Table 3). The test produced statistically significant correlations (Sig. 0.000).

Strong positive correlation (0.519) was found between social media use and perceived potential in marketing. Moderate correlation (0.309–0.480) was found between all the other variables that were used to evaluate social media use and perceived potential in various business functions in the customer interface. It is debatable whether the use of social media in the customer interface has a positive influence on the perceived potential or the other way round, nor we can rule out other variables that can influence both variables. Nevertheless, the results seem to indicate a possible causality between the use and the perceived potential of social media in the customer interface.

We carried out the same correlation analysis with external social media use with partners in different business functions and found slightly smaller correlations in results compared to customer interface. Moderate positive correlation (0.398) was found between partner use and potential in network management, partner use and potential in change management and communication (0.384), partner use and potential in communication and collaboration (0.363), partner use and potential in project communication (0.327) and general communication (0.310). Some weaker correlations (at 0.01 and 0.05 significance levels) were found for instance between partner use and potential in improving efficiency of project work (0.296) as well as between partner use and potential in sharing best practices (0.292). See Table 4 for more results.

While it can be presumed that understanding the true potential of social media- like novel collaboration and communication approaches requires earlier use experience in similar purposes, we analyzed the perceived potential for external uses of social media in external use by only such companies that used social media themselves externally at least moderately. Concerning the perceived potential experienced in studied external social media use options, on the basis of the most experienced companies in social media external use, the B2Bs studied perceived much and very much potential most commonly in employer branding and recruitment, general communication (with partners), communications (with customers), sales support and project communication, with over 40% of the experienced users perceiving much or very much potential. The most perceived potential, perceived by at least a third of the most experienced users is further illustrated in Table 5.

4.4. Barriers against using social media by studied B2Bs

The most common reasons for not using social media were, in order of popularity other projects being more important and the companies not being able to measure or assess the benefits for business. Both were deemed very important by well above half

Table 3
Correlation between social media use and potential in the customer interface.

Variable pairs	Correlation coefficient	Sig. (2-tailed)	*N*
Use in marketing * potential in marketing	0.519	0.000	116
Use in communication * potential in communications	0.480	0.000	116
Use in finding out customer needs * potential in finding out customer needs	0.468	0.000	113
Use in sales support * potential in sales support	0.431	0.000	116
Use in building thought leadership * potential in building thought leadership	0.401	0.401	115
Use in gathering customer leads * potential in gathering customer leads	0.397	0.000	114
Use in improving customer service * potential in improving customer service	0.339	0.000	116
Use in customer participations in R&D * potential in customer participations in R&D	0.309	0.000	115

Table 4
Correlation between social media use and potential with partners.

Variable pairs	Correlation coefficient	Sig. (2-tailed)	*N*
Partner use in network management * partner potential in network management	0.398	0.000	114
Partner use in change management and communication * partner potential in change management and communication	0.384	0.000	110
Partner use in communication and collaboration * partner potential in communication and collaboration	0.363	0.000	114
Partner use in project communication * partner potential in project communication	0.327	0.000	114
Partner use in general communication * partner potential in general communication	0.310	0.000	111
Partner use in improving efficiency of project work * partner potential in improving efficiency of project work	0.296	0.000	112
Partner use in sharing best practices * partner potential in sharing best practices	0.292	0.001	109
Partner use in induction * partner potential in induction	0.276	0.001	111
Partner use in transfer of tacit knowledge * partner potential in transfer of tacit knowledge	0.248	0.001	111
Partner use in utilizing expert know-how and reducing workload * partner potential in utilizing expert know-how and reducing workload	0.249	0.003	109
Partner use in preserving information * partner potential in preserving information	0.178	0.033	113

Table 5
Most important external social media uses as perceived by companies that have used social media externally (at least moderately) (CP = external Customer Potential related uses; PP = external Partner Potential-related uses).

External social media uses	Perceived potential (much or very much) (%)
Employer branding and recruitment (CP)	56.2
General communication (PP)	46.6
Communications (CP)	43.8
Sales support (CP)	43.8
Project communication (PP)	40.0
Finding out customer needs (CP)	37.4
Improving the efficiency of project work (PP)	35.7
Marketing (CP)	33.3

Table 6
The most common barriers against using social media.

Barriers	*N*	%
Other projects are more important or urgent	67	56.8
No ability to evaluate the benefits for business	64	54.7
Lack of relevant case studies	54	45.8
Lack of understanding the possibilities	51	43.3
Lack of resources	49	41.9
Difficulties in adopting new approaches and ways of thinking related to social media	42	35.9
Information security problems	39	33.0
No need – things are done with emails and by meetings	39	33.0

of the respondents. Other reasons with a popularity of more than 40% were a lack of good case studies, lack of understanding of the opportunities, and lack of resources (Table 6).

5. Conclusions

Earlier academic social media-related studies, especially survey-based studies, have not focused particularly on companies that operate wholly in B2B markets or to the external use of social media in B2B relationships. Studying particularly the external use by B2B's is relevant, because it is poorly understood by managers, external use lags clearly behind internal use in B2B's, and because especially the external inter-organizational use of social media by B2B's is, in many ways, very different from external B2C use, which has been covered quite extensively in academic research compared to B2B social media use. Major reasons for such differences between B2B and B2C use were explained earlier in this study. This study contributes to current literature by exploring and improving the understanding of B2B companies' external social media use, perceived potential and barriers against social media use in especially external (customer- and partner-related) use context.

29.6% Of the studied B2B's used social media in overall (internally 28.8%), and externally social media was used by less than half of the overall and internal use, 12.8% (partner/customer use). This is in line with the earlier presumptions about the clearly less active use of social media externally than internally. Concerning the generic social media adoption process of B2B's and other organizations, this is probably due to companies first testing and experimenting with novel technologies and practices internally, and only in the next stages expanding the use to customers or other external parties. This is supported at least partly by the fact that while external users were few compared to internal users, practically all external social media users in studied B2Bs were using social media also internally. One explanation is that, external parties are, quite naturally, less easy to govern or motivate to use novel approaches. Secondly, any failures leading to customer dissatisfaction or the leakage of confidential information to external organizational parties might be fatal in the external B2B sector social media use. The overall use rates are very close to the use rates reported in the only found academic study to survey the use of social media by B2B's, which indicated a 27% usage rate of social networking sites in branding by SME B2B's. In our study, which also addressed for the major part SMEs, social networking sites (SNS) were clearly the most commonly used individual approach, with at least double the commonality compared to the next most popular approach. Considering the adoption literature, LinkedIn-or Facebook-like SNS are a natural choice for beginning social media adoption because of their relative ease of use, ease of trialability, perceived advantages, and compatibility to current user needs and systems, which are major factors in organizational adoption of innovations (e.g., Rogers, 2003), Our study, however, contributes to the above and other earlier studies, because it provides a more broad view to both social media genre than merely SNS, as well as its external use (not only branding and marketing) and use barriers. This enables managers to pinpoint potential uses and use barriers at large in inter-organizational social media use. This is necessary, because currently, only a very minor part of studied B2B's used social media actively, despite the relatively common moderate use, in different external business functions or purposes. Both the current use and the seen potential seemed to be clearly higher in the customer interface than in partner use.

Surprisingly, we found the current external social media use between different company sizes and turnover similar (with statistical significance). This contradicts to earlier studies of technology adoption (e.g., Del Aguila-Obra & Padilla-Melendez, 2006; Premkumar & Roberts, 1999) suggesting that firm size correlates positively with the use of technology. This could refer to the adoption of

social media to differ from other Internet-based technologies' adoption. Possible explanations for this include the relatively limited financial resources needed for the adoption (see e.g., Michaelidou et al., 2011), and the ease of adoption and the cost effectiveness of at least some social media approaches, such as SNS or one-way communication related approaches used e.g., in marketing of smaller companies.

We found a number of external social media uses that were seen as important by at least a third of those companies with at least moderate experience of using social media externally. Two of these, employer branding and recruitment (in customer interface), and general communication (in partner interface) were seen as important applications of social media by as many as around half of the companies.

In addition, we found both strong and moderate statistically significant correlations between current social media use and perceived potential for external use. Correlations were there for both customer and partner use and perceived potential, even if we found slightly smaller correlations in results compared to customer interface. Thus, the less the companies used social media externally, the less potential they perceived with it in various external potential uses, and vice versa. One explanation for this is, rather easy to accept by anyone that has used various social media approaches, is that it is often very difficult to understand the true potential of these types of really novel and complex organizational innovations and technologies, and to really appreciate them, before you have at least some earlier use experience about them (Fulk, Steinfield, Schmitz, & Power, 1987; Rogers, 2003; Lee & Ma, 2011). This can be detected by users of e.g., Facebook-type of social media applications as well as in the use of social office tools such as GoogleDocs, to mention a few. It can be debated whether the use of social media in customer or partner interface influences positively the perceived potential, or the other way round. We cannot either rule out other variables that can influence both variables. Nevertheless, the results raise up a possible causality between use and perceived potential of social media in customer interface. The results also indicate that there is a need for companies to support formal and informal learning (see e.g., García-Peñalvo et al., 2012) related to social media use in especially B2B context and external use of social media with customers and partners. Our study discovered several potential factors at least partly explaining the limited use, which were deemed very often, by about half or-more of the respondents, important reasons for not utilizing social media. The most common reasons for the reluctance against adopting social media practices were, in the order of the commonality of very important challenges were other projects being more important, and the companies not being able to measure or assess the benefits for business. Both were deemed very important by clearly more than half of the respondents. Other reasons with the commonality of more than 40% were lack of good case studies, lack of understanding the possibilities, and lack of resources. The results concerning the most common important barriers are somewhat in line with an earlier generic higher management-oriented social media survey by Helfenstein and Penttilä (2008), which found lack of know-how to be clearly the most important barrier (48.8% of respondents) to the adoption of Enterprise 2.0. For comparison, the four most common barriers in the foundgeneric management or marketing-oriented survey-based studies (BtoB magazine, 2011; Growth Lab Consulting, 2010; Helfenstein & Penttilä, 2008; Ramsey, 2010) were lack of knowledge or understanding, measurement of ROI or performance, and lack of generic resources or time. Thus, lack of understanding the benefits and possibilities, as well as the incapability of measuring the benefits seem common both in our study and the other found studies that did not focus on B2B use of social media. Failed experiments or bad experiences were not deemed very important challenges impeding the adoption of social media, which can be explained, of course, at least partly by the generally rare use and related experiments.

To increase social media use in B2B context, at least the abovementioned most important social media adoption barriers should be addressed in companies, and academic research should be carried out to produce a more systematically organized, more holistic and less fragmented picture of the above issues.

Academically, we have achieved new understanding about the usage, perceived potential and challenges of social media in especially in B2Bs, the external use of which to the best of our knowledge has so far been studied academically with survey approaches very scarcely, and in the found study of Michaelidou et al. (2011), very narrowly from branding and social network sites' perspective, which is only a small part of social media genre.

Managerially, the results can be used, for instance, to better understand the special challenges and features of B2B-related social media, and especially the various types of possibilities of social media to support and facilitate external social media use in B2Bs, which are currently only superficially understood by a significant part of managers. In addition, the social media uses seen as most important by more experienced external users give ideas for a faster adoption of social media. Also, due to the relatively low current active usage of social media implied by the results, the companies that first experiment with and develop social media-based ways to support B2B social media use might benefit greatly from these investments. In addition, consultants might benefit from these results by developing ways to avoid the important social media adoption challenges and facilitate the adoption.

This study opens up several areas for further research. First of all, in order to facilitate the adoption of social media and to fill the gap between perceived social media potential and actual use in B2Bs discovered in this study, it seems apparent that academic as well as pragmatic research should be carried out. This research provides important starting points for such further research. Most importantly, the academic research should focus on gathering and organizing the fragmented empirical research to provide a systematic and holistic picture of the possibilities of social media in B2B, developing ways to present a better analyzed picture of the financial benefits of social media, as well as to gather more organized and varied types of case studies, examples and case evidence into a good overall picture of how social media may facilitate B2B business.

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Publication 4

Innovation-related benefits of social media in Business-to-Business customer relationships

By

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Innovation-related benefits of social media in Business-to-Business customer relationships

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Abstract: The aim of this research is to explore social media and its benefits and impacts especially from Business-to-Business (B2B) innovation and customer interface perspective, and to create a more comprehensive picture of the possibilities of the social media for the B2B sector. The B2B context is in many ways a very different environment for social media than Business-to-Consumer (B2C) context, and is still very little academically studied. A systematic literature review on B2B use of social media and achieved benefits and impacts in the innovation context was performed to answer the questions above and achieve the research goals. The study clearly demonstrates that not merely B2Cs, as commonly believed, but also B2Bs can benefit from involving customers in innovation by social media in a variety of ways. The reported benefits of social media use referred broadly to increased customer focus and understanding, increased level of customer service and decreased time-to-market.

Keywords: social media; web 2.0; B2B; business-to-business; benefits; impacts; customer interface; innovation; co-creation.

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1 Introduction

Despite the growing amount of company experimenting and academic studies, social media are still new to many businesses. Its real opportunities and benefits are not well understood in many business contexts, such as the Business-to-Business (B2B) context, and despite the growing recent interest in the use of social media in B2B marketing applications, the adoption of social media in B2B innovation (e.g., Kärkkäinen et al., 2010) and involving customers in innovation (e.g., Jussila et al., 2012) are still currently quite low. In addition, in B2B environment, currently the innovation perspective seems clearly lacking in academic research and well-reported case studies, which would enable companies to better adopt social media.

Despite the relative novelty of social media in business and lack of academic research, social media have already been demonstrated to open many new opportunities for the B2B sector due to its features that can enhance communication, interaction and collaboration, which can bring significant benefits to organisations. For instance, social media can be utilised to identify new business opportunities and new product ideas, to deepen relationships with customers and to enhance collaboration not only inside but also between companies and other parties (Barker, 2008; Gillin and Schwartzman, 2011; Hoffman and Fodor, 2010; Lehtimäki et al., 2009).

Concerning the challenges related to adoption, according to, for instance a recent survey, lack of understanding of the possibilities of social media in innovation, difficulties in assessing its financial gains and lack of suitable case evidence are among the most important reasons for B2B companies not adopting social media in their innovation (Kärkkäinen et al., 2010). Thus, academic studies utilising case material are needed in researching the above areas to improve the understanding of social media in the B2B context, as well as to enable companies to better adopt new social media practices.

On the basis of available literature, it can be presumed that the challenges, benefits and useful approaches of social media in the B2B sector are at least somewhat different from those of Business-to-Consumer (B2C) companies (Gillin and Schwartzman, 2011; Lehtimäki et al., 2009). It has been a relatively common assumption (e.g., Eskelinen, 2009; Lehtimäki et al., 2009) that it is much more difficult to utilise social media in B2B innovation and customer interface, for instance because of the many significant differences in the B2B products, markets and product development. By 'B2B' we mean transactions between businesses, such as between a manufacturer and a wholesaler. Differing from B2C products, B2B products and services are sold from one company to another, not directly to end-users or consumers. Most B2B products are purchased by companies to be used in their own production of goods and services to be sold on to further customers. By B2B innovation we refer to the development of new commercially successful products, services and other innovations for other companies, and by B2B customers not only the direct customers who directly pay for the developed products but also other organisations and parties (such as dealers, customers' customers, end-users and consumers) who are a part of the customer chain towards the end-users and consumers of final products, and may thus help to understand the needs of direct customers. For instance, Juran (1988) has extended the concept of a 'customer' to include not only the direct users, customers or consumers, but everyone who is impacted by the product. Thus, it is apparent that in the industrial markets, the number of those 'customers' of various types and of different levels that are impacted by a product is generally much larger than in the consumer markets. In this study, we exclude internal customers, and focus on social media use in external customer relationships.

Concerning the above reasoning, thus, we find a clear need for research of social media in the specific context of B2B, even if some practices might be transferrable from B2Cs to B2Bs. For instance, internal social media use and practices may be very similar in B2Bs and B2Cs. However, we limit this study to external use of social media with customers, where differences between B2Bs and B2Cs are significant, explaining the differences in this study in more detail. In addition, since a major part of the recent existing very few B2B social media studies discuss social media from merely the marketing perspective, there is clearly a need for innovation-related research.

Utilising social media tools can lead to significant benefits for the company, but without a set of concrete objectives and related measurable results, there is no certainty that the social media process is efficiently employed (Mangiuc, 2009). Setting useful objectives for social media efforts that are based on business goals, as well as following evaluating and measuring the benefits, helps organisation to keep on track on its position, communicate its position internally and externally, confirm priorities and direct the progress of its activities (Carlucci and Schiuma, 2010; Neely et al., 2000).

Even though the adoption of social media tools in organisations has spread in the last few years (Jefferies, 2008), evaluating and measuring the benefits of social media approaches has not been much investigated. Organisations are spending more and more on social media applications, but there is no clear view or consensus on what should be strived for with social media efforts and how to evaluate the benefits of social media (Hoffman and Fodor, 2010). Also, social media are a large umbrella term for various very different types of approaches with different purposes and benefits, and the various approaches are often utilised in very different ways. This should also be taken into consideration when evaluating and measuring the benefits, but a large part of existing benefit-exploring studies either discuss social media as a very broad concept, or discuss

individual social media case studies from a very narrow perspective. In this study, we try to get a more comprehensive picture of the benefits with making a review to existing B2B research on the benefits of social media in the customer interface of the innovation process, while maintaining the more concrete insights from individual cases.

Evaluating and measuring social media benefits is a very topical issue in general social media research, and it has been a subject of many studies in recent years (e.g., Hoffman and Fodor, 2010; Mangiuc, 2009). However, there are only few studies that discuss the various different benefits and the evaluation of benefits of social media from the perspective of B2B companies. According to a study of Finnish Business and Policy Forum EVA, B2B companies typically see social media as something belonging to consumer business, and that it has little or nothing to offer in improving the effectiveness of business between business companies (Isokangas and Kankkunen, 2011). This highlights the importance of evaluating and measuring the benefits that specifically companies operating in B2B sector and B2B relationships can gain from social media.

The aim of this research is to explore social media and its benefits and impacts especially from B2B innovation and related customer interface perspective, and to create a more comprehensive picture of the possibilities of social media for the B2B sector. We also examine the challenges of evaluating social media benefits in this context. In this way, we hope to enable managers to better understand the broad possibilities of social media in the B2B context, to set realistic objectives and to create related useful measures for social media use. In this way, we intend to help companies to adopt social media in a faster and more planned manner.

2 Definitions of Web 2.0 and social media

Although the concepts Web 2.0 and social media are often used synonymously, it is useful to differentiate them from each other (Kaplan and Haenlein, 2010). The concept Web 2.0 can be defined as technologies that enable users to communicate, create content and share it with each other via communities, social networks and virtual worlds, making it easier than before. Social media can be defined as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user generated content" (Kaplan and Haenlein, 2010). Furthering this, social media are often referred to as applications that are either fully based on user-created content, or in which user-created content or user activity has a significant role in increasing the value of the application or the service.

Social media can be used as an umbrella term, under which various and very different types of cultural practices take place related to the online content and people who are involved with that content (Lietsala and Sirkkunen, 2008). A large number of generic different types of social media application categories can be identified (Cooke and Buckley, 2008; Dewing, 2010; Warr, 2008), such as wikis, blogs, microblogs, social networking sites, social content, mashups and virtual social worlds. Social media are certainly not a unified and well-defined set of approaches, and despite some broad common characteristics described above, their benefits and measurement should be analysed in more detail considering the specific social media types and the context of use (Hoffman and Fodor, 2010; Weinberg and Pehlivan, 2011). Indeed, not all social media are the same (Bernoff and Li, 2008; Nair, 2011). From a technology perspective, the platforms vary and, along with that, so do the rules of utilisation and functionality

(e.g., Twitter tweets/posts can be no more than 140 characters). In turn, there is variation in how people use these platforms and/or associated applications (e.g., bloggers tend to post at most once per day, and their posts tend to be up to one page in length).

3 Social media objectives and roles in the customer interface of B2B innovation

When social media benefits are tried to be understood properly, we should first understand some major social media objectives and specific roles it can play in achieving those objectives. In addition, when beginning social media activities in business, it is necessary to make clear what the objectives of the company for operating in social media environment are.

The question is not whether to blog or tweet, but what objectives need to be achieved and also which set of tools can best achieve them (Hoffman and Fodor, 2010). It is impossible to evaluate the success and benefits of social media without knowing what the actual objectives are (Fisher, 2009; Ramsey, 2010). Being active in social media in itself is not an actual useful objective, because the activity without a purpose does not necessarily bring value to an organisation, or the value might turn out to be even negative due to, e.g., information leakages or inferior handling of received feedback. Social media objectives also need to be aligned with the goals of the firm to focus on those social media activities that will best facilitate the needs of its business (Kietzmann et al., 2011).

3.1 Customer roles in the innovation process phases

In the strategic management literature and quality management literature five main roles have been identified for customers in value creation: resource, co-producer, buyer, user and product (Finch, 1999; Kaulio, 1998; Lengnick-Hall, 1996).

In several studies in the innovation management literature, the authors have found it useful to divide the innovation process into three parts, especially regarding the viewpoint of innovation process-related customer roles, analysing them accordingly: the front end (phases before product concept), the product development phase (phases between concept and launch) and the commercialisation (phases during/after launch) phase (Desouza et al., 2008; Fuller and Matzler, 2007; Lettl, 2007; Nambisan, 2002). Thus, we find it necessary to analyse the social media benefits in the customer interface of the innovation process in more detail from the perspective of the different customer roles and the different innovation process phases. We have not been able to find earlier B2B-related studies that have carried out such analysis, and will take this into consideration in our own analysis.

In the first innovation process phase, customers can be regarded as a resource, i.e., the source of ideas or need-related information, in the second phase customers can be regarded as co-creators (or co-producers) and in the final phase customers can be regarded as buyers and/or (end)users (Bartl et al., 2010; Chan and Lee, 2004; Fuller and Matzler, 2007; Nambisan, 2002), or as product. Co-creation can include for example validation of product architectural choices, design and prioritisation of product features, specification of product interface requirements and establishment of development process priorities and metrics with customers (Nambisan, 2002). When regarding the customer's role as a buyer, the focus is on converting potential customers into actual customers

(Lengnick-Hall, 1996). Customers as users role suggests that companies can receive valuable contributions in product testing and product support from customers (Lengnick-Hall, 1996; Nambisan, 2002). Regarding customer as product implies that the ultimate outcome of the innovation process or the following transformation process is change in behaviour or condition of the customer, that is the customer both experiences transformation activities and becomes the final stage of the transformation process (Lengnick-Hall, 1996). These roles bear a very close resemblance to the afore-described three main phases of the innovation process, and support the division of the innovation process accordingly in the context of this study. This enables us to better analyse the different roles and benefits of social media in the creation of new customer insights, understanding and knowledge in more detail than has been achieved so far.

According to Nambisan, of the above roles, three (resource, co-producer and user) are most relevant for specifically the innovation process (Nambisan, 2002). For the above reasons, we decided to focus the study on these roles.

3.2 Possibilities of social media in different customer roles

The possibilities of social media in the customer interface vary significantly in the different phases of the innovation process. First, because the patterns of interaction between a firm and its customers vary with the roles the customers are playing in the development process (Kaulio, 1998; Leonard-Barton and Leonard, 1998; Lettl, 2007). Second, the knowledge creation activities vary depending on the nature of knowledge to be created, e.g., knowledge acquisition about the product from different sources or knowledge conversion of factual knowledge about a product to experimental knowledge about its usage in a specific context (Nambisan, 2002). Third, customer's motivation to participate or be involved in the innovation process varies greatly depending on the innovation process activity, for example there are different motivations to participate in the actual product development activities than there are in participating in product support.

Social media can provide new possibilities and novel types of business benefits concerning all the above mentioned innovation process phases and the related customer roles. Social media can for instance provide quite novel community-oriented and social ways of receiving and giving feedback from new products and concepts (Barker, 2008; Jussila et al., 2012; Peppler and Solomou, 2011), as well as providing a useful platform for inter-organisational co-creation (Verona et al., 2006). Some forms of social media, such as virtual worlds, can also enable customers and companies to receive a real-world experience from products, as well as experiment with novel concepts (Jussila et al., 2012; Kohler et al., 2009, Messinger et al., 2009). Not only one-sided but even mutual learning can be achieved for instance by means of co-development and co-creation (see e.g., Payne et al., 2008; Prahalad and Ramaswamy, 2004; Rowley et al., 2007), for instance in a common development project. In such a case, the supplier would probably learn from its customer's needs, and correspondingly, the customer would learn about technological ways to solve its own needs.

However, the roles and objectives of social media can be presumed to have different generic emphases in B2Bs compared with B2Cs, which is briefly explained next. This explains for instance that many B2C practices used in the customer interface are not transferrable easily, or even at all, to B2Bs.

3.3 Generic social media objectives in B2B customer interface

As mentioned earlier in this paper, doing business in B2Bs differs from doing business in the B2C sector. This should mean that also the social media objectives differ. When considering the objectives of improving business processes, the generic objectives can be partly the same in B2B and B2C companies, for example to enhance cooperation by connecting all parties together (Gillin and Schwartzman, 2011; Lehtimäki et al., 2009) or to shorten solving time of customer problems (Blanchard, 2011).

From the customer interface perspective, while the B2C objectives are often concerned with understanding the customers' needs as larger entities (whole markets or larger customer segments), the B2B objectives are commonly focused on deepening and on time-wise extending the personal relationships with the generally relatively few customers that a B2B company has (Barlow and Thomas, 2011; Geehan, 2011; Isokangas and Kankkunen, 2011; Lehtimäki et al., 2009) to enhance the company's credibility in business relationships, or to improve responsiveness to customer feedback (Kietzmann et al., 2011).

Social media objectives for innovation, for example a higher level of product innovation (Mangiuc, 2009) can be related to both B2B and B2C companies, but the objective might be reached differently. When B2C companies usually have a large number of customers, the goal may be for instance to have plenty of product ideas from customers as a large crowd, without aiming to understand each and every customer's detailed needs. Contrary to this, in B2B companies the role of individual customers or sometimes even one single customer, and their better understanding, can be very important. Thus, it seems evident that in many cases, the benefits of social media should be evaluated and measured differently in B2C vs. B2B use. To successfully set targets for social media use and to evaluate the social media activities, the objectives must be first understood and clarified (Blanchard, 2011).

4 Evaluating and measuring the benefits of social media in innovation

Social media benefits have been studied from a variety of perspectives. Concerning the benefits of social media in innovation, there are studies that consider individual social media approaches, such as wikis (e.g., Standing and Kiniti, 2011), blogs (e.g., Singh et al., 2008), virtual worlds (e.g., Kohler et al., 2009) or customer communities (e.g., Antikainen et al., 2010), in the customer interaction and the creation of understanding about customer needs. The clear majority of existing studies on the roles of social media in innovation are case study based; they view the benefits from merely individual social media approaches' (such as wikis) perspective, and they do not specifically address the perspective and the benefits of B2B companies. Although social media benefits in innovation from B2C companies and from consumers' point of view are relatively well understood, several studies point out that B2B companies do not yet fully understand the potential of social media and find it difficult to evaluate and measure the benefits of social media (Isokangas and Kankkunen, 2011; Kärkkäinen et al., 2010).

Often the evaluation and measurement of benefits might be quite challenging, especially in the case of applying novel technologies which are not thoroughly understood yet, or aiming to facilitate complex processes such as innovation and product development, which in addition to their complexity involve long time periods between

the investment decision and its actual impacts. The above types of challenges cannot, still, justify not evaluating or measuring the impacts of social media efforts. Sometimes the task might, however, require even novel approaches and ways to measure and evaluate the impacts, as seems to be the way with social media (Hoffman and Fodor, 2010).

Evaluation of social media benefits can be done at different levels: process, output and outcome (Brown, 1996; Neely et al., 2000). Process measures evaluate the effectiveness of the transfer of inputs to outputs, e.g., % products developed on time and turn-around time for support requests (Phillips and Paine, 2009). Outputs are the results or deliverables of the process (Deragon, 2009), for example number of new product ideas that have been submitted by customers. Outcomes can be divided into financial outcomes and non-financial outcomes (Blanchard, 2011). Financial outcomes are ultimately either increased revenue or cost reductions, that can be measured, for example by decreases in the technology costs, and savings in the costs of customer support services (Blanchard, 2011; Gillin and Schwartzman, 2011; Hoyer et al., 2010; Mangiuc, 2009). Non-financial outcomes are everything else, for example more than 50% customers interacting with each other (Blanchard, 2011; Mangiuc, 2009; Ogrinz, 2009).

Regarding innovation, perhaps due to the complexity of the issue, as well as the fragmented and various approaches proposed, many organisations tend to focus only on the measurement of innovation inputs and outputs in terms of spend, speed to market and number of new products, and ignore the processes in-between (Adams et al., 2006; Cordero, 1990). In addition, Adams et al. (2006) make a point that there is an over-reliance on financial measures rather than process measures, a similar reliance on, for instance codified knowledge such as patents to the exclusion of more intangible measures such as tacit knowledge, and furthermore, an over-reliance on quantitative or dichotomous yes/no measures instead of measuring the quality of actions and results.

5 Research approach

A systematic literature review was performed using the following databases Scirus, ABI, Emerald, ScienceDirect and EBSCO with the following search term combinations: impact and social media, impact and social media and B2B, value and social media, value and social media and B2B, value of social media, measurement and social media and B2B, measurement of social media, ROI and social media, ROI and social media and B2B, ROI of social media.

A total of 414 of articles were found as a result, of which 43 were selected for more detailed analysis on the basis of their relevance. In addition, we made searches concerning individual Web 2.0 related tools, such as wikis, blogs, Twitter, LinkedIn and others in the specific context of B2B, using various combinations of search terms and above research databases. We searched and discovered some additional references by searching forward and backward referencing of the most relevant discovered articles. Six books were used as additional sources to extend the literature review to cover more B2B examples that were relatively scarcely presented in the existing academic literature.

The relevance of each discovered article was judged by first examining whether the articles discuss social media use specifically in the B2B context (not, e.g., B2C or internal use). Out of the remaining articles, second, we reviewed whether benefits and

impacts had been evaluated empirically, and whether they were achieved in the context of the customer interface (with customers or/and end users). Those articles that matched these criteria were chosen for a more detailed analysis.

We summarised the information from the discovered articles, books and blog articles in the form of a table (Table 1) describing the found benefits and impacts of social media categorised by innovation process phases and different social media applications.

6 Results

Through literature review we were able to find more than 20 studies or cases that reported benefits of using social media in innovation of B2B companies. There were eight journal articles, out of which almost all, seven, were peer-reviewed academic articles. We were also able to find five authoritative books, one authoritative research report and three blog articles which brought additional understanding to this little academically studied and reported area. Despite the so-far relatively few academic studies, we believe that the analysis of the more than 20 authoritative sources does bring new broader understanding of the wide usefulness of social media in the specific context of B2B companies and innovation.

In addition to the results represented in Table 1, some studies described social media benefits in B2B companies on a general level of broad 'social media', but did not state clearly what the benefits were from any recognisable social media approaches, and to what degree the reported benefits were even attributable to the companies' social media efforts distinguished from other business development investments, for example traditional marketing campaigns. Because we wanted to understand specifically how certain social media approaches contributed to benefits, these were decided not to be included in the resulting table.

The results of the literature review and the observed online community platforms are summarised on Table 1. The table illustrates the customer interface-related benefits in using certain social media applications in different phases of innovation processes from B2B companies' perspective. Those academic sources mentioning benefits and found positive impacts in B2B context are indicated by reference '(1)', reference '(2)' indicates identified B2B benefits found from authoritative blogs, books and white papers or other reports as sources of information, and reference '*' is used to indicate that innovation process phase where the benefits are realised is not explicitly described. Customer roles in innovation process phases are indicated by the following symbols: (R) resource, (C) co-producer and (U) user.

We were able to find social media-related benefits of the above three customer roles. Benefits were found in almost all the individual categories of the resulting table (Table 1). However, in the front-end phase, three approaches lacked concrete case evidence on benefits in academic literature. We did find social media cases also in these categories; however, that did not explicitly state the context or applicability to include B2B, or this context could not be clearly concluded from the case material. Concerning the development phase of innovation process, customers did not always operate as co-creators, but also as resources, which contrasted to the categorisation implied by Nambisan (2002).

Table 1 Benefits and impacts in using social media approaches in the customer relationships of different innovation process phases from B2B companies' perspective

	Front end	*Development phase*	*Commercialisation*
Blogs		Obtained customer feedback and customer need data more favourably than by traditional methods, also in the case of anonymous blogs it was possible to receive unfiltered information from customers (Singh et al., 2008)(1)(Barker, 2008)(1)(R)	Cisco achieved 75% cost savings and increased customer interaction by virtual product launches through blogs (Barlow and Thomas, 2011)(2)(U). Real time user feedback concerning products (Singh et al., 2008)(1)(U)
Micro-blogs		Obtained real time and honest feedback (Franklin et al., 2009)(2)(R). Increased level of co-creation with customers (Fischer and Reuber, 2011)(1)(C)	Faster communications with customers (Kho, 2008)(1)*(U)
Wikis	Quicker capture of ideas, also enabled asynchronous distributed brainstorming (Standing and Kiniti, 2011)(1)(R)	GoodWater Inc achieved 85% ROI while investing in blogging, wiki and asocial networking platform for internal collaboration. By means of the wikis, over 400 product features were described as a response to customers' requests (Mangiuc, 2009)(1)(R)	Sharing ideas on commercialisation and obtaining feedback from customer (Standing and Kiniti, 2011)(1)(U). OSIsoft improved the solving time of customer problems by 22% by sharing customer service info using Wik is (Isokangas et al., 2011)(2)(U)
Mashups	Mashups in improving customer enhancement requests (Ogrinz, 2009)(2)(R)		Mashups in improving, customer service and product trials. Significant savings in product deployment (Ogrinz, 2009)(2)(U)
Social networking sites		Obtained customer feedback that helped to accelerate product refinement (IBM, 2007)(2)*(R)	Over 300 customers had joined the GoodWater social network, giving valuable feedback, with over 1000 employee-customer interactions being recorded, with more than 50% of the customers started interacting with each other, (Mangiuc, 2009)(1)(U)
Online community platforms	Dell IdeaStorm had achieved in gathering more than 17,000 ideas from B2B and B2C customers, with more than 96,000 comments, of which Dell has implemented over 517 ideas (Jussila et al., 2011)(1)(Gillin and Schwartzman, 2011)(2)(R), e.g., Storm Session on development of B2B-product (developer laptop) gathered 153 ideas from customers during an event lasting from 6 May 2012 to 16 September 2012 (Jussila et al., 2011)(1)(R). Cisco I-Prize competition, aimed at identifying new business ideas (both B2B and B2C-related), gathered 824 ideas from a total of 2900 participants (Jussila et al., 2011)(1)(R)	Reduced time-to-market and NPD budgets by engaging customers as innovation agents (Constantinides et al., 2008)(1), LabVIEW Idea Exchange helped R&D to prioritize B2B product ideas submitted by customers and users (Gillin and Schwartzman, 2011)(2)Jussila et al., 2011)(1)(C). TechSmith received hundreds of product development ideas to their B2B product Camtasia with over 700 actively engaged users (Jussila et al., 2011)(1)(C). The SAP Community Network had achieved more than 2 million users to participate in sharing and co-creating knowledge on SAP's B2B products and services. (Demetriou and Kawalek, 2010)(1)(C), Innovation contest by Bombardier, aimed at identifying new interior designs for trains, resulted in a total number of 2232 participants, these including end-users and professional designers, and 4298 designs, 26,617 ratings and 8562 comments (Haller et al., 2011)(1)(R)(C)	Intuit TurboTax user forum enabled solving of users problems by users that often were more knowledgeable than company's own agents, this also speeding up the customer service process. Intuit founder Cook noted that internal experts were pleased with the quality of the answers, which seemed to be also self-correcting as other users refined them. (Wollan and Smith, 2010)(2)(Jussila et al., 2011)(1)(U)

Majority of the reported benefits were qualitative, non-quantified benefits of using social media, such as better feedback, increased customer service, gaining more detailed information about customers and customer needs. However, in almost half of the cases,

the benefits were tried to be quantified at least on the general level (as outputs), such as more than 14,000 ideas from customers, and with more than 89,000 comments on the created product ideas. Interesting further output-related benefits dealing with the core of social media, the increased enabling of interaction, included benefits such as over 1000 employee–customer interactions being recorded, and more than 50% of the customers starting interaction with each other. Actual outcome-related reported benefits were quite few, including benefits such as improved solving time of customer problems by 22%. Especially rare were instances that tried to quantify actual financial benefits gained from social media, including benefits like increased customer interaction with 75% lower costs.

7 Discussion and conclusions

We were able to find benefits and positive impacts of social media in a large variety of different application areas in the B2B companies' customer interface. In this way, the study clearly demonstrates that not only B2Cs but also the companies of the B2B sector can benefit from involving their customers into innovation by social media in a variety of ways. This contributes to the existing social media-related literature, because there are no found earlier academic studies on the use of social media in the innovation process in the context of B2B customer interface, evaluating in a more comprehensive way the benefits of social media, in addition to the few academic studies focusing on individual-related cases and examples.

Despite the special characteristics of the B2B sector, such as the commonly relatively small amount of customers compared to B2Cs, often believed to negatively affect the usability and benefits of social media in B2B companies, and restricting the use of social media especially in the B2B customer interface, according to our results, in all recognised and described cases the studied B2Bs have benefited from social media in the customer interface in a variety of ways. In several cases, the B2Bs seemed to benefit quite considerably from social media use. In addition, the B2B companies benefiting from social media represented different types of industries (e.g., software, ICT, pharmaceuticals, consulting and various types of B2B services) with different business logics and models, and their size varied from small to very large companies like Cisco.

Concerning the above, the usability and usefulness of social media seem to be generalisable also more commonly to different types of B2Bs, not only, e.g., ICT and software companies, which are among the most often referred companies as social media exploiters in the B2B sector. Major part of reported benefits was output-related benefits, but these did not directly address the actual business-related outcomes. This is understandable, since it is quite difficult to evaluate and measure which are the actual effects of social media investments, and separate these from the effects of, e.g., other investments, internal changes and changes in the business environment. In addition, the complex cause–effect chains from social media use to financial savings or gains are, like in the case of all complex customer interface-related processes such as the innovation process, very difficult to describe and verify. Even though some studies reported outcome-related benefits, it is difficult to analyse how credible the studies are, because the related causal chains and the separation of social media investments from other possible investments and explanations were generally not reported in any useful way to allow the objective evaluation of the reliability and validity of the reported benefits.

Despite this difficulty, future studies should at least attempt to report and analyse how the reported benefits were arrived at.

From the standpoint of the innovation process, the studied B2Bs were able to derive social media and customer interface-related benefits in all three major phases of the innovation process.

The applications which the benefits were derived from included almost all the major types of social media categories, including blogs, microblogs, wikis, mashups, social networking tools and online community platforms. However, we were not able to come up with reported B2B cases and related benefits and impacts in the category of virtual worlds. We did find some cases that reported social media use and benefits in this category on a very generic level (e.g., Prandelli et al., 2006; Kohler et al., 2009), but it was not possible to say explicitly whether the cases and examples referred to B2C or B2B companies, or even whether the results would have been generalisable to the B2B context.

Concerning the broader classes of innovation-related benefits, the reported benefits of social media use referred to increased customer focus and understanding, increased level of customer service and decreased time-to-market. Many studied cases reported benefits related to the core of B2B customer relationships, the deepening of customer relationships, such as increased customer interaction with and between customers, but no benefits or impacts were found that directly addressed the potential benefits concerning the time-wise extensions of customer relationships. Still, future research should be carried out to understand better in which different specific ways and in which specific contexts social media can actually deepen and extend customer relationships. For instance, while some companies such as National Instruments attempted to deepen their B2B customer relationships by extensive open professional communities, some companies aim to learn, in a more focused way, from their key B2B customers by putting together small closed LinkedIn customer focus groups. Different types of community logics and participation incentives have also been reported in B2Bs: while some B2B companies use social media to organise innovation competitions, others arrange community events, and others prefer social media-supported market places and communities. By different contexts we refer to, e.g., different industries with different business logics. All the above require in-depth analyses for optimal B2B social media use, approach selection and expectable benefits from their use in different contexts.

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Publication 5

Learning from and with Customers with Social Media: A Model for Social Customer Learning

By

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Learning from and with Customers with Social Media: A Model for Social Customer Learning

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Social media can enable and significantly increase the collaboration and learning from customers in various ways, for instance by novel social ways of providing and receiving feedback from new products and concepts. We have created a model that can support managers and researchers to better analyse and understand the possibilities of social media approaches especially from the business-to-business (B2B) customer interface standpoint. We used the model to analyse found various types of business-to-business related social media approaches to create new understanding of the scarcely researched field of social media in the customer learning and the customer interface of B2B innovation.

Keywords: innovation, customer, learning, organizational learning, customer learning, social media, business-to-business

Introduction

Organizations have to learn about market needs and technological solutions increasingly quickly if they want to respond to the quick and often unpredictable changes in their business environment. This learning need is caused and driven by frequent scientific and technological breakthroughs and the quickly changing and unpredictable market and customer needs (Akgün, Lynn, & Byrne, 2003).

Much of the customer information gathered by traditional methods, such as statistical surveys, is not adopted and properly used by organizations (Deshpande & Zaltman, 1987). Some reasons for this are that it is not felt as useful by product development or it is not trusted (Gupta & Wilemon, 1988). Additionally, traditional methods are not very well-suited to uncover latent or future customer needs (Matthing, Sanden, & Edvardsson, 2004). Learning from and with customers is more easily said than done. Some foundational background for this challenge is provided by the knowledge of the limitations of customers to imagine and give feedback about something that they have not experienced (Von Hippel, 2005). This means that organizations find serious difficulties for understanding, learning from and meeting the hidden or latent needs of customers by using traditional methods, such as interviews and surveys (e.g. Matthing et al., 2004).

The recent innovation literature has increasingly emphasized the efficient use of knowledge and information not only inside the company borders, but particularly the knowledge locating outside the company borders, such as the knowledge of customers and users, as well as communities formed by customers or suppliers (Chesbrough, 2003). In addition, the co-creation of new knowledge has gained fast in importance (Rowley, Kupiec-Teahan, & Leeming, 2007; Payne, Storbacka, & Frow, 2008).

Various types of collaborative web tools and approaches, such as social media, can enable and significantly increase the collaboration and learning from customers in various ways (Peppler & Solomou, 2011; Albors, Ramos, & Hervas, 2008). Social media can for instance enable the use of the distributed knowledge and the collaborative knowledge creation not only within but also outside the company borders. Importantly, social media can provide quite novel community-oriented and social ways of providing and receiving feedback from new products and concepts (Peppler & Solomou, 2011; Barker, 2008), as well as providing a useful platform for inter-organizational co-creation (Verona, Prandelli, & Sawhney, 2006). Some forms of social media, such as virtual worlds, can also enable customers and companies to receive a real-world experience from products, as well as experiment with novel concepts (Kohler, Matzler, & Füller, 2009; Messinger et al., 2009). All the above novel possibilities are important enablers for efficient individual and organizational learning (e.g. Easterby-Smith, 1997; Von Hippel, 2005).

If social media provide novel possibilities for learning from customers, why are companies then not taking fully the advantage of social media in this respect? A recent survey of social media use in innovation identifies some important reasons that slow down the current adoption of social media in innovation: the lack of understanding of the possibilities of social media in innovation, the difficulties in assessing its financial gains and the lack of suitable case evidence were among the most important reasons for companies not adopting social media (Kärkkäinen, Jussila, & Väisänen, 2010).

Currently, the social media are so novel an area in innovation that managers have difficulties of understanding the possibilities, and due to the large variety of social media approaches, managers and researchers find it hard to understand the commonalities and differences between existing approaches. It is also difficult to understand how the various existing approaches can support learning from and with customers, and to create a larger picture of the possibilities for learning due to the lack of systematic description of current approaches, the fragmented current research, and the lack of suitable models for understanding the possibilities of social media in the specific contexts of innovation, customer interface and organizational learning.

Due to the novelty of social media concepts and approaches in business use, the possibilities of social media are not yet very well understood in the broader context of innovation. Still further, the use of social media in different specific contexts, such as the business-to-business (B2B) sector and in different types of industries, is currently poorly understood. First, since the number of customers is generally much smaller in the B2B sector (Gillin & Schwartzman, 2011), the use of crowdsourcing which is quite commonly used in B2C operations, is limited. Second, in the context of innovations and the B2B sector, legal contracts and IPR issues can become challenges in the free disclosure of product or business ideas in inter-organisational innovation collaboration (e.g. Nordlund, Lempiala, & Holopainen, 2011) and may thus seriously limit the usability of social media between B2B companies and their customers. Third, various issues concerning information security have been raised already in individuals' use of social media, but due to the nature of business-to-business communication, the business-to-business context includes severe information security risks, potentially limiting the use of social media in ways that are not necessarily similarly problematic in B2C social media applications. No studies were found to study the potential of social media more comprehensively in the B2B customer interface especially from the innovation viewpoint, or from the more specific standpoint of customer learning and the creation of customer knowledge and understanding in the innovation context.

Due to the above, our purpose is, first, to create a model that can support managers and researchers to better analyse the important characteristics of current social media approaches, especially from the B2B customer interface standpoint. In order to make the model easy to understand and to be utilized, we point out, illustrate and apply in the model the critical few dimensions needed to understand the major options and possibilities of social media in this context. This will also support the planning and roadmap building of social media use in the customer interface, showing the major directions that can be selected. Second, we use the model to analyse found various types of business-to-business related social media approaches, and create new understanding of the scarcely researched field of the possibilities of social media in the customer learning and the customer interface of B2B innovation.

Learning from and with Customers

One rather common perspective in literature is that organizations learn when their knowledge in the form of rules and standard operating procedures is changed (Argyris & Schön, 1996), i.e. their actual behavior changes. From another perspective, an organization or another entity learns 'if, through its processing of information, the range of its potential behav-

iors is changed' (Huber, 1991), or the organizational mental models and schemas change. A further important feature in organizational learning focuses on the distinction of learning between single- and double-loop learning. The basic premise is that organizations learn and make decisions and adjustments often through the mechanism of feedback (Argyris & Schön, 1996). Furthermore, it can be stated that, basically, organizations learn in two ways: through their own experiences or through the experiences of other organizations (Levitt & March, 1988). Learning from one's own experiences includes experimenting and interpreting the earlier outcomes, while learning from the others means the transfer of knowledge embedded for instance in products or processes, or transferring the knowledge in some other form.

Some foundational generic prerequisites for learning to happen in individual and organizations, commonly present in various models of organizational and individual learning, include real-world experience (Kolb, 1984), feedback from decisions (Sterman, 2000; Senge, 1990; Argyris & Schön, 1996), reflection (Kolb, 1984), socialization (Nonaka & Takeuchi, 1995) and iteration (Easterby-Smith, 1997; Kolb, 1984; Nonaka & Takeuchi, 1995).

Literature on organizational learning (e.g. Argyris & Schön, 1996) emphasizes the importance of feedback for effective learning. Sterman (2000) even goes as far as stating that all learning is based on some sort of feedback. Johannessen and Olsen (2010) point out the importance of feedback in enhancing value creation and propose that when firms and customer can both give and receive immediate feedback, the instant connection between the firm and customer's needs will enhance not only value creation but also innovation. According to Lampela and Kärkkäinen (2008), some of the main factors affecting the feedback related to innovation-related decision making deal with long time delays from decisions to feedback, the long physical distance from decisions to their effects and feedback, the difficulty in differentiating which decisions and other factors really caused a failure or a success in the innovation process or contributed to it in the longer term. Also the misperceptions of received feedback or lacking feedback are important factors. The above factors hinder both learning from customers and markets as well as learning from technological solutions.

There are a number of generic barriers to learning from customers in organizations. One foundational problem in learning from customers is that customers' and users' insights into new product needs and potential solutions are usually severely constrained by their real-world experience, meaning that they are unlikely to imagine or generate very novel product concepts that conflict with the familiar (Von Hippel, 1988). According to Adams, Day & Dougherty (1998), further more detailed major barriers for learning from markets and customer needs include compartmentalized thinking, avoiding ambiguity and inertia. The barriers affect the acquiring, disseminating and using of market information. Such barriers limit or bias the flow of market

and customer need information, as well as the feedback from other departments in the case of product innovation. This has a significant impact in the innovation process, limiting for instance the learning from the market and customer information and feedback (see e.g. Adams et al., 1998).

Customer-related learning can be divided into two major parts: learning from the customers and learning with the customers (e.g. Matthing et al., 2004). The concept 'Learning from and with customers' suggests that customers can become more than just passive informants (Matthing et al., 2004). 'Learning from customers' hints that only the other party, the supplier, learns (receives new information and knowledge about customers' needs and/or changes the mental models), while 'Learning with customers' hints that both the supplier and the customer learn by receiving and adopting novel information and knowledge. For instance Meeus, Oerlemans, and Hage (2001) define a similar concept, interactive learning of a firm as the '(in-)formal exchange and sharing of knowledge resources with suppliers and/or customers that is conducive to the innovation of the firm.' Lubatkin, Florin and Lane (2001) emphasize a strong need for a similar capability using the term 'reciprocal learning,' but they refer to the concept more in the context of alliance partners.

This interactive or both-sided learning can be achieved for instance by means of co-development and co-creation (see e.g. Payne et al., 2008; Prahalad & Ramaswamy, 2004; Rowley et al., 2007), for instance in a common development project. In such a case, the supplier would probably learn from its customer's needs, and correspondingly, the customer would learn about technological ways to solve its own needs. Additionally, both parties might additionally add their absorptive capacity (Cohen & Levinthal, 1990; Lubatkin et al., 2001), which would increase their capability to identify and adopt further need- and solution-related knowledge.

However, an even more interesting case is that, e.g. by means of novel web-based solutions such as social media, the customers may even learn to better understand their own needs and the suppliers learn about novel solutions. Various novel approaches of social media, for instance peer-learning (Rowley et al., 2007), user toolkits combined with user communities (Jeppesen & Frederiksen, 2006) and virtual worlds (Messinger et al., 2009) are able to provide such organizational learning-related benefits. These approaches and their benefits, however, remain so far very little researched and understood, especially in the B2B context (Jussila, Kärkkäinen, & Leino, 2012).

Possibilities of Social Media in Customer Learning

Although the concepts Web 2.0 and social media are often used synonymously, it is useful to differentiate them from each other (Kaplan & Haenlein, 2010). The concept Web 2.0 can be defined as technologies that en-

able users to communicate, create content and share it with each other via communities, social networks and virtual worlds, making it easier than before. They also make it easier to have real life experiences in virtual worlds and to organize content on the internet with content aggregators (Lehtimäki, Salo, Hiltula, & Lankinen, 2009). Social media can be defined as 'a group of internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user generated content' (Kaplan & Haenlein, 2010). Further to this, social media are often referred to as applications that are either fully based on user-created content, or in which user-created content or user activity play a significant role in increasing the value of the application or the service. Lietsala and Sirkkunen (2008) define social media being built on the combination of Web 2.0 technologies, content and communities, this definition emphasizing the social aspects, instead of Web 2.0 technologies that may or may not be used in an interactive and social manner.

A large number of generic types of social media-related applications can be identified (e.g., Warr, 2008; Cooke & Buckley, 2008), such as wikis, blogs, microblogs, social networking sites, social content communities, and virtual worlds. Some of the practices are already relatively well established in private and business use, such as participating in wikis, blogging, and social networking, and some are still developing, such as microblogging, or participating in virtual worlds.

In general, social media and Web 2.0 have been noticed to bring several benefits for organizational learning and knowledge management. These include enhancing networking and the use of weak ties (Levy, 2009; Schneckenberg, 2009), facilitating the mobilization of tacit knowledge (Ribiere & Tuggle, 2010; Schneckenberg, 2009), facilitating knowledge acquisition; (Schneckenberg, 2009; Ribiere & Tuggle, 2010; Levy, 2009), organizing knowledge and information (Ribiere & Tuggle, 2010), and enhancing information and knowledge sharing (Levy, 2009). According to the literature, social media provide quite novel and useful ways of interacting and collaborating with customers in the innovation process, as well as for creating new information and knowledge for innovations (Kohler et al., 2009). In brief, new web-based technologies, such as social media, can enable a shift from a perspective of merely exploiting customer knowledge by the firm to a perspective of knowledge co-creation with the customers (Sawhney & Prandelli, 2000).

One of the key benefits of social media in customer learning is that they enable unfiltered feedback to be received from customers (Singh, Veron-Jackson, & Cullinane, 2008). Furthermore, social media can provide more rich feedback than traditional media. For example compared to e-mail, virtual worlds provide a hugely more representational-rich environment for com-

panies to have direct and rich interactions with their customers (Kohler et al., 2009; Lee, Cheung, Lim, & Sia, 2006).

Novel modes of interaction that support for instance community-based peer-learning have emerged with internet-based collaboration and social media (Sawhney et al., 2005; Bullinger, Neyer, Rass, & Moeslein, 2010). Importantly, social media can provide quite novel community-oriented and social ways of providing and receiving feedback from new products and concepts (Peppler & Solomou, 2011; Barker, 2008), as well as providing a useful platform for inter-organizational co-creation (Verona et al., 2006). Additionally, even without direct interaction with customers in social media, various analysis tools such as data mining and social network analysis can be utilised for creating customer information and knowledge from social media supported communities.

Introducing Social Customer Learning Model

The four-dimensional Social Customer Learning Model was created in our research group to better understand in which different ways social media have been and can be utilized to learn from customer needs in the B2B-environment. In creating this model the aim was to consider some major characteristics of B2B's related to this respect. We also utilized the empirical study of Kärkkäinen, Piippo, Puumalainen and Tuominen (2001) to check that the most common challenges of B2B's to assess their customers' needs and to get useful understanding about them were taken into consideration in the dimensions. The model was tested and preliminarily validated with 14 B2B-cases to see how the model brings out important differences in social media utilization.

The introduced Social Customer Learning Model includes four dimensions which describe the different major factors affecting the learning from customers. The dimensions are 1) level of information richness, 2) immediacy of feedback, 3) level of interaction, and 4) number of actors. We have selected the critical few dimensions that explain the major possibilities of social media to support learning from and with customers especially in B2B's. They enable affecting the major learning challenges described in the second section. Information richness and immediacy of feedback are related partly to the ability of approaches, e.g. virtual worlds, to provide immediate visual feedback for customers and suppliers, helping them to also reflect on their decisions and iterate the solutions based on the feedback. Partly they are related to the quality and amount of feedback that can be delivered through the social media approaches used. Level of interaction is related mostly to the earlier mentioned one important prerequisite of organizational learning, socialization, as well as to the ways the approaches are used, since social media can be used in various ways from

Table 1 Table Of SCL-Model Dimension Descriptions

Information richness definitions	
Very low: Numerical feedback (data)	1
Low: Textual and numerical feedback	2
Moderate: Textual and visual 2D feedback and/or audio	3
High: Visual 3D and/or video feedback	4
Very high: Face-to-face or virtual face-to-face	5
Immediacy of feedback definitions	
Very slow: History, trends	1
Slow: Asynchronous	2
Moderate: Periodical and consequent	3
Fast: Realtime and consequent	4
Immediate: Realtime and simultaneous	5
Interaction levels	
No direct interaction	1
One-way interaction (broadcasting)	2
Commenting between two parties	3
Deep dialogue between two parties	4
Community interaction	5
Number of actors	
Number of stakeholder groups	1 . . . 5

no direct interaction to intense social community interaction, which is the characteristic feature of social media. Often companies start the use from less interactive, and develop gradually the culture and skills towards more intense interaction. The number of actors refers to how many different actors interact through the communities, which affects the type and depth of customer-related learning that can be achieved. Based on the literature review, the dimensions thus are essential and affect both the type and depth of learning that can be achieved. Next the dimensions are presented and explained (see Table 1).

Daft and Lengel (1984) introduced media richness theory to explain information processing behaviour in organizations. The media richness concept consisted of feedback immediacy, number of cues available, variety of language and personal focus. According to Dennis and Kinney (1998), immediacy of feedback and multiplicity of cues are arguably the most important factors (c. f. Kraut, Galegher, Fish, & Chalfonte, 1992). Kaplan and Haenlein (2010) utilized the media richness theory to classify social media tools. Nöteberg et al. (2003) separated the concept of feedback immediacy from media richness to better explain the use of new technology-based media, as Daft and Lengel's (1984) media richness model did not consider the features of new web-based technologies, such as social media. There-

Table 2 Table of Researched 14 Social Media Tools with SCL Model

Case	(1)	(2)	(3)	(4)
Angel IVR wiki	2	2	5	3
BASF social media newsroom	4	2	2	3
Boeing blogs	2 (2–4)	2 (1–2)	2	3
Bombardier innovation contest	3 (1–3)	2 (1–4)	3	2 (2–5)
Caterpillar on-line community	2 (2–4)	2	5	2
Crescendo virtual 3D design tool	5 (4–5)	5 (2–5)	4	2 (1–3)
Intuit SME blogs and forums	2	2	5	4
Lilly innovation platforms	2	2	5	5
Mydeco social user toolkit for innovation	4 (2–4)	4 (1–4)	4	5 (1–5)
National Instruments Developer Zone	3 (2–3)	2	5	2
SAPiens innovation community	2	2	5	2
Steelcase virtual world design contest	5 (4–5)	4 (4–5)	3	1
Tecnisa innovation community	4 (2–4)	2	5	3 (1–5)
Wells Fargo virtual world	5	5 (4–5)	3	1

Notes Column headings are as follows: (1) Information richness, (2) Immediacy of feedback, (3) Level of interaction, (4) Number of actors.

fore, we divided the larger concept of media richness into two dimensions in our model: information richness (multiplicity of cues) and immediacy of feedback.

Information richness is defined as the ability of information to change understanding within a time interval (Choo, 1991). According to him, communication transactions that can overcome different frames of reference or clarify ambiguous issues to change understanding in a timely manner are considered rich, and communications that require a long time to enable understanding or that cannot overcome different perspectives are considered low in richness. Thus, information richness can be seen to include the number and quality of cues. Face-to-face communication allows the simultaneous observation of multiple cues, including body language, facial expression and tone of voice, which convey more information than only the spoken message (Daft & Lengel, 1984). Virtual worlds, such as Second Life, make it possible to replicate the information richness of face-to-face interactions in a virtual environment (Kaplan & Haenlein, 2010). Thus, interaction in virtual worlds can be considered to convey a very high level of information richness. Less rich than virtual worlds, feedback in the form of 3D images or video in social media can provide a high level of information richness. Text combined with visual feedback, e.g. 2D static images, represents a moderate level of information richness, whereas solely textual feedback can be considered as low level, and finally, only numerical feedback or data is considered a very low level in information richness.

Immediacy of feedback describes how quickly a medium allows users to respond to the communications they receive (Daft & Lengel, 1984), or the user to receive, e.g. visual feedback from his or her decisions. Immediacy of feedback has an impact on the speed of feedback acquired and the speed of learning. Face-to-face is the most immediate form of feedback (Daft & Lengel, 1984), as happens in realtime and simultaneously. Virtual worlds can mimic face-to-face feedback in terms of realtime and simultaneous communication (Kaplan & Haenlein, 2010). It can take longer and be more difficult to understand a message when communication is consequent instead of simultaneous. This can be the case, for example with Skype video, where typically communication takes place consequently. Moderate feedback in social media refers to periodical and consequent feedback, where feedback is not immediate but happens at fixed time intervals, for example a daily notification of new messages in Yammer microblog. Slow feedback in social media either lacks the above types of possibilities of immediate, fast or moderate interaction between the parties, or else such functionality is not utilized in practice. Slow feedback is for example blog or microblog posting between the company and the customer, or between customers, that takes place asynchronously, without notifications from the service. The final level, the very slow type of feedback is the history or trend information that is generated by monitoring or analyzing the social media user data. Such user data can be, for example, how many times a certain content has been liked, viewed, shared, etc.

Multiple studies indicate the importance of customer interaction in understanding customer needs better and support new product development (e.g. Bonner, 2010; Johannessen & Olsen, 2010). The model dimension 'interaction level' describes how a company or customers learn from customer needs by interaction. Rafaeli (1988) categorized interactions to three levels: non-interactive communication, reactive communication and fully interactive communication. Since the new social technologies offer more interactive ways to connect, our interaction dimension consists of five levels, which correspond to the novel interaction possibilities of social media. The interaction levels in this model are: no direct interaction, one-way interaction (broadcasting), commenting between two parties, deep dialogue and community interaction. 'No direct interaction' is possible for example when the company is only monitoring customer behavior and use of social tools. 'One-way interaction' includes broadcasting information from company to customers without any feedback possibilities. 'Commenting' refers to superficial, occasional comments in which the nature of information is not very in-depth. 'Deep dialogue' means two-way interaction including more commenting and exchange of ideas and viewpoints, usually between two parties. Two-way interaction represents an interactive exchange, while ideas

and viewpoints are communicated and analyzed, and feedback is provided (Bonner, 2010). Community interaction refers to conversation between multiple parties, where the exchange of opinions, knowledge and ideas is possible. Community interaction is one way for firms to enable knowledge sharing and co-creation among their business customers (Erat, Desouza, Schäfer-Jugel, & Kurzawa, 2006).

In the competitive business environment the role of networking with supply chain partners has increased in recent years (Cao & Zhang, 2011). Since great diversity of knowledge is distributed across the supply chain, collaboration provides an ideal platform for learning (Verwaal & Hesselmans, 2004). The model dimension 'number of actors' describes how many active stakeholder groups a company interacts with by social media, in order to learn about and to understand the customers' needs. Company's own employees are not included in the number of stakeholder groups since we are considering only external actors in learning from and with the customers. The importance of the number of actors derives from the need to understand widely a company's market and customer needs. B2B companies should take into consideration various parties in the customer chain towards the end user to be able to better understand and also to predict customers' explicit and latent needs (Kärkkäinen et al. 2001). Stakeholder groups considered in our model include direct and indirect customers, partners, research organizations, competitors, intermediaries, end users and external experts.

Case Studies

This section includes more detailed case descriptions of the four case companies' social media utilization. It also provides the case analysis and comparison using the Social Customer Learning Model presented in the earlier section. The four cases were selected by using the maximum variation case selection strategy (Flyvbjerg, 2006). The purpose was thus, first, to test and preliminarily validate the model concerning its ability to point out important differences in various social media approaches, as well as obtain more in-depth understanding about the various ways for utilizing social media in B2B customer interface. The chosen cases were preliminarily deemed to be different from each other on at least one of the model dimensions. In Figure 1 the cases are presented with the developed Social Customer Learning Model. Next, the cases are briefly described and analysed.

Case 1: Bombardier Innovation Contest

Bombardier is a global transportation company operating in two industry-leading businesses, aerospace and rail transportation. Bombardier utilized social media to create a YouRail-competition for creating new innovative

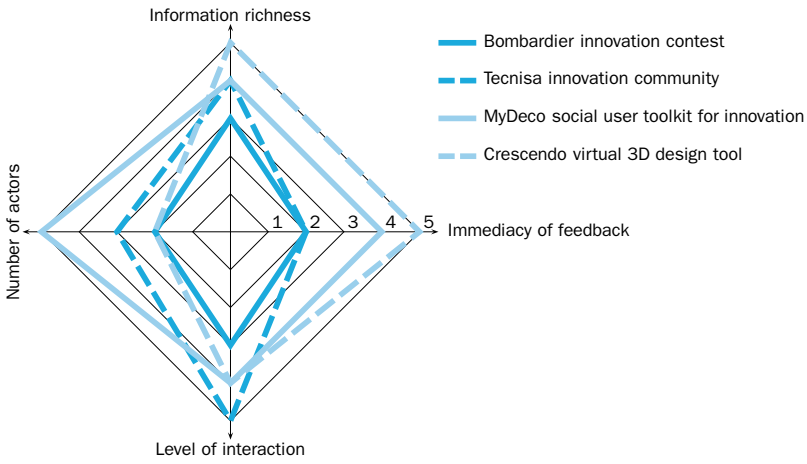

Figure 1 Different Social Media Tools Described with Social Customer Learning Model

interior designs for trains. Bombardier took advantage of the innovative potential not of their direct B2B-customers but of the end-users, for instance train enthusiasts, by calling for submissions world widely to gather first-hand end-user insights by the creation of novel designs, reviewing others designs for ideas, giving the designs ratings, and providing comments (Haller, Bullinger, & Möslein, 2011). The YouRail-website enabled users to create their designs by using a configuration tool as well as to freely create them in a design tool. In addition, the website also contained a user community where registered users could explore all uploaded designs, comment on other users' designs and give them ratings. During a ten-week period, 2232 persons participated in the innovation contest by submitting 4298 designs, as many as 26 617 ratings, and 8582 comments on competing designs (Haller et al., 2011).

Information richness in the YouRail-web site was evaluated by direct and participant observations to be moderate level, since the acquired feedback included photos of designs usually with textual descriptions. The immediacy of feedback for the company was deemed generally to be slow, since the community contributes designs asynchronously to the service. The YouRail user community enabled commenting others' designs, although the level of interaction was mainly limited to single textual comments. With the innovation contest Bombardier could get into touch with and utilize the creative resources of two major stakeholder groups that the company had relatively little earlier understanding about: the end users and other outside experts, such as designers. Both groups provided important novel viewpoints to enable the company to learn from the current customer needs from the user perspective.

Case 2: Tecnisa Innovation Community

Tecnisa is one of Brazil's most profitable constructors, and the company is operating in all areas of the real estate development sector. The company invests significantly in understanding and meeting its clients' needs, while Tecnisa's Ideas-community is one interesting approach in gaining new customer understanding. 'Tecnisa Ideas' is an online innovation community that is open for everyone interested. In the community the users can generate new ideas from small enhancement requests to developing whole new concepts. The ideas can deal with Tecnisa's construction projects, building sites, individual apartments or for instance with just one single feature in a garage. Via Tecnisa Ideas-community, users can create and develop ideas, vote for ideas, leave questions, and participate in idea challenges created by Tecnisa. They can also contact with other users and follow the ongoing discussions about ideas and inspirations.

In the community of Tecnisa Ideas the information richness level was evaluated by direct and participant observations to vary from very low level to high level, since the feedback acquired by users can vary from the number of 'likes' for a certain submission to textual, visual, and even video-based feedback, which is encouraged because it can provide the most informative feedback. However, the feedback immediacy was deemed mainly as slow, since the community parties are mainly interacting with each other by asynchronous means. Via Tecnisa Ideas, users can generate ideas together with other users by asking questions and discussing them with the community users or by proposing enhancement requests for others' ideas. These all enable community interaction. The community connects mainly two groups of stakeholders, end users and designers, with each other and with Tecnisa.

Case 3: Mydeco User Toolkit

Mydeco is the UK's largest homeware and interior design web portal for shopping furniture, planning home decorations and design. Mydeco web portal is linking many consumer and B2B parties within a single community: the web site brings together more than 2000 high street stores, designers and boutiques, while Mydeco also works as a link between home decorators and the furniture manufacturer. Mydeco provides value to home decorators with the Mydeco 3D online designer tool, which both consumers and other designers can use to plan their room decoration. 3D room designer is a user toolkit by which users can design rooms with realistic 3D. It is possible to see other users' 3D designs, as well as review and grade them. Users can also join to community subgroups based on their specific interests, and they can create, comment on and subscribe to user blogs of home decorators or professional designers. It is also possible to use designs that others have

created as a basis of own design, thus enabling learning from peers in many different ways. As a further result, the users also get a cost estimate of the whole design.

By direct and participant observations it was evaluated that Mydeco provides high information richness while the designs can be seen in 3D. The feedback immediacy with Mydeco was deemed to be between very slow and fast. This means that the home decorator can receive visual feedback from his or her experiments relatively fast by viewing them in 3D. However, peer-feedback for designs via e.g. Facebook or feedback to designer companies from their own designs can be moderate, slow or even very slow. Very slow for instance when the number of 'likes' or views of designs is monitored, slow when feedback in the form of comments is received asynchronously and moderate when comments are received periodically.

Mydeco portal provides not only deep dialogue but also community interaction possibilities since users can contact each other by forums and comment on each other's designs. 3D plans can also be shared with others when users are willing to design a room collaboratively. Mydeco makes it easy to involve many stakeholders. Main stakeholder groups involved in the portal are home decorators, professional designers and furniture manufacturers, but also e.g. design magazines and constructors can be easily involved, for instance by the creation of their own room decoration competitions.

Case 4: Crescendo Virtual Design Tool

Crescendo Design is an architecture and design firm which plans houses and some urban planning. They have been utilizing the virtual reality platform Second Life in communicating and interacting with their B2B and consumer clients. Second Life enables meetings with clients virtually, and clients may review the designs from their working place or home. In virtual meetings the company or its clients can test different design ideas in real-time, and customers can see the changes instantly while both receiving and giving instant feedback as they experience the design in an almost real environment. Virtual worlds enable designers and architects to gain valuable insight into the development of new products, when analyzing users' reactions towards virtual prototypes.

By direct and participant observations with the virtual design tool the information richness was evaluated very high and feedback acquisition from fast to immediate, since the interactions in the virtual world are very close to real life face-to-face interactions. Customers can receive and give instant feedback from changes to designs as they can experience the design in virtual reality. The interaction is usually deep dialogue between two parties, where the designer and client or client groups meet virtually and dis-

cuss about the design. As clients can also meet virtually with other experts whose opinion they want, there are mainly two stakeholder groups involved: customers and outside experts.

Discussion and Conclusions

In this study, we have created and proposed a model, the Social Customer Learning (SCL) model to analyse the potential of social media approaches in the customer interface of especially B2B innovation process. We also analysed, iterated and preliminarily validated the model by analysing various different types of B2B approaches.

On the basis of the preliminary testing and validation, the model seemed to be able to support recognizing and bringing forth important customer learning-related differentiating characteristics of the studied social media approaches. Many social media approaches that on the surface level seemed relatively similar were found, through SCL model analyses, to include important differences, for instance concerning the quality and type of feedback concerning customer needs received from the use, as well as the type of interaction supported.

The model can be applied to analyse quite various types of social media applications. The model was designed to be rather generic, and thus, it could be criticized for being too general to be pragmatically useful. However, our aim was to describe and analyse very different types of social media approaches available, from more simplistic and less information rich microblogging and blogging solutions to highly information rich virtual world communities. Thus, such a model had to be designed at a relatively high level of generality. We tested mainly B2B company-oriented customer communities, excluding in this study for instance intermediary organization-types of closed communities such as InnoCentive, which have rather little value in the in-depth customer learning.

On the basis of our analysis of 14 B2B social media cases altogether, and 4 more in-depth analyses, we found interesting rather novel opportunities for customer learning from the use. A large variety of levels of use was discovered in all the four dimensions of the SCL model. No two similar profiles were found in analysing the 4 more in-depth or even the 14 cases of more superficial analysis. This indicates, first, that the model was able to uncover differences quite well, revealing the existing differences. This supports the functionality of the model dimensions and level descriptions. Second, the results reveal that there is a large variety of different forms of existing solutions that can be used in the B2B sector to support learning from and with customers. Thus, we have demonstrated that not only B2C's but also B2B's can really make use of and benefit from social media in their innovation process and customer knowledge creation. Furthermore,

on the general level, our study has demonstrated that various social media approaches can promote the change from merely exploiting customer information and knowledge by companies to actually engaging customers to be involved in knowledge co-creation with their suppliers and peers.

Some of the learning-related benefits were related to learning from customers, and some, on the other hand, to learning with customers. In earlier studies, even if user-toolkits combined with communities and peer-learning have been identified as a novel and very useful social media approach in customer-oriented learning and innovation, the existing examples identified in current studies (e.g. Jeppesen & Frederiksen, 2006; Piller & Walcher, 2006; Franke, Keinz, & Schreier, 2008) have been almost solely intended for consumers and usable as models for the consumer-sector only. Such examples include the cases of Lego and Threadless user communities. In our study, three very different types of possibilities for using user-toolkits (c.f. Von Hippel, 2005) in B2B customer learning were recognized in this study, namely Bombardier innovation contests, Crescendo 3D design tool in Second Life, and Mydeco's 3D social user toolkit for interior design. The analysed profiles of all these three differed from each other very distinctly in all four model dimensions. The ways for peer-related learning and experimentation-related learning through various types of feedback were also quite different from each other, providing interesting models for B2B's that can be applied in different situations and industries. In addition, the number and type of stakeholders of the respective communities and the ways that they interacted with each other, enabling peer-learning differed clearly.

There are various possibilities for benefiting from using the SCL model both managerially and academically. The model can be used, first, for evaluating the major characteristics of existing B2B-related social media approaches in the customer interface of innovation. It can be applied to support the identification of novel social media approaches that might serve as examples and models for creating or facilitating companies' own social media approaches. The model serves also as a basis for building a roadmap for social media adoption: all four dimensions serve as potential directions for extending current approaches and for planning the adoption in reasonably small, manageable steps using also the level descriptions as a guideline. Thus the model may help in avoiding too large or unplanned steps, because the adoption of more complex approaches may take a long time and requires the simultaneous development of new open culture, incentives, processes, skills and information security management. We notice also that the model may help to identify novel possibilities of social media implementation, helping for instance to identify novel combinations of different dimensions and their respective levels.

While ideally, model dimensions should be fully independent, we found that few correlations exist between some model dimensions. These are concerned mostly between the very high level of information richness and the other dimensions, especially the immediacy of feedback. However, the proposed model in our opinion addresses the paper goal better from the specific standpoint of customer-related learning by B2B social media applications than found earlier information richness models, and provides a more descriptive way to analyse and distinguish between different social media approaches, especially in their capability to support customer-related learning, as intended. Still, this matter should be taken into consideration when interpreting the results, and the results should be interpreted more as a means of better understanding, characterizing and distinguishing the major characteristics of B2B social media applications that affect the ability of the applications to support customer-related learning.

Further research includes the more detailed validation of the model with more in-depth analyses of B2B cases, as well as the identification and analyses of further novel B2B approaches. We also consider it interesting in our further research to analyse which kinds of customer learning-related synergies might be approachable by combining for instance user toolkits with various types of community approaches, while the benefits are derived from the combination of for instance experimenting with novel concepts, getting both sensory feedback from 2D or 3D pictures and feedback from peers and respective communities.

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Publication 6

Towards Maturity Modeling Approach for Social Media Adoption in Innovation

By

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Towards Maturity Modeling Approach for Social Media Adoption in Innovation

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Abstract: Social media provides new opportunities for innovation, however its adoption especially in business-to-business innovation has remained moderate. While many companies are experimenting to develop and adopt social media approaches in innovation, many experiments fail, or are not designed in a useful way to maximize learning and social media adoption. Much has been studied and is generally known about the adoption of organizational innovations, such as IT-based solutions. However, very few studies relate directly to the unique challenges of social media adoption and use. Our aim is to develop a pragmatic and easy-to-use and understand framework for aligning social media –related development efforts, basing the framework on many-dimensional maturity modeling not earlier found in academic literature. Using literature and interviews of business-to-business companies, we determined preliminarily major maturity dimensions for social media maturity model in innovation, and preliminary descriptions related to the low and high maturity in each determined dimension.

Keywords: social media adoption, maturity models, innovation, business-to-business

1 Introduction

The paradigm of "open innovation" emphasizes importance of the efficient use of knowledge and information, particularly the significance of knowledge residing outside company borders. This is because valuable innovation-related knowledge is being increasingly widely distributed to different actors, organizations and communities.

Importantly, various types of collaborative web approaches, such as social media, can significantly increase the use of distributed knowledge both within and outside company.

Even though social media provides new opportunities for innovation and new ways of involving customers in innovation (Bernoff & Li, 2008; Cachia et al., 2007), social media adoption in innovation has remained low (Inkeroinen, 2010), and especially, its adoption in business-to-business innovation has been moderate (Isokangas & Kankkunen, 2011; Kärkkäinen et al., 2010). While many companies are experimenting to develop and adopt social media approaches in innovation, a large part of the experiments fail, or are not designed in a useful way to maximize learning and social media adoption.

Our aim is to develop a pragmatic and easy-to-use and understand framework for aligning social media -related development efforts. This means, for instance, that we aim to include and focus on the most critical few managerial dimensions that affect adoption in specifically innovation context. We base the framework on maturity modeling, which is commonly used in similar types of roadmapping approaches, e.g. in innovation and collaboration. Maturity modelling has not been previously applied in academically reported studies in social media adoption in innovation. The general purpose of the framework is to enable the development of novel social media -related knowledge and capabilities in a more planned and coordinated way, thus facilitating the adoption of social media. In line with experiences of maturity modeling approaches in other application fields, the purpose of the maturity model framework is to increase the probability of success in social media efforts in innovation.

2 Organizational innovation adoption and maturity models

At general level, much has been studied and is known about the adoption of organizational innovations, such as IT-based solutions. However, while several studies have been conducted on the topic of challenges faced by organizations during the adoption and use of various enterprise systems, very few of them relate directly to the unique challenges of social media adoption and use (Kuikka & Äkkinen, 2011). Some found studies on the issue of social media adoption include the studies of (Far, 2010; De Hertogh et al., 2011; Corrocher, 2010; Zeiller & Schauer, 2011).

There is a huge stream of literature that helps to understand generic factors affecting adoption of organizational innovations or technologies, such as various IT solutions. Generally accepted individual adoption factors, as perceived by potential adopters, include the relative advantage and complexity of the innovation, its trialability, compatibility to current practices, innovation familiarity, etc. As a second adoption approach, there are several adoption models, e.g. Rogers' adoption model (Rogers, 2003) and Technology Acceptance Model (Davis, 1986). These aim to explain the potential users' intention to use technological innovations, more than the adoption per se. As a third approach, in complex and long-term adoption processes, such as the adoption of large IT solutions and the alignment of IT with business, companies have been able to support adoption by using maturity modeling approaches. Maturity models can be described as roadmaps for implementing practices in organisations. Conceptually a maturity model represents phases of increasing quantitative or qualitative capability changes of a maturing element in order to assess its advances with respect to defined focus areas (Kohlegger et al., 2009). We use maturity modelling design literature, as well as found existing maturity modeling approaches of various application areas as important

ingredients in designing the maturity model for social media adoption. Maturity models have shown great promise in helping companies to adopt various types of ICT- related approaches both on organizational level and individual process level.

3 Research design

The research design for the maturity model framework for aligning social media –related development efforts included the following steps:

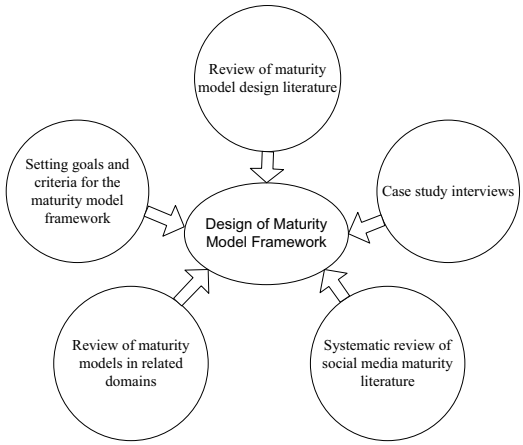

Figure 1: Major factors affecting the maturity model framework design

First we reviewed maturity model design literature for establishing important design criteria (Mettler, 2009; De Bruin et al., 2005). Second, we used the literature and our own objectives to setting goals and criteria for the maturity model framework (Kohlegger et al., 2009; Jokela et al., 2006). Third, we reviewed existing maturity models (Scheper, 2002; Batenburg et al., 2006; Fraser et al., 2002; Hain & Back, 2011; Essmann & du Preez, 2009) in related domains for identifying critical managerial dimensions, creating a picture of potential major dimensions for the maturity model framework. Fourth, we carried out a systematic literature review of social media maturity literature (see section 3.3) in order to identify the critical success factors of social media adoption, combining these to the previous preliminary dimensions and thus complementing the preliminary framework. Finally, we carried out case study interviews in different types of business-to-business companies with different expertise and interests in business-to-business social media, for complementing the picture and determining the criticality of the dimensions from the perspective of the companies. We also assessed the major links between dimensions by the interviews.

3.1 Creating and selecting suitable maturity dimensions for social media maturity model

Degree of specificity of the social media maturity model. Since maturity models can be both generic or specific (e.g. industry specific) (Mettler, 2009; De Bruin et al., 2005), this overall goal must be first taken into consideration when planning and selecting the

dimensions. In our case, our goal is to create a maturity model which can be applied in social media development in innovation and business-to-business contexts. Thus, ideally the dimensions should be (at least relatively) independent of for instance business-to-business companies' a) industry b) business logic, and c) product type. Due to the aim of a rather generic model, instead of a strictly company or industry-specific model, the assessed companies and their maturity levels should be at least somewhat comparable according to the dimensions.

Number of maturity dimensions. Quite generally, the number of organizational 'foci of assessment', i.e. the dimensions or viewpoints through which the organizations are examined and evaluated according to the maturity levels, varies from 1 to over 20 (Jokela et al., 2006) being typically around 3–7, depending on the model and its purpose. Concerning the number, no exact rule can be given, but the number should be such that the maturity model is capable to detect relevant differences between companies, and to provide useful instructions for improving the level of maturity in the context of the exact maturity assessment task. In addition, the results should be easy to understand. Since humans have limited cognitive capacities for memory, attention and perception, it has been suggested that five to seven items (Miller, 1956), generally known as the golden rule of 7, can be considered simultaneously in human decision making, and later research has maintained that the real number is even less, between three to five (Cowan, 2001). Bearing the above in mind, in our case, while we emphasize the easiness of use and the usefulness of the maturity assessment framework for continuous development of social media use, we aim for the least reasonable amount of dimensions, which would allow the continuous development of social media maturity.

First, the dimensions should be **critical for the maturity assessment purpose**, in our case social media maturity assessment and development. Taking into consideration our important maturity assessment aims, simultaneously, there should not be too many dimensions first, to make the assessment both easy to understand as a whole, and second, not to make the assessment too heavy for the organization or the assessors.

Generic planning goals. Maturity dimensions should reflect the critical success factors of social media, as well as the main competence areas which allow the planned adoption of social media. Closely related to social media maturity assessment, the commonly used basis for assessing maturity in information systems are people, processes or objects, or their combination (Kohlegger et al., 2009).

Alignment and coordination of development in maturity dimensions. Generally it is thought that in maturity modelling, the advancement in the dimensions should be aligned and coordinated. On the other hand, the relevance of a particular dimension may differ between companies, meaning that it may depend on the companies which dimensions should be most mature. Therefore, ideally, the dimensions, the scales and the levels should be selected also to reflect the above principle in the advancement of social media maturity.

Independence of maturity dimensions. Concerning the measurement aspect, ideally the dimensions should also be independent in the respect that for instance maturity in one dimension would not automatically imply maturity also in some of the other dimensions. Naturally, the dimensions, their names and descriptions should be well-defined and similarly understood by all making the assessment.

Bearing the above in mind, we first develop and describe preliminary major dimensions for a social media maturity model in the context of innovation and B2B industry, that is easy to use and comprehend.

3.2 Review of maturity models in related domains

As a starting point, since there were no academically described earlier maturity models in the field of social media in innovation or social media in general, one approach was to search for and utilize maturity modeling approaches in related fields. Considering the very substance field, innovation, we were able to find several related maturity models in product development and innovation. Second approach was to benchmark maturity models used more generally in Business Process Management. Third, taking into consideration that social media is based on web2.0 and various related IT- based solutions and applications, we benchmarked models related to the alignment of IT and business, and fourth, since the essence of social media is in collaboration support, several models were found that concentrate on various aspects of business-oriented collaboration, such as e-collaboration, product development collaboration and product lifecycle management (PLM). PLM maturity model is interesting because PLM is essentially about both intra-organizational as well as inter-organizational collaboration, in the specific context of information and knowledge management during the whole lifecycle (Batenburg et al., 2006).

Even though the models had their own more specific focus areas, they had many similarities, as well. Taking into consideration the topic area, social media in innovation, as well as our main design criteria, we benchmarked the maturity dimensions of especially the below described relevant models, but also other ones that seemed to integrate major dimensions or success factors that are important for social media adoption. Most relevant ones for our topic area were Information technology / Systems, Organisation / Processes / Management / Structured development process, People / Culture, Monitoring / Management / Control, and Strategy / Policy / Strategy and objectives / Collaboration strategy. Benchmarking other models, further relevant maturity model dimensions were for instance Incentives / Human Resource Systems / Human Resource Management (Niemi et al., 2009; Hammer, 2007; Kwak & Ibbs, 2002), and Information security (Lessing, 2008; Sallé, 2004). The last two ones are also among the major success factors of social media in business (see next section). In next section, we will combine found critical success factors having an impact to social media adoption to the analysis of the above potential maturity dimensions, deriving more understanding of most relevant maturity dimensions for our model.

Table 1 Related maturity model domains and their dimensions.

Maturity model domain	*Maturity model dimension*
Business/IT-alignment (Scheper, 2002)	Strategy and policy, Monitoring and control, Organisation and processes, People and culture, Information technology
Product Lifecycle Management (Batenburg et al., 2006)	Strategy & policy, Management & control, Organisation & processes, People & culture, Information technology
Business Process Management Maturity (Rosemann et al., 2006)	Information Technology and Systems, Culture, Accountability, Methodology, Performance
Product development collaboration (Fraser et al., 2002)	Collaboration strategy, structured development process, systems design and task partitioning, partner selection, getting started, partnership management, partnership

	development
E-Collaboration (Hain & Back, 2011)	Strategy, Processes, People, Systems
An Innovation Capability Maturity (Essmann & du Preez, 2009)	Strategy & Objectives, Function & Processes, Organisation & Management, Data & Information, Customers & Suppliers

3.3 Critical success factors of social media adoption

The existing studies mainly report only individual factors that affect social media adoption, such as management support, people's skills and culture, processes, and empowerment. Supplementing the social media –related maturity modes' maturity dimensions, we attempted to relate the found social media critical success factors to maturity dimensions. One critical area was found to be Incentives, rewards and motivations, not included as a separate dimension in the maturity model studies among the most closely related ones. This was mentioned as critical in almost all critical success factor studies. Second critical area of similar fashion was Information security, mentioned as critical in several success factor studies. Other commonly mentioned ones included top management support, empowerment and simplicity / ease of use. Information technology or Monitoring, management or control did not find very much support in success factor studies, but this does not necessarily mean that they are not among the important factors.

Similarities with above mentioned maturity dimensions:

- Incentives / rewards / motivation (a, b, c, d, g, e, h, i)
- People / Culture / Skills / Attitudes (b, f, g, h, i)
- Information security (d, f, i)
- Organisation / Processes / Management / Structured development process (a, b, d, f)
- Monitoring / Management / Control
- Information technology / Systems
- Strategy / Policy / Strategy and objectives / Collaboration strategy

Table 2 Critical success factors in social media adoption.

Social media maturity studies	*Critical success factors in social media adoption*
a) Governing Web 2.0 (De Hertogh et al., 2011)	Empowerment, Processes, Collaboration, People and Culture
b) Adoption, Motivation and Success Factors of Social Media for Team Collaboration in SMEs (Zeiller & Schauer, 2011)	Empowerment, Processes, Collaboration, People and Culture
c) The adoption of Web 2.0 services: An empirical investigation (Corrocher, 2010)	Ease of use, usefulness, tool experience, Extrinsic motivation and intrinsic motivation
d) Evolving the Social Business: A Look at Stages of Growth	Issues of ownership, approval, branding and responsibility, Security, Empowerment, Management

	for Web 2.0 Integration with Business Activities (Jacobs & Nakata, 2010)	models, business models and processes, Motivation
e)	A Conceptual Model for Dimensions Impacting Employee's Participation in Enterprise Social Tagging (Allam et al., 2010)	Perceived usefulness, Perceived usability, Perceived sociability
f)	A Comparative Study on the Use of Web 2.0 in Enterprises (Fuchs-Kittowski et al., 2009)	Business processes, organisational principles of Web 2.0, Top management support, Security, Corporate culture
g)	Web 2.0 in Unternehmen – Eine Fallstudien-Analyse (Granitzer & Tochtermann, 2009)	Management support, Attitude of management, Management acting as a role model, Using opinion leaders and promoting to attract attention and raise interest of employees, Training
h)	Exploring the value of enterprise wikis – A Multiple-Case Study (Stocker & Tochtermann, 2009)	Management commitment and attention, Corporate culture privileging open communication, Convinced users and first-movers that motivate others
i)	Overcoming Organisational Resistance to Using Wiki Technology for Knowledge Management (Pfaff & Hasan, 2006)	Open democratic approach to knowledge sharing, Security and legal concerns, Rewards

4 Case study interviews

Case study interviews of four B2B company's key persons: CEO of social business design and social media consultancy company, Managing Director and Project Leader of Business-to-business marketing agency, Marketing and Product Manager of automation technology company, CEO and CTO of software company, were performed to the determine criticality of the dimensions from the perspective of the companies and to assess the links between the dimensions. Information oriented selection strategy was used in the selection of cases in order to maximize the utility of information from small samples and single cases (Flyvbjerg, 2006). The intent was "to obtain information on unusual cases, which can be especially problematic or especially good in a more closely defined sense" (Flyvbjerg, 2006), from two companies with extensive experience of social media maturity as well as extensive experience on various types of companies in the business-to-business sector, and two business-to-business organisations with less experience of social media maturity in innovation. Four cases were found to be sufficient for in-depth cross-case analysis (Eisenhardt, 1989). Triangulation of researchers was used in the case company interviews and data analysis in order to explore the phenomena from multiple perspectives (Baxter & Jack, 2008).

Case study 1: Social business design and social media consultancy company

Company A is a social business design and social media consultancy company focused on helping companies understand and utilize social tools and ways of working to improve

their competitiveness. Company A has broad experience of social media adoption in business-to-business companies ranging from small to large enterprises representing different industries.

Based on extensive practical experience and studies conducted by the company, companies describe several critical managerial dimensions with varying degrees of importance. At a general level especially the innovation-related processes seem challenging for companies. Companies are finding it difficult to integrate social media efforts into business processes. Regarding managerial dimension of needed skills and competences, there seems to be a generational gap, while the younger generation are adept at utilizing social media the older generation have less personal experience with social media, which can lead to different misconceptions about the adoption of social media. Concerning social media practices companies are having difficulties in adopting more interactive and collaborative ways of working. Regarding the motivation to adopt social media companies are finding it difficult sell the benefits of using of social media internally, without knowing "what is it in for me", there is less incentive to adopt social media. Regarding information security there is yet a relatively common misconception that using social media means sharing all content openly in a public network, which limits the perceived potential of social media.

Two critical links between the managerial dimensions are important from the business perspective. If senior management is not leading, or is lacking on needed skills and competences, it is more likely that the business functions adopt social media rather independently, for example product development uses social media, such as wikis, internally in product development, but the efforts are not coordinated with other functions. Information security is another influential managerial dimension, which has many implications on the social media practices of the company.

Case study 2: Business-to-business marketing agency

Company B is marketing and communications agency specialised in business-to-business context. Company B provides development and implementation for brand- related concepts, marketing solutions, advertising solutions, communication solutions and social media solutions for different industries and companies.

Company B has gained broad experience in implementing and using social media with their business-to-business customers. With the experience Company B has, they stated innovation-related processes, needed skills and competences, social media practices and information security as the most critical managerial dimensions affecting social media adoption. Regarding business processes, according to Company B, companies find it challenging to integrate social media with business processes. Social media is often considered as a new dedicated process in companies, without any connection or need to rethink the role of the existing processes. Another important managerial dimension according to Company B was needed skills and competences where social media adoption encountered challenges with different age groups. The lack of knowledge and skills complicates social media adoption and use among older generation employees and management.

Company B highlights especially one critical link that is between innovation- related processes and social media practices. In innovation- related processes it is difficult to connect and integrate social media with and between processes because companies have the notion that each process requires its own dedicated resources that typically are

established as a separate function from other processes. When adopting new technology, such as social media, the ways of working also with existing technology should be re-examined.

Case study 3: Automation technology company

Company C provides automation systems. Since the foundation of the company a couple of decades ago, continuous development of innovative products and solutions has been the basis of continued success.

In social media, Company C is utilizing social networking as a source of innovative ideas. Based on the experiences, Company C considers the most critical managerial dimensions being: Information security, Social media practices, Innovation-related processes and Incentives and motives for participation. Company and customer confidentiality must be secured in social media. Not all the social media channels are such, where customers are willing to communicate openly, e.g. about their products or product related problems. Generally, understanding the benefits of social media both personally and for the business can work as an Incentive and motive to participate.

Company C highlighted two critical links between the managerial dimensions. Firstly, the importance of information security is influencing social media practices because it places boundaries for participation of customers in innovation. Not all information is suitable to be shared in social media. Secondly, related to both the Innovation-related processes and Incentives and motivations for participation, it is challenging to measure the financial outcomes of social media adoption and use.

Case study 4: Software company

Company D is a software company that helps its clients to make better decisions about their property by developing software that adapts to the client's needs and helps to reduce operation costs and increase the value of the investment. Company D can be described as a business-to-business company that is just beginning to adopt social media in innovation with their customers, although they have extensive knowledge of web 2.0 technologies.

Considering information security it's necessary that confidential customer information is only discussed in two-way interaction with customers and not posted on community that is open and visible for all users. Different types of incentives are suitable for different audiences. For example, the key customers could benefit from the opportunity to tailor the product to better meet customer's needs, e.g. to participate in more detail in the ideation of new product features. Whereas, for the broader customer base, the open and visible customer community that provides an opportunity for everyone to post, and comment on new ideas about product features can facilitate learning from others and thus motivate to contribute.

The company described two critical links between the management dimensions. Firstly, depending on the social media practices there are different issues about information security that have to be addressed. Secondly, different incentives have to be used at different levels of social media practices.

Summary of case-studies

The cross-case analysis (Table 3) summarizes, which managerial dimensions the companies considered most critical. Innovation- related processes, social media practices, incentives and motives for participation and information security were seen in all companies as critical managerial dimensions. Six different critical links between the managerial dimensions were described in the interviews, which indicate that parallel and coordinated development of managerial dimensions is needed.

Table 3 Summary of cross-case analysis.

	Social business design and social media consultancy	*Business-to-business marketing agency*	*Automation technology company*	*Software company*
Most emphasized critical managerial dimensions				
a) Innovation- related processes	X	X	X	X
b) Needed skills and competences	X	X		
c) Social media practices	X	X	X	X
d) Incentives and motives for participation	X	X	X	X
e) Information security	X	X	X	X
Most emphasized critical links between managerial dimensions				
	(a) and (b), (e) and (a), (e) and (c)	(a) and (c)	(e) and (a), (a) and (d)	(c) and (e), (d) and (c)

5 Preliminary social media maturity model dimensions and framework

Based on review of maturity model design literature, related maturity models, social media adoption success factors, and case company interviews the selected critical managerial dimensions and their preliminary low and high level descriptions are illustrated in Figure 2. Other possible managerial dimension candidates include strategy, culture and measurement. However, since strategy should control all managerial dimensions it is perhaps not best represented as another managerial dimension, but as a separate entity spanning all dimensions. Culture is partly connected to Incentives and motives of participation e.g. top management support and attitude of management and also Needed skills and competences, as in participatory culture that manifests e.g. as changed attitude toward intellectual property and strong support for creating and sharing one's creations. Measurement that many other maturity models also do not treat as a separate dimension, is also linked into Incentives and motives for participation. For

example, the need to perceive personal and business benefits in using social media is mentioned in the interviews.

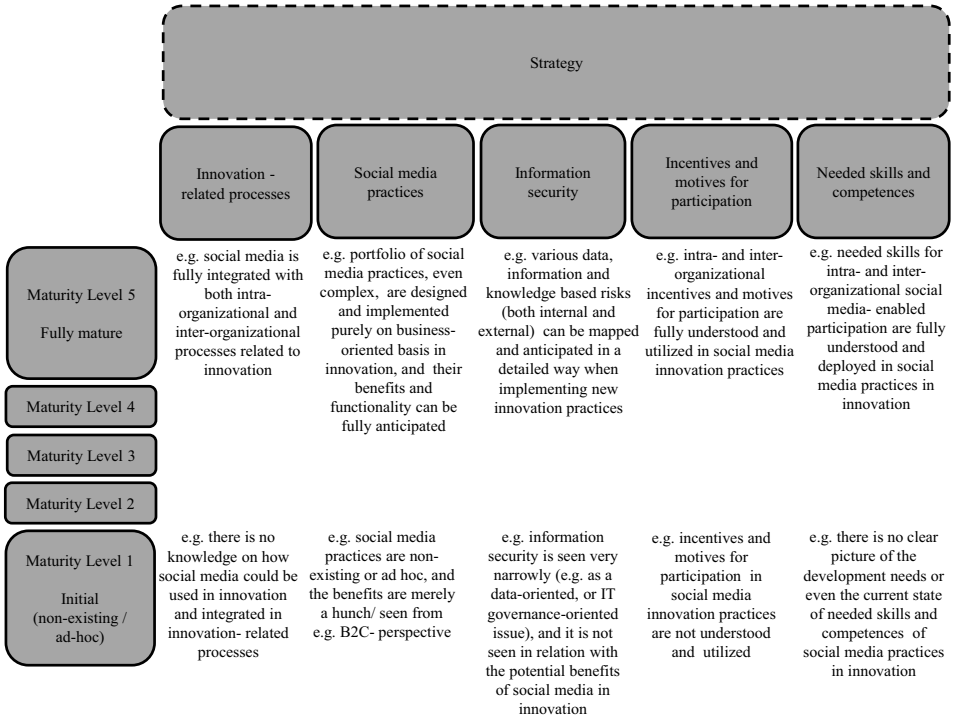

Figure 2.Critical maturity dimensions of social media adoption in innovation, and the preliminary low and high level descriptions of dimensions

6 Discussion and conclusions

Our aim was to develop a pragmatic, easy-to-use and easy-to-understand framework for aligning social media -related development efforts, focusing on the most critical few managerial dimensions that affect the adoption of social media specifically in the innovation context.

Using current literature and interviews, the few most critical managerial dimensions having an impact on social media adoption in innovation were Innovation- related processes, Social media practices, Information security, Incentives and motives for participation, and Needed skills and competences. Other possible managerial dimension candidates included strategy, culture and measurement. We created also preliminary descriptions related to the low and high maturity of each dimension. In addition to these, we described some critical links between dimensions important for coordination of efforts, on the basis of literature and company interviews.

It would perhaps be possible to end up slightly in different types of dimensions than the above, for instance depending on in which manner the critical social media adoption factors would be organised and categorised into larger entities. Still, we consider our model and model dimensions to be a good first attempt towards maturity modelling

approach in social media- supported innovation. The framework and dimensions will be further validated and developed in future studies.

Our study contributes to the social media adoption literature in innovation context first by adding our understanding of social media adoption in innovation as a process, as well as the adoption in the form of a roadmap (maturity model). Second, we contribute to the above literature by understanding social media adoption as a sequence of parallelly and coordinatedly developed adoption stages, and as the development of related knowledge, competences and capabilities. Earlier related studies have not considered social media adoption as a process and as the coordinated parallel development of competences that are interconnected.

Considering the managerial implications, first, the developed maturity model will help companies to adopt social media in a more coordinated and faster way. Second, it can be presumed to increase the probability to succeed in social media efforts, and to enable the companies to create more intelligent and realistic experiments when facilitating social media adoption. Third, it enables the development of novel social media -related knowledge, capabilities and competences in a more planned way, and develop a roadmap for their facilitation in the longer period of time

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Publication 7

Social Media Roles in Crowdsourcing Innovation Tasks in B2B-Relationships

By

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Social media roles in crowdsourcing innovation tasks in B2B-relationships

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Abstract: Social media and crowdsourcing are increasingly important means of involving different actors from outside the company borders, as well as their expertise, knowledge and other resources in the development of new innovations. Research on the use of social media in innovation of B2B companies has been carried out only quite recently, and is yet little understood. The goal of this exploratory study is to understand the significance and the various roles and functions of social media in crowdsourcing, especially in crowdsourcing innovation- related tasks in B2B relationships. A three-phase netnographic approach, including literature review, participant observation and case analysis, was used to identify crowdsourcing platforms that have been utilized in B2B context, as well as concrete company cases targeted for B2B innovation development, and to develop understanding on what was crowdsourced, and what was the role of social media in crowdsourcing carried out by companies.

Keywords: Crowdsourcing; innovation; open innovation; social media; B2B; business-to-business; B2B products.

1 Introduction

Some increasingly important relatively novel means of involving different actors and their expertise and knowledge in the development of new products and innovations are social media (Bernoff and Li, 2008) and crowdsourcing (Howe, 2008) in particular.

Social media is one of the important drivers for a quick-paced increase in currently existing crowdsourcing approaches.

The current lack of organized and analysed case evidence and examples, as well as a lack of a suitable framework for evaluating and pinpointing useful crowdsourcing approaches especially in the business-to-business (B2B) sector make it difficult for managers to estimate the possibilities of social media in crowdsourcing innovation tasks. Some characteristics of the B2B sector, such as B2B's having typically far fewer customers than B2C's (Geehan, 2011), often make it difficult to locate sufficiently large and useful crowds of customers for crowdsourcing purposes. Second, the ways to motivate and engage business customers are, in many respects, very different from motivating and engaging consumers (Tickle et al., 2011) for crowdsourcing purposes. Third, various IPR and information security issues (Marjanovic et al., 2012) set limitations and challenges for crowdsourcing use in B2B sector. Due to the above characteristics, currently available academic studies, that almost merely present B2C crowdsourcing examples, are useful only in a very limited way to B2B's.

Recent studies demonstrate that B2B- crowdsourcing is actually possible, despite many restrictions and related doubts (e.g. Koivisto, 2012; Kärkkäinen et al., 2012; Simula and Vuori, 2012). It has only been done by a small amount of forerunner companies in variety of innovative ways (Simula and Vuori, 2012; Simula et al., 2012). Simula and Vuori (2012) demonstrate that conducting crowdsourcing is clearly more challenging in the B2B context, and they emphasize the need for more research of crowdsourcing especially in B2B context.

Recent studies (Marjanovic et al., 2012; Stanoevska-Slabeva, 2011) reveal that social media seems commonly to have an important role in crowdsourcing, and even if crowdsourcing has been carried without the aid of computers, it seems to benefit from social media in a variety of ways, for example by enabling crowdsourcers to reach larger crowds, more competent crowds, or crowds with more extensive knowledge variety. Current studies (e.g. Simula and Vuori, 2012) also bring forth that the roles of social media in B2B crowdsourcing are not yet understood comprehensively.

In addition research of social media in business-to-business innovation and new product development tasks, has been carried out only quite recently, and the topic is currently yet little understood. In the B2B context, it has been e.g. shown that social media can enable and significantly increase the collaboration and learning form customers in various ways, for instance by novel social ways of providing and receiving feedback from new products and concepts (Jussila et al., 2012; Kärkkäinen et al., 2011).

The goal of this exploratory study is to understand the significance and the various roles and functions of social media in crowdsourcing innovation- related tasks in B2B relationships. To achieve the goal, a three-phase netnographic approach was used to gather and analyse the data related to the specific subject area of the study. The first phase consisted of a literature review to gain an overview of the various crowdsourcing platforms related to B2B innovation. The second phase included a participant observation to gain more knowledge and identify crowdsourcing platforms, as well as identifying concrete company cases targeted for B2B innovation development. The final phase consisted of a maximum variation case selection strategy-based multiple case study followed by case analysis to develop understanding on what was crowdsourced (innovation task, task complexity and types of crowds used) and how the crowdsourcing was carried out (the role of social media in crowdsourcing) in companies operating in B2B markets and producing B2B products and services.

2 Crowdsourcing in B2B innovation

Crowdsourcing is a relatively new concept. One widely accepted useful definition clarifying the general nature of crowdsourcing has been presented by Howe (2008). 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.". This definition is not, however, sufficient for understanding crowdsourcing specifically in B2B context, nor to identify useful B2B crowdsourcing cases for our study.

Defining crowdsourcing in B2B context

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 (2012) 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 fulfil the task, but also distinguishing the different needs that both actors have during the process (Estellés-Arolas and González-Ladrón-de-Guevara, 2012).

Drawing from the above, we perceive B2B crowdsourcing 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). In order to understand crowdsourcing in B2B innovation in the context of this paper, we define (Kärkkäinen et al., 2012) crowdsourcing as:

> "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

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"

By business-to-business innovation we refer to the development of new commercially successful products, services and other innovations for other companies. In this study, we exclude internal crowdsourcing and focus on social media roles in external business-to-business relationships.

Crowdsourcing types in B2B innovation

Classifications of crowdsourcing have earned substantial attention in recent crowdsourcing literature. For example, Howe (2008) has described four primary types of crowdsourcing: crowd wisdom, crowd creation, crowd voting and crowd funding. Schenk and Guittard (2011) have collected and classified different crowdsourcing practices based on the type of tasks sourced (simple, complex or creative) and the nature of the crowdsourcing process (selective or integrative). In addition, Vukovic (2009) 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).

Based on our analysis of current literature, most importantly, the studies of Howe (2008), Schenk and Guittard (2011) and Vukovic (2009), crowdsourcing can be divided into two classes depending on the nature of compensation: a) mainly monetary or material compensation, b) mainly non-monetary or non-material compensation. In the mainly monetary or material compensation class we applied the definition of Vukovic (2009) that distinguished two different crowdsourcing types: competition and marketplace. However, based on the literature we identified three additional crowdsourcing types: events (Erickson, 2011), communities (Zwass, 2010) and toolkits (Bessant and Möslein, 2011). Instead of considering toolkits as an independent crowdsourcing type, we recognize it as a technological option that can be used in all types of crowdsourcing (for example Bombardier uses toolkits in its innovation competition).

In events and communities the compensation is typically mainly non-monetary and non-material, such as reputation, gaining new understanding, sharing knowledge, reciprocity, and a sense of community. It must be noted that our classification does not limit the use of multiple forms of compensations, but it is based on the primary form of compensation that is typically used. For example, in competitions the winner is typically compensated monetarily but he or she may also gain other forms of compensation, such as reputation.

To select different types of crowdsourcing cases for our maximum variation case strategy- based multiple case study approach, we ended up categorizing the different crowdsourcing types based on how the crowdsourcing platforms help the company to gain the resources (e.g. ideas, concepts, funding). For example, crowdsourcing platforms that applied competition logic, such as Atizo, were categorized as competitions. As events we categorized such crowdsourcing platforms as Dell Storm Sessions, where the resources were acquired by time-limited events, that neither were competitions nor were the participants monetarily compensated for participating in the event. Those crowdsourcing platforms (e.g. uTest) that followed a market logic, in which the company

gains the resource through assignment or task, we categorized as marketplace crowdsourcing type. Last, as innovation communities, we categorized crowdsourcing platforms where the acquiring of resources is not organised as competitions, time-limited events, or marketplaces, rather as ongoing communities, where the company and each community member can initiate the open call, for example National Instruments Idea Exchange (cf. Leino, 2011).

Roles of social media in crowdsourcing

A useful framework for conceptualizing the role of social media is the categorization of 5Cs based on the actions enabled by the social media tools: communicating, collaborating, connecting, completing, and combining. The frame was introduced by Vuori (2011). Examples of social media tools based on the 5Cs categorization are illustrated on Table 1.

Table 1 Examples of social media tools based on 5Cs categorization.

Tools	*Purpose*	*Application examples*
Communicating: publishing and sharing content		
Blogs, media sharing systems, discussion forums, microblogging, instant messaging	Publish, discuss, express oneself, show opinion, share, influence, store	Blogger, WordPress, Flickr, YouTube, Twitter, SlideShare, Prezi
Collaborating: collective content creation		
Wikis, shared workspaces	Create content together, collaboration, produsage	Wikipedia, TWiki, GoogleDocs, MatchWare
Connecting: networking people		
Social networks, communities, virtual worlds	Socialise, network, connect, play, entertain	Facebook, LinkedIn, SecondLife, World of Warcraft, Habbo Hotel
Completing: adding, describing and filtering		
Tagging, social bookmarking, syndications, add-ons	Adding metadata, describing content, subscribing updates, combining, serendipity	GoogleReader, Del.ici.ous, Pinterest
Combining: mixing and matching		
Mash-ups, platforms	Combining other tools and technologies according to situation and needs	GoogleMaps

Source: Condensed from Vuori (2011).

3 Research approach

We applied netnographic research principles, designed for studying internet- based platforms, e.g. social media- based communities, on the observation of textual discourse in selected social media- based crowdsourcing platforms, and the media (platforms) themselves (Kozinets, 2002) related to our research goal. The subject area of observation

of textual discourse was specifically crowdsourcing innovation tasks in B2B relationships, and the media studied were the identified and selected crowdsourcing platforms, where the conversation that produced the studied textual discourses took place.

Firstly, following Kozinets' netnography approach, we conducted a literature review to gain an overview of the various well-known crowdsourcing platforms related to our subject area. 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 which were skimmed by evaluating their relevance to B2B and innovation. Articles that dealt with only intra-organizational crowdsourcing were excluded, based on our B2B crowdsourcing definition. After removing duplicates from the search results, there were 59 unique documents in total that matched our criteria. Based on the literature review, we identified 104 different crowdsourcing platforms.

Secondly, to collect data and to sample related crowdsourcing platforms with the specific subject area (cf. Rokka, 2010), a participant observation (Lewis et al., 2009) was used as a part of our netnographic approach to identify the crowdsourcing platforms that have been utilized in business-to-business context, as well as concrete company cases targeted for crowdsourcing innovation tasks. The observation included registrations to several online platforms, browsing through the available textual discourses, and identifying, observing and analysing the social media actions the users have performed or can perform in the platforms. The approach included also following various links to secondary sources (e.g. company websites and online discussion forums) in order to gain comprehensive knowledge about the crowdsourcing platforms. During the observation we adapted Gill and Johnson's (2002) role of "complete observer" with some characteristics from "observer as participant", as we did not take part in the actual crowdsourcing tasks, but did not deliberately hide our presence on the platforms, either.

Further analysis, from the original 104 platforms, resulted in 19 crowdsourcing platforms that were used by B2B companies for innovation purposes representing four crowdsourcing types. Competition type of crowdsourcing included platforms: Atizo (Frey et al., 2011), Bombardier YouRail (Haller et al., 2011), InnoCentive (Brabham, 2008), Brainfloor (Hüsig and Kohn, 2011), Cisco i-Prize (Simula et al., 2012), Idea Bounty (Puah et al., 2011), GrabCAD Challenges (Simula et al., 2012), Lemminkäinen Constructive Idea (Simula et al., 2012), NI Community Challenges (Elliott et al., 2007), and TopCoder (Vukovic, 2009). Marketplace type of crowdsourcing included platforms: Go4funding (Simula and Vuori, 2012), Kickstarter (Noble, 2012), NineSigma (Sawhney et al., 2005), uTest (Vukovic, 2009), and Yet2 (Sawhney et al., 2005). Event type of crowdsourcing included platforms: Dell IdeaStorm Storm Sessions (Bernardino, 2010) and IBM Innovation Jam (Frey et al., 2011; Hüsig and Kohn, 2011). Community type of crowdsourcing included platforms: Dell IdeaStorm (Bernardino, 2010), My SAPiens (Ebner et al., 2008), NI Community Idea Exchange (Elliott et al., 2007), and YourEncore (Simula and Vuori, 2012).

Thirdly, and finally, by using maximum variation case selection strategy (Flyvbjerg, 2006) we selected nine crowdsourcing platforms with related B2B cases. The cases were drawn from different industry sectors, i.e. manufacturing, construction, information technology and professional services, and they represented different types of crowdsourcing (competitions, events, marketplaces, and communities). The studied companies operating in B2B markets utilizing these nine crowdsourcing platforms in innovation-related tasks were Baden-Chemie, Bombardier, Dell, Formlabs, Intuit,

Konecranes, National Instruments, Numerex and Tecnisa (Table 2). The purpose of the maximum variation case strategy was to learn as much as possible about the critical few cases concerning the different crowdsourcing approaches applied in the development of B2B products and services in different industries.

Table 2 B2B companies using a crowdsourcing platform to crowdsource innovation tasks related to specific B2B product in their respective industries.

Company and platform	*B2B product*	*Industry*
Baden-Chemie Atizo	Chemical product for building and redevelopment	Construction chemistry
Bombardier YouRail	Rail vehicles (interior design for trains)	Rail-equipment manufacturing
Dell IdeaStorm Storm Session	Developer laptop	Computer hardware
Formlabs Kickstarter	Professional 3D printer	Manufacturing (3D printing technology)
Intuit TurboTax Live Community	TurboTax Business tax software	Professional services
Konecranes GrabCAD Challenge	Chain hoist (chain wear indicator)	Manufacturing
NI Idea Exchange / Community Challenges	LabVIEW software product	Software
Numerex uTest	M2M (machine-to-machine) solution for tracking vehicles and assets	M2M hardware and software
Tecnisa Ideas	Building sites and buildings	Construction

4 Results and analysis

Because crowdsourcing an innovation task is a complex phenomenon, we decided to limit the results of this study to crowdsourcing of specific innovation tasks related to a specific B2B product of the company operating in B2B markets using the crowdsourcing platform (see Table 3).On the basis of the studied crowdsourcing cases, the complexity is due to several factors. First, crowdsourcing in B2B involves a crowdsourcing platform, which can be either company built or maintained, such as Dell IdeaStorm Storm Sessions, or it can be an intermediary platform that the company is using to crowdsource a specific task, such as Numerex used uTest to crowdsource testing of their hardware product. Second, while some platforms are seemingly built for crowdsourcing only one type of innovation task, for example funding in Kickstarter, actually various types of innovation tasks can be crowdsourced in most of the platforms. For example, in Kickstarter the company that is crowdsourcing funding from the platform can also crowdsource ideas from the contributors (backers) of the project. Third, the crowdsourcing platforms keep evolving, and new features and possibilities for crowdsourcing innovation tasks are introduced, making the object of study a moving target.

Table 3 Description of crowdsourced innovation tasks in select B2B company cases and crowdsourcing platforms.

Company and platform	*Crowdsourced innovation task*	*Task complexity*
Baden-Chemie Atizo	New ideas for chemical products (Atizo, 2012)	Complex
Bombardier YouRail	New interior designs of trains (Bombardier, 2012)	Creative
Dell IdeaStorm Storm Session	Requirements and features for developer laptop (Dell, 2012)	Complex
Formlabs Kickstarter	Funding of development of 3D printer (Kickstarter, 2012)	Simple
Intuit TurboTax Live Community	Solutions for customer problems regarding corporate taxes (Intuit, 2012)	Complex
Konecranes GrabCAD Challenge	New ideas and designs for chain wear indicator of chain hoists (Step files) (GrabCAD, 2012)	Complex
NI Community / Idea Exchange	New ideas and features for LabVIEW software product (National Instruments, 2012)	Complex
Numerex uTest	Testing hardware of vehicle tracking device (uTest, 2012)	Simple
Tecnisa Ideas	New ideas and concepts related with Tecnisa's construction projects, building sites, and individual apartments (Tecnisa, 2012)	Complex

We discovered that the crowdsourcing platforms were used to crowdsource simple, creative and complex innovation tasks. Simple innovation tasks, that required a relatively low involvement from the individuals, were observed to have been crowdsourced from Kickstarter platform and uTest platform. Numerex crowdsourced testing of their vehicle tracking device on uTest's platform, which practically only required the testers to install a device on the roofs of their vehicles. Formlabs used Kickstarter to crowdsource funding for the development of 3D printer, where the task was simply to pledge from $5 to $10 000 or more to the project.

Crowdsourcing of creative innovation tasks were observed in Bombardier's YouRail platform, where the company crowdsourced new interior designs for trains. The designs were either freely created by using any design tool or created with the help of configuration tool provided by Bombardier.

Most of the crowdsourced innovation tasks were however complex in nature, such as complex problem solving activities (e.g. solving problems of the customers on Intuit's platform) or generating new ideas, concepts or designs (e.g. Konecranes' GrabCAD challenge). Solving complex innovation tasks requires more knowledge intensive activities from the solvers as opposed to solving simple tasks (Schenk and Guittard, 2011). For example Konecranes' GrabCAD challenge of designing new chain wear indicators requires significant knowledge and expertise from various knowledge domains. Regarding crowdsourcing complex innovation tasks all of the platforms have different processes for selecting the most suitable solution from amongst all candidate solutions. These processes include, for example, GrabCAD's competition logic together with

solution seeker's criteria, and Tecnisa's or NI Community's processes where the solution seeker decides the solutions for further development.

In order to better understand the potential and roles of social media in crowdsourcing innovation tasks in B2B companies we used the 5C framework of social media tools (Vuori, 2011) to analyse the roles. Table 4 illustrates the identified social media roles in the studied company cases and crowdsourcing platforms from the perspective of the user.

Table 4 Social media roles in the studied company cases and crowdsourcing platforms from the user perspective (1C = Communicating, 2C = Collaboration, 3C = Connecting, 4C = Completing, 5C = Combining).

Case and platform	*1C*	*2C*	*3C*	*4C*	*5C*
Baden-Chemie Atizo	X	-	X	X	-
Bombardier YouRail	X	-	X	X	-
Dell IdeaStorm Storm Session	X	-	X	X	-
Formlabs Kickstarter	X	-	X	X	-
Intuit TurboTax Live Community	X	-	X	X	-
Konecranes GrabCAD Challenge	X	-	X	X	X
NI Idea Exchange / Community Challenges	X	-	X	X	X
Numerex uTest	X	-	X	-	-
Tecnisa Ideas	X	-	X	X	X

Regarding communicating there were differences in different platforms in sharing information inside and outside the platform. While most crowdsourcing platforms enabled sharing information inside the platform, platforms such as Bombardier YouRail and GrabCAD enabled sharing information also outside the platform. Sharing of information inside the platform was possible in a limited way in uTest and Kickstarter.

As for collaboration, collective content creation actions similar to the use of Wiki or Google Docs were not supported directly in any of the platform from the users' perspective.

Concerning connecting, the role of social media varied greatly between the platforms, although setting up profiles was possible in all of the platforms. Only a few platforms enable linking to other individuals' profiles, such as Atizo and NI Community and uTest. Navigating and interacting with others inside the platform was enabled slightly more in the platforms, e.g. Atizo, Bombardier YouRail, GrabCAD, and NI Community. In addition navigating and interacting with others outside the platform was made possible to those user's that had provided their social media contact details in platforms, such as Tecnisa Ideas and GrabCAD.

Related to completing, most platforms enabled describing content by means of commenting, but only a few platforms like NI Community enabled tagging. In NI Community new ideas are searchable by tags and tagging is also encouraged by presenting Tagging Leaderboards to the community.

Combining actions were possible in GrabCAD, NI Community and Tecnisa Ideas. In NI Community users could combine YouTube videos into new ideas to demonstrate what the user would like the software to do. Similarly, in GrabCAD and Tecnisa Ideas users combined YouTube videos to their ideas to better demonstrate the idea to the company.

5 Conclusions

We found that the role of social media was quite essential in every crowdsourcing type. Most of the crowdsourcing platforms utilized well-known social media platforms, such as Facebook, Twitter, LinkedIn, and YouTube to enhance the crowdsourcing initiatives. Some of the crowdsourcing platforms had built-in social functionalities such as commenting, mash-up functionalities, rating functions, and effective cross-referencing tools. On the surface level most studied crowdsourcing platforms enabled communicating, connecting and completing actions. Regarding communicating there were differences in sharing information inside and outside the platform. Collaboration, was not supported directly in any of the platforms from the users perspective. Related to completing, most platforms enabled commenting, but only a few platforms enabled tagging. Most platforms enabled connecting actions at the surface level, since it was possible to set up a profile in every platform. Combining actions were possible only in three platforms, in GrabCAD, NI Community and Tecnisa Ideas.

Social media served many different functions in B2B crowdsourcing, such as making the crowdsourcing calls more extensively visible, and enabling the general networking of the members of the crowds, but also quite essentially, they enabled, in various ways analyzed in this study, the efficient sharing of information and knowledge. As social media use has been very little studied and understood in the specific contexts of B2B and crowdsourcing, this study adds to the understanding of the roles of social media in B2B innovation context in general, as well as more specifically in crowdsourcing innovation related tasks in B2B relationships.

Companies that operate in B2B markets and produce B2B products and services can utilize the recognized and analyzed social media approaches and social media- based crowdsourcing approaches as useful models for facilitating their own open innovation activities and experiments. The concrete examples provide insight on potential areas of application of social media- based crowdsourcing approaches in manufacturing, construction, information technology, and professional service industries in innovation of new products and services ranging from machine parts to corporate tax solutions.

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