Organizational Online Participation

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Abstract

As today's employees demand higher degrees of involvement in terms of how, when, and where they work, open innovation and (internal) crowdsourcing are being widely adopted. Despite recent efforts by many organizations to implement such systems in order to increase the possibilities for organizational participation, studies have only narrowly explored how their design affects employee opinions and communication as well as how organizational culture influences usage and adoption.

This thesis investigates the conditions, capabilities and components for the design of organizational online participation systems, applying a Design Science Research approach. Following a literature review on idea generation, collaboration and evaluation in open innovation processes, we outline success factors for open innovation systems. We validate our success factors in practice by conducting semi-structured interviews with 20 experts from mid- and large-cap private and public organizations in Germany. Moreover, we derive three key challenges that guide our subsequent studies. First, we investigate the "Bag of Lemons" approach, a novel rating technique, and compare it to the standard techniques Likert scales and up- and down-voting. Our study with 141 participants in an open innovation engagement at a public-private research organization finds that BOL is perceived as more frustrating than the other two rating techniques, which is partly mediated by the significantly increased information overload. Second, we turn to anonymity in two distinct studies. We analyze the effect of anonymity, as compared to identifiability of user profiles, on communication persuasiveness – operationalized as actual opinion change – in a two-staged online experimental survey with 377 participants. We find anonymity to be a double-edged sword as it decreases perceived social presence, which in turn affects both user involvement as well as perceived user credibility. Thereafter, we investigate the design of a feature for optional anonymous contributions and its effect on participation and the choice of language in an internal crowdsourcing platform. Our analysis of an implementation and five-month test at a public organization with more than 110 employees shows the effectiveness of our "opt-in anonymity" feature as we elicit participation from otherwise reticent employees and no disinhibited language. Third, we analyze the design of an internal crowdsourcing system at this public organization in more detail, focusing on the influence of its organizational culture on usage and acceptance. We assert an IT-culture-conflict, as the organizational values do not match the open and communal approach transposed by the crowdsourcing system.

We suggest that organizational online participation is a promising tool to enhance employee involvement, driving innovations and enabling organizational transformation.

Contents

List of abbreviations

BDSG
: Bundesdatenschutzgesetz

BetrVG
: Betriebsverfassungsgesetz

BOL
: Bag of Lemons

CSCW
: Computer Supported Cooperative Work

DSR
: Design Science Research

DSRM
: Design Science Research Methodology

ELM
: Elaboration Likelihood Model

ESN
: Enterprise Social Network

GDSS
: group decision support systems

IS
: Information Systmes

NGO
: Non-Governmental Organizations

OOP
: Organizational Online Participation

OP
: Organizational Participation

OT
: Organizational Transformation

PaaS
: Participation as a Service

PLS
: Partial Least Squares

RQ
: Research Question

SEM-PLS
: Structural Equation Modelling based on Partial Least Squares

TMG
: Telemediengesetz

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1. Introduction

1.1 Motivation

Our working environment has dramatically changed in the past decades. Globalization and digitization have brought tremendous technological and organizational innovations. While they offer new opportunities, there are also many challenges for firms and their employees (Bock 2016; Brynjolfsson & McAfee 2017). For instance, at a time when artificial intelligence gains renewed attention, some scholars suggest that technological innovation will replace up to 47 percent of the workforce (Frey & Osborne 2013; Bonin et al. 2015). Simultaneously, competition increases for the human capital that is still required for those jobs that cannot be automated. This talent pool is getting scarcer and ever more sought after, which drives organizations to adopt new strategies (Cappelli 2014). Establishing working conditions that empower employees are at least as or, arguably, getting more important, given the increasing complaints by employers about a shortage of qualified labor (e.g., Cappelli 2014; Bundesagentur für Arbeit 2017) and the simultaneously growing demands by employees for a more meaningful, flexible and communal way of work (Tumasjan et al. 2011; Bock 2016).

There are many ways to improve the quality of working conditions, including ensuring safety and health as well as providing modern equipment and offices. Yet, as (particularly high-skilled) employees seek for more meaning in their jobs (Arnold et al. 2007), the topic of organizational participation (OP) recently gains more attention. OP is a way to meet the new demands by employees. For instance, start-ups seek to reduce hierarchies and increase employee engagement by implementing quasi-democratic structures in decision-making processes (Spiegel et al. 2016). OP's positive effects on job satisfaction and productivity have been well studied (Wegge et al. 2010; Wilkinson et al. 2010). However, despite recent efforts by many organizations to transform their organizational culture in the wake of "New Work" initiatives to promote more flexibility and empowerment (Bock 2016), OP is far from being widespread as it builds on flexible processes and flat hierarchies (Erickson et al. 2012). Yet, seen from the lens of the Information Systems (IS) literature, systems that enable participatory decision-making, such as creating, collaborating and evaluating ideas, may support organizations on their way to incorporate practices for OP.

In terms of these functions, many companies already offer their employees online social software, such as Intranets and, as of lately, Enterprise Social Networks (ESNs) as well as platforms for open innovation and crowdsourcing (Urbach et al. 2011; Leonardi &

Barley 2013; Riemer et al. 2015; Zuchowski et al. 2016). However, both from a theoretical as well as a managerial perspective, it is unclear whether OP per se suits all organizations (Davison & Martinsons 2002) and how an information system for organizational *online* participation (OOP) needs to be designed in order to give all employees a fair and efficient chance to participate in the decision-making processes of their organization.

Thus, the main research objective of this thesis is to study the conditions, capabilities and components (Baskerville & Pries-Heje 2010) for the design of OOP systems. In this sense, we[1] define OOP as online-based information systems, which enables all members of an organization to participate in its decision-making processes (we refine this definition below). Members include employees of an enterprise, Governmental staff, fellows of a university, or members of a Non-Governmental Organizations (NGO). Participation includes various forms of interactions in an organization, such as information sharing, consultation of stakeholders as well as co-determination and (shared) control by employees (Nerdinger & Wilke 2008). To this extent, OOP shares commonalities with both (internal) crowdsourcing (Zuchowski et al. 2016) as well as open innovation (Adamczyk et al. 2012).

1.2 Research Methodology

In order to approach the research objective of this thesis, we apply a Design Science Research (DSR) methodology (Hevner et al. 2004; Peffers et al. 2007; Gregor & Hevner 2013). OOP represents a topic, which not only involves technical considerations, but also encompasses organizational and behavioral questions. Thus, we need to aim for a holistic research approach. To this end, DSR is a promising method as it aims to capture both the practical side of relevant business and environmental conditions (i.e., people, organizations and technology) as well as theoretical foundations. Providing primarily prescription-driven research, DSR develops sound change programs that go beyond the mere understanding of problems (van Aken 2004; Gregor & Hevner 2013). Specifically, DSR applies rigorous IS research methodologies in order to develop artifacts and theories that can then be evaluated in research and practice (Hevner et al. 2004). Evaluation might entail case and field studies, analytical methods, as well as experimental and testing methods (Venable et al. 2012). It is because of this wide span that the Design Science

[1] "We" and similar plural forms refer to both the reader of this thesis as well as, if applicable, to the co-contributors of this thesis, which are explicitly mentioned for each chapter below.

Research Methodology (DSRM) continues to extend a highly influential position in IS literature (Gregor & Jones 2007).

While there are many different process models for DSRM (Offermann et al. 2009), we choose the one proposed by Peffers et al. (2007). The authors built on models from scholars of different disciplines, including IS, Engineering and Management Science. Peffers et al. (2007, p. 52-56) derive six key activities:

- Problem identification and motivation
- Define objectives for a solution
- Design and development of the artifact
- Demonstration
- Evaluation
- Communication

Although these steps seem sequential, Peffers et al. (2007) explicitly state that they would not expect researchers to proceed sequentially. Depending on the specifics of a case, a DSR project might start at any of the first four activities. More importantly, Peffers et al. (2007) emphasize that design science researchers could use the results of their evaluation to inform another iteration of the objectives definition as well as the design of the artifact in order to improve its effectiveness. Yet, the nature of the research venue determines whether such iteration is feasible or should be left to subsequent projects (Peffers et al. 2007, p. 56).

In order to define our research problem, we do not only consider the theoretical basis in this thesis. Hevner et al. (2004) stressed that DSR aims to solve *business* problems, too. Thus, we also aim to establish that our artifact is able to solve something of relevance for practitioners. Moreover, we will apply different methods in our chapters in order to cater each study to specific the problem or objective at hand. The next subsection will provide detailed information on the methodology and design of each of the chapters.

Finally, in Section 9 we will provide prescriptive as well as descriptive explanations for the results of this thesis. Baskerville and Pries-Heje (2010) argue that, by doing so, DSR is able to explain *how* an artifact should be designed and *why* it should have a particular set of design features. Prescription can be best captured in terms of components, whereas descriptions are best presented as requirements (Baskerville & Pries-Heje 2010). Thus, we summarize general components and general requirements for each of the chapters in the concluding part of this thesis.

1.3 Research Agenda

As emphasized by Peffers et al. (2007), at the beginning of our research, we need to understand and conceptualize prior literature relevant to our topic of interest. Thus, in Section 2, we begin with the theoretical background on OP, drawing from decades of research in Organizational Psychology and Management Science. At the end of Section 2, we also provide a definition of OOP and distinguish it from related research subjects.

We then begin to review literature from the IS discipline, which serves as the basis for this thesis. As we identify idea generation, collaboration and evaluation as key processes in OOP, we turn to the topic of open innovation (OI) for our literature review. We choose OI as this subject still receives a remarkable attention in research more than ten years after its conceptual inception (Chesbrough 2003). As both public as well as private actors continue to use OI instantiations in order to solicit new ideas, concepts and strategies from various stakeholders, OI is a highly relevant component of research and development activities in business, academia and society. There are now a number of professional OI platforms, which offer white label solutions to a variety of customers.

Although there are some literature reviews that focus on sub-areas of OI, from a system design perspective, it is still widely unclear which factors make an OI system successful. Thus, in Section 3,[2] we conduct a structured literature review (Webster & Watson 2002) that allows us to gain a better understanding on current research by deriving success factors (Petter et al. 2008) for idea generation, collaboration and evaluation in OI engagements. In terms of success factors, we build on the well-known IS success model (DeLone & McLean 2003), which includes the six dimensions of system quality, information quality, service quality, system use, user satisfaction and net benefits. Accordingly, our first research question (RQ) is the following:

> ***RQ1:*** What are the success factors for idea generation, collaboration and evaluation in OI systems?

We analyze, cluster and integrate 50 articles from leading IS journals and conferences in terms of their sources of innovation, types of IT artifacts, target variables and study methodologies. We also provide a research table that helps to distinguish and identify well-studied vis-à-vis under-researched areas in order to highlight emergent topics as well as research gaps. Furthermore, we run a greedy clustering algorithm analysis in order to

[2] This chapter is based on a joint research project with Jan Crommelinck, Timm Teubner, and Christof Weinhardt. Thomas Wagenknecht was the main contributor and lead author.

identify how the literature is connected in a network graph. This will help to locate studies and subjects that are central and, thus, of greater importance, to the study field. Moreover, we derive OI system success factors based on the six dimensions of the IS success model. Moreover, we analyze whether the model is able to properly reflect the results of extant research on OI. If not, we will extent the model in order to create a more specific success framework that is particularly valid for OI as well as OOP systems.

As Hevner et al. (2004) stressed that DSR aims to solve business problems, after having established a theoretical relevance, we validate these success factors in practice in Section 4[3] by interviewing 20 experts from various organizations. Our guiding research questions in this context are:

RQ2: What is the relevance of the success factors in practice?

RQ3: What are the objectives for a OOP solution design?

We leverage the network of a Government-funded research project consortium in order to recruit senior personnel from German mid- and large-cap companies as well as public and non-profit organizations. We develop an interview guide with open-ended questions (Weston et al. 2001) that aims to examine the organizational culture of the experts' organizations. Thereafter, we analyse prior experience with OP in general and OOP software tools in particular. We focus on idea generation, collaboration as well as evaluation in order to closely connect the expert interviews with Section 3. After recording each interview, we code and analyze them. Taking the OI system success factors as a basis, we cross-validate success factors with the practical experience our experts elaborated on. Taking the results of the literature review as a basis and validating the success factors in business practise allows us to establish the relevance of our research in practise (Peffers et al. 2007).

We derive three main challenges for OOP, which form the objectives for a solution and are, thus, the content of the subsequent chapters and the heart of this thesis. These include:

- the effect of rating scales on the idea evaluation process,
- the influence of anonymity on communication in OOP engagements, and
- organizational culture as an enabler or barrier for OOP.

[3] This chapter is based on another joint research project with Jan Crommelinck, Timm Teubner, and Christof Weinhardt. Thomas Wagenknecht was the main contributor and lead author.

OOP engagements usually generate vast amounts of proposals of varying quality. However, only a few can or even should be implemented (Di Gangi & Wasko 2009; Hossain & Islam 2015). Hence, there is a strong need for appropriate filtering techniques that achieve high accuracy in identifying the best ideas and avoid exposing users to the adverse effects of information overload (Schultz & Vandenbosch 1998). In practise though, OOP facilitators often ask their users to evaluate their peers' ideas by using simple rating techniques, such as up- and down-voting as well as Likert scale ratings. Yet, these techniques have inherent problems, such as limited accuracy due to oversimplification, a possible disconnect between the goals of process organizers and raters, as well as reduced user satisfaction (Ebner et al. 2009; Riedl et al. 2010) . Klein and Garcia (2015) developed a new rating technique, which aims to reduce some of these malfunctions. They proposed the "Bag of Lemons" (BOL) technique, which – in their own tests – performed faster and more accurate than other techniques. However, prior research has also established that users form attitudes toward rating scales (Kamis et al. 2008; Riedl et al. 2013; Blohm et al. 2016). This in turn predicts user motivation and long-term retention. Moreover, these indicators are also key in determining user acceptance and usage intention of information systems in the long-run (Venkatesh 1999; Hwang & Yi 2002). Nonetheless, Klein and Garcia (2015) did control neither for these attitudes nor for information overload. Thus, in Section 5,[4] we analyze the effects of the BOL rating technique in comparison to the more common techniques up- and down-voting as well as Likert scale rating. We study users' activity, perceived information overload (Schultz & Vandenbosch 1998; Oldroyd & Morris 2012), perceived novelty, and frustration (Riedl et al. 2013; Blohm et al. 2016). Accordingly, our research questions are as follows:

> ***RQ4***: How does the BOL rating technique affect user activity and frustration in a crowd-based evaluation task?
>
> ***RQ5***: Which role do perceived novelty and information overload play in mediating these effects?

In an online-based field experiment in an OI campaign for a mid-size German research center we assess how these three rating methods differ in terms of these measures. The study is embedded in a larger change management project. Employees are asked to evaluate a corpus of 42 ideas created by their peers. 141 employees participate in our

[4] This chapter is based on a joint research project with Timm Teubner and Christof Weinhardt. Thomas Wagenknecht was the main contributor and lead author.

study and are split among three treatments. Though it is difficult to compare rating techniques with one another, focusing on information overload as well as the attitudes users form towards the rating techniques – while keeping the idea corpus constant – represents a promising path that could grant more generalizability and validity to our study. Our basic study setup is similar to that of Klein and Garcia (2015). Yet, other than previous studies (Riedl et al. 2010; Riedl et al. 2013; Klein & Garcia 2015), participants in our study are not forced to rate all ideas, which promises a more realistic situation and novel findings.

After having studied rating techniques, which are part of idea evaluation in OOP, in Section 6 and 7, this thesis focuses on anonymity in the context of OOP as part of idea generation, collaboration and evaluation. Sharing information openly in an organization can become difficult when employees are afraid to communicate an opinion that is in contrast to what (they think) their managers' position is. This might not only hamper participation but also the potential impact of an OOP engagement (Haines et al. 2014; Tegarden et al. 2016). Thus, a feature for anonymous communication could free reticent employees. However, as anonymity also reduces behavioral cues and credibility, it might also lower the persuasiveness of arguments (Wilson et al. 2012; Jiang et al. 2013; Haines et al. 2014). Moreover, anonymity also reduces perceived social presence (Teubner et al. 2014), which is conceptualized as a computer-mediated feeling of social warmth (Short et al. 1976). We propose that this effect is mediated by the users' involvement and how they perceive the sender's credibility. Thus, in Section 6,[5] we assess actual opinion change as the main dependent variable in view of different conditions of user representation (anonymous vs. identifiable) in the context of a corporate discussion forum. Building on the eleaboration likelihood model of persuasion (Petty & Cacioppo 1986) and signaling theory (Spence 2002), we ask the following research questions:

RQ6: How does anonymity (as compared to identifiability) affect communication persuasiveness in a corporate discussion environment?

RQ7: Which role does social presence play in this context?

RQ8: How is the effect on communication persuasiveness mediated by perceived user credibility and personal involvement?

[5] This chapter is based on another joint research project with Timm Teubner and Christof Weinhardt. Thomas Wagenknecht was the main contributor and lead author.

We conduct a two-staged online survey, simulating a corporate discussion forum as part of an OOP engagement. We ask participants to state their opinion on a set of controversial discussion topics (e.g. pay-ratio between executives and lower-level employees). 583 participants completed this stage. Weeks after this initial assessment, we invite the same participants again for another survey. They see a semi-fictional discussion on one selected topic of these controversial issues, where their supposed colleagues either argue for or against a way to deal with this topic. The discussants are represented either by a profile image and name or remain completely anonymous. After reading through the discussion, participants are asked to state their opinion on the controversial topic again. Taking the statement of the first survey as a basis, this allows us to track actual opinion changes. 337 participants completed this second stage. Using a structural equation model and partial least squares analysis, we study the effect of anonymity on communication persuasiveness.

As mentioned above, anonymity is associated with positive and negative effects – some of which we are able to examine in Section 6 as we find anonymity to be a double-edged sword in OOP engagements, affecting message persuasiveness in intricate ways. Besides its effect on persuasiveness, anonymity is also often associated with foul language, hoax and more polarizing debates (Sia et al. 2002; Cho et al. 2012; Haines et al. 2014). Hence, if OOP facilitators want to grant an option for anonymous communication, they need to find a way to reap the positive effects, while mitigating the downsides. Accordingly, in Section 7,[6] we explore "Opt-in anonymity," a feature of an IT artifact we designed that aims to improve current OOP systems. Using this feature, by default, users contribute content identified by their (real) name. However, simply ticking a box they can switch to completely anonymous content contribution. We integrate this feature in an internal crowdsourcing system at a public organization that seeks to engage employees of a public organization to contribute proposals for strategic planning. In order to evaluate whether the artifact is able to reap the positive benefits of anonymity (i.e., increasing participation), while mitigating the negative sides (i.e., foul language), we ask the following research question:

RQ9: How does a feature for optional anonymity affect participation and the choice of language in a OOP engagement?

[6] This chapter and Section 8 are based on a joint research project with Olga Levina and Christof Weinhardt. Thomas Wagenknecht was the main contributor and lead author.

After jointly gathering software requirements with future users, we analyze our artifact during a five-month test run at the public organization that has approximately 110 employees. Our evaluation is informed by the conceptual framework of group support system anonymity by Valacich, Jessup, et al. (1992), which claims an anonymous group process to be dependent on the organization's group size, proximity, history and composition. After analyzing these organizational components, we conduct our evaluation in four steps. First, we perform a qualitative content analysis of the user-generated input. Second, we invite all employees to a survey, asking for user acceptance, ease of use and future usage intention of our artifact (Venkatesh et al. 2003). Third, we conduct individual interviews with senior personnel at the public organization and, fourth, run a focus group with both senior as well as lower-level employees in order to gain a deep understanding of user behavior and usage of our artifact.

Our analysis shows no disinhibited language or caustic comments. Instead, user contributions were perceived as innovative, constructive and mostly positive. Yet, there seem to be further factors that hinder wider user acceptance and participation. As these factors are related to the organizational structure and culture, in Section 8[6], we turn to organizational transformation and culture. To this end, we refer to the theory of IT culture conflict (Leidner and Keyworth 2006). Research in IS proposes that organizational culture determines the use of IT – and vice versa (Cooper 1994; Cha et al. 2015). If employees perceive a system to match organizational values and norms, they will likely adopt it (Leidner & Kayworth 2006; Nevo & Wade 2010). Yet, for various reasons, if the system does not fit the organizational culture, it will remain unused or employees might even resist implementation (Tyworth 2014; Cooper 1994; Markus 2004). Although the broader IS literature, as well as this thesis, have already explored various aspects of internal crowdsourcing systems, studies on the effect of organizational culture on the implementation of such systems are scarce (Erickson et al. 2012; Benbya & Leidner 2016). Yet, several scholars suggest that internal crowdsourcing systems require a shift in organizational practices from hierarchical structures and fixed processes to flat hierarchies and flexible processes (Erickson et al. 2012; Zuchowski et al. 2016; Riemer et al. 2015). However, we argue that the prevailing organizational culture at the public organization at hand, which has a high degree of formalization and hierarchy (Jackson 2011; Hurley & Hult 1998), might be in sharp contrast to the organizational culture that would be required to ensure a successful adoption. Thus, we aim to identify organizational culture characteristics that facilitators should consider when implementing an OOP system. Our research question is as follows:

> ***RQ10:*** How does organizational culture affect the usage and acceptance of an internal crowdsourcing system?

To this end, we seek to explore the transformative capabilities of an information system with a special emphasis on how knowledge and information are shared in an organization. We explore the values that internal crowdsourcing and OOP systems are related to and compare them to the organizational culture and structure at the public organization where we implemented the artifact and overall internal crowdsourcing system in Section 7. Moreover, we use the qualitative and quantitative data collected in Section 7 in order to propose improvement measures to be adopted both from a system design perspective as well as from a managerial view.

Finally, we draw a conclusion for all of the results of the thesis in Section 9. We summarize conditions, capabilities and components for each prior section (Baskerville & Pries-Heje 2010). Moreover, we highlight areas for future research – both for the entire IS community as well as for the specific cases of rating techniques, anonymous communication and organizational culture.

In summary, by identifying and motivating our problem, defining objectives for a solution, designing and developing artifacts, demonstrating and evaluating it, this thesis encompasses all six steps prescribed by Peffers et al. (2007). Moreover, Gregor and Hevner (2013) emphasize that a doctoral thesis (as well as research articles) using DSRM need to make a meaningful contribution to IS knowledge by either improving, inventing or expatiating solutions to new or known problems. This thesis improves existing rating techniques, invents a new feature for anonymous user contributions and expatiates the role of organizational culture on internal crowdsourcing systems. In terms of communicating and in order to justify this thesis' contribution to the IS community, we published all of our solutions in well-known scholarly research outlets in the IS field. We provide detailed information on where earlier versions of each chapter were published in the footnotes. Having passed a peer review, these publications demonstrate the novelty and rigor we applied in each step of our research. In addition, publications were extended and revised in order to improve their quality further for this thesis.

2. Theoretical Background

2.1 Organizational Participation

Organizational participation can take various forms in a firm. Scholars often distinguish between material and immaterial participation (Nerdinger & Wilke 2008). While material participation refers to financial participation in the capital or a form of compensation related to the success of the company (Schaschl 2000). Immaterial participation means that employees are involved in information, coordination and decision-making processes within the company (Nerdinger & Wilke 2008, p. 23). This thesis only discusses the immaterial form of employee participation.

In a behavioral context, participation is understood as participation in decisions (Wilpert 1984). A more detailed definition of the concept comes from the organizational psychologist Bernhard Wilpert, who includes various forms of participation in his definition. This includes both direct (directly personal) and indirect (directly via representatives or institutions); small to comprehensive; from individuals to groups and collectives, who secure their interests by self-determined choice of possible actions (Wilpert 1984). Especially in light of legal requirements throughout unionized European countries, organizations need to grant certain rights of co-determination and are free to engage in further voluntary participation actions. Statutory co-determination can initially be exercised at company level, e.g. in the form of a supervisory board. In addition, there is also the level of corporate co-determination, which includes bodies such as the worker's council, the spokesperson committee or the economic committee (Nerdinger & Wilke 2008). The worker's council is likely to play the most important role with regard to the introduction of digital participation processes. It represents the interests of *all* employees vis-à-vis the organizational management. Depending on the subject matter and content, it is entitled to certain rights of information, consultation and co-determination (Nerdinger & Wilke 2008). For instance, when launching a new information system in an organization in Germany, the worker's council needs to approve it. It is legally bound to stop any form of surveillance of the employees, though the extent to which this is allowed is negotiable.

Voluntary participation in the company can take place in an indirect and direct manner. While indirect participation describes the involvement of employee representatives who represent the interests of the workforce (e.g. in the form of a "round table"), direct participation involves employees directly, i. e. personally, in the organization's processes. This includes processes such as employee surveys, company suggestion scheme, partly

autonomous working groups, etc. In the broadest sense, target agreements and forms of delegative leadership can also be understood as forms of direct participation (Nerdinger & Wilke 2008).

Before the concept and structure of participation is explained, a brief overview of the historical development of participation in organizations is given, which can be used to classify current developments.

2.1.1 History of Organizational Participation

The demand for co-determination in organizations is old. As industrialization progressed, a large number of participation concepts developed over the last century. The main aim of the early efforts for OP was to increase efficiency. For example, the "company suggestion scheme", one of the oldest forms of employee participation (Thom 1996), was created in a first version in 1880 and is still being used today. It describes a system for the promotion, assessment, recognition and implementation of suggestions for improvement. These suggestions can relate to any work-related processes and are submitted directly by employees.

At the beginning of the 20th century, a new form of participation developed in response to Taylorism with the Human Relations movement. Taylorism describes the predominant management at the time of industrialization, which is based on maximizing productivity by breaking down work processes into small units, each of which is then carried out by one employee (Haas 2012). In response to the negative consequences of this optimization, such as the mental and physical health of employees due to understating, the human relations movement that developed in the US at the beginning of the 1930s aimed to improve working conditions and strengthen social relations in the workplace. With it, topics such as leadership styles, organizational climate and culture were discussed more closely (Haas 2012). In the 1950s, Europe also began to deal with the negative consequences of mass production for employees. This resulted in emerging concepts for the participation of employees. The first models of participatory group work were tested with the aim of improving working conditions (Haas 2012). One rather infamous example of a concept from this time is the Volvo model, which was first tested in the Scandinavian automotive industry. At its core, the completion of work tasks is carried out by the employees semi-autonomously. While the employer relinquishes part of his authority, the group itself takes over coordination and control (Carnall 1982). This model of semi-autonomous group work was regarded as an ideal for more far-reaching decision making until the 1990s. The model was found to have a positive effect on productivity and product quality as well as on the motivation of employees (Carnall 1982). At the end of the 1980s,

a further model of participation developed in contrast to the model of semi-autonomous group work. Work in Quality Circles is a form of participatory group work, which originated in Japan and became world-famous under the slogan of "Lean Production." The model aimed to improve product quality and reduce costs as well as to reduce hierarchy levels and to enable flexibility in terms of market demand and supply (Haas 2012). The basic idea of the Quality Circle is the development of solutions for quality issues and process optimization, as well as for problems of working conditions by groups of employees, usually at lower hierarchical levels (Nerdinger & Wilke 2008).

Since the beginning of the 21st century, the discussion on what can be solved by OP has seen a shift. While the first models on OP described above were mainly concerned with improving as well as the humanizing working conditions, solving hierarchical problems and the distribution of power, more recently flexibility and new forms of collaboration have become the center of attention (Haas 2012). This is where this thesis sets foot.

2.1.2 Theories of Participation

Typically, there are four basic theories that shape organizational participation: democratic, socialist, human growth and development as well as those focusing on productivity and efficiency (Dachler & Wilpert 1978). The democratic view emphasizes participation in a form that includes as many employees and stakeholders as possible. The socialist assumption departs from the notion of participation as increasing workers' control of the production process, while simultaneously educating them to the point that they can replace their managers. Furthermore, human growth and development theories extend the latter aspect by highlighting self-development and self-fulfilment. Finally, theories on productivity regard participation as having the goal of increasing employee satisfaction and commitment as well as a general increase of productivity and efficiency through better decision quality (Dachler & Wilpert 1978).

Building on previous works, Wegge et al. (2010) developed a scale of OP, ranging from a low to a high level of employee decision-making authority:

1. **Information** (leadership informs employees on certain decisions),
2. **Consultation** (employees can share their thoughts on certain issues, which may or may not be taken into account in final decisions)
3. **Codetermination** (employees have to be included in the decision-making process, either by getting a vote or because parts of their feedback needs to be incorporated)
4. **Veto right** (employees can block certain decisions)
5. **Shared leadership** (employees can decide on some matters)

6. **Autonomy** (employees have the final say on some or all matters)

Having established the basics for OP, we need to explore how OP can be enabled using technology. However, before we begin to gather system requirements, we review the legal situation, with a particular focus on Germany.

2.2 Legal considerations

Data protection in organizations is a complex legal challenge. The operator of a platform for OP is faced with significantly higher hurdles than in the area of private use. In principle, however, the same laws apply to employee data protection - in particular the Federal Data Protection Act, *Bundesdatenschutzgesetz* (BDSG), as well as the respective national data protection laws and the Telemedia Act, *Telemediengesetz* (TMG). In the context of a platform to be implemented in an organization, the Works Constitution Act, *Betriebsverfassungsgesetz* (BetrVG) is added, insofar as influences of the worker's council or a worker's agreement are affected.

In general, natural and legal persons are largely free to act as they please. The area of data protection is, however, a special feature in this context, because a prohibition prevails with the reservation of permission for the collection, processing and use of personal data in accordance with § 4, BDSG. This restriction takes effect as soon as data is saved in a file or transferred from a file. Accordingly, other conditions apply than in the case of a staff meeting, which would take place at the site of the organization.

The aim of the BDSG is to protect the individual in his or her personal rights against a data storage and processing institution. Personal data, i. e. data that can be attributed to a specific or identifiable natural person, are particularly worthy of protection. The term is far-reaching, as it includes names, addresses, e-mail and everything else that relates to a natural person, including hobbies and interests. Especially employers may not collect these data without further ado. For instance, a survey among employees is usually only permissible where this is permitted and required by law – or if the worker's council agrees. This is usually the case in an organization if the data is urgently needed to carry out the employment relationship, for example, in the Human Resources department for billing and payroll processes. Still, the data *subject* must be informed of the use of his or her personal data. The organization must inform the user about which data is being used, exactly who the responsible party is, how to access it, whether the data is being transmitted to third parties and, if so, which bodies are involved. In urgent cases beyond this, the use of data requires a "predominantly legitimate interest" (§ 28 BDSG) as well as a voluntary, written consent of the employee (§ 4a, section 1 BDSG). It is precisely

this point that makes data exploitation in an organization considerably more difficult, because in many cases of new software implementations, data collection and exploitation are not *absolutely* necessary.

2.2.1 Consent and Transparency

The German legislature assumes that the employee is dependent on the employment relationship. Therefore, in many cases, the necessary voluntariness for the effectiveness of a consent may not be given. It is important that the declaration was made without compulsion. The objective circumstances are decisive here. For instance, if employees can be assumed to have an interest in processing data, this can be considered an indication of a voluntary nature.

It is essential that consent is given prior to data processing, as the data subject can no longer cancel the data processing later. In order to be able to make a truly free decision, the data subject must know to what extent his or her data will be processed. In addition, the data protection officer in an organization must be informed in good time about automated processing of personal data. The data must always be deleted when the previously defined purpose has been achieved. In terms of time, the consent is basically valid for the duration of the concrete data processing. Furthermore, there is the possibility of revocation, after which all data must be deleted – even if they are passed on to third parties. If the data is transmitted to third parties, they must be informed of the revocation. However, the right of withdrawal is excluded for anonymous data.

2.2.2 Legal Requirements on Anonymity

The use of procedures for anonymization and pseudonymization is recommended for the protection of personal rights (§ 3a BDSG). In this process, identification features are removed or adjusted in the data. Data processing in anonymous form is permitted without further ado, since the data have lost their quality as "personal" data, so that the prohibition with reservation of permission does not apply. Data is transmitted without personal reference when the personal reference cannot be established for the recipient. However, as absolute anonymization is hardly achievable, the legislature makes the exception that anonymization has been achieved when de-anonymization is only possible after disproportionately large expenditure of time, costs and labour For instance, the Higher Administrative Court of Baden-Württemberg, ruled that Google searches using simple combinatorial methods represent a quite conceivable, reasonable effort. Thus, anonymization still needs to be reasonably difficult.

Moreover, aggregated data does not count as personal data either. However, a proper aggregation is only available when identifiers of an individual person are reasonably hidden. According to the prevailing opinion, this is always the case when data of at least three, or rather five people are aggregated. For example, assume that Person A, B and C together weigh 200 kg. The formation of size classes alone would not be enough to anonymize this group. If it is known that all group entries are closely related to each other, aggregation is also considered person-related.

2.2.3 Software as a Service

A decentralized solution might be appropriate to deal with some of the difficulties associated with the processing of employees' personal data. Setting up an authority between employer and employee could ensure that the employer as the final recipient only gets access to data that has already been sufficiently anonymized. However, it should be clear that the employer does not have access to the personal data of employees. This means that information needs to be encrypted to such an extent that the employer cannot easily understand which employees it is. Thus, the anonymization processes has to be adopted to the organizational context. For instance, if a department only had five employees and a statement is made about them, the relevant group of people can possibly be de-anonymized too quickly. Accordingly, higher minimum limit for aggregation must be set.

However, even with the burden for correct anonymization lying with an external third party, employees might (justifiably) not feel safe. Instead, it might be worth giving them an option to communicate completely anonymous in a OOP engagement. We will explore the implications of anonymous user communication in subsequent sections.

2.3 Definition of Organizational Online Participation

In our introduction, we have defined OOP as online-based information systems, which enable all members of an organization to participate in decision-making processes of their organization. Thus, our definition bears some resemblance to the definition of open innovation by Adamczyk et al. (2012). They referred to it as IT-based and time-limited competitions by organizations calling on the general public or a specific target group to propose innovative solutions. However, we limit OOP to *internal* members of an organization, such as employees or staff. This definition includes senior management as participation is an inclusive, not bottom-up-only, approach. However, it excludes the general public as well as external other groups (e.g., customers, residents, etc.). Moreover, OOP also has some similarities to internal crowdsourcing. Zuchowski et al. (2016) defined internal crowdsourcing as an IT-enabled group activity based on an open call for

participation in an enterprise. We differ from this definition in two way. First, we do not limit OOP to an enterprise, but extent it to organizations of all sorts (e.g., public organizations and NGOs). Second, Zuchowski et al. (2016) barely elaborate on their definition of participation. We clearly state that participation can entail various forms of interactions in an organization, such as information sharing, consultation of stakeholders as well as co-determination and (shared) control by employees (Nerdinger & Wilke 2008).

Nonetheless, we argue that OOP is – to some extent – similar to open innovation and internal crowdsourcing. This is why we draw from and extend these research streams in this thesis. In order to get a broad overview of the current state-of-art in the IS literature, we begin with a literature review on open innovation – as the broadest form of IT-enabled participation – in the following chapter.

3. Literature Review on Open Innovation[7]

3.1 Introduction

OI refers to the opening of innovation processes of organizations and thus the active strategic use of the outside world to increase the organization's innovation potential. The OI concept describes the appropriate use of knowledge penetrating into and out organizations, using internal and external marketing channels to generate innovation. Gassmann et al. (2010) note that increasing competitive pressure due to globalization, shorter product lifecycles, and the resulting increased pressure to innovate as decisive driving factors for the necessity of optimizing innovation processes and opening up as a consequence. In many industries, the required investments to generate innovation overstretch the resources of individual players, so that there emerges a need for innovation in cooperation with strategic partners, suppliers, or customers.

More than a decade after its conceptual inception by Chesbrough (2003), OI has received a remarkable amount of attention and by now represents an established means of developing, evaluating, and selecting new ideas, concepts, and strategies in business as well. It is hence not surprising that OI has emerged as a viable field of research in the information systems literature and beyond (Gassmann et al. 2010). Many organizations, including public and corporate agents, have established OI platforms to solicit innovative ideas from a broad base of users. Dell's ongoing "IdeaStorm," for instance, generated more than 20,000 suggestions for product improvements from thousands of registered users (Bayus 2013). In line with the "wisdom of the crowds" paradigm, such vast numbers of participants and proposals are likely to enable OI processes to generate ideas and solutions that are able to compete with those of experts and innovators from corporate research and development units (Lakhani & Jeppesen 2007; Poetz & Schreier 2012; Adamczyk et al. 2012; Riedl et al. 2013). However, previous research suggests that these large idea collections from OI processes also tend to produce many highly *redundant* ideas, as well as large *variance* in terms of quality. This includes a significant share, typically about one third, of very poor quality proposals (Blohm et al. 2010; Riedl et al. 2010; Poetz & Schreier 2012). Thus, organizations often invite users of the OI engagement to collectively evaluate their peers' ideas and propositions, develop them

[7] An earlier version of this chapter has been published as Wagenknecht, Crommelinck, et al. (2017a). There is also a version of this chapter under review with the Journal of Organizational Computing and Electronic Commerce.

further, and identify the most promising ideas to be actually implemented in practice. While earlier research on OI focused on the process of idea generation, such evaluation and selection processes must today be seen as an integral part of the overall scope of OI campaigns.

At the same time, the broader landscape of OI is rapidly changing. While early on, most involved firms attempted to set up proprietary OI systems, the wider adoption of crowdsourcing and professional OI platform providers has turned OI into a common mode of R&D (Gassmann et al. 2010). Examples of commercial OI service providers include Jovoto ("open innovation platform"), Hyve ("the innovation company"), and Exago ("Innovation & Idea Management Software"). There exist a few structured literature reviews on sub-areas of OI, such as idea contests (Adamczyk et al. 2012), information systems for crowdsourcing (Pedersen et al. 2013), and internal crowdsourcing (Zuchowski et al. 2016). However, it is still widely unclear which factors lead an OI system to be *successful*. In this regard, the DeLone & McLean (D&M) IS Success Model (DeLone & McLean 1992) has repeatedly served as a powerful framework to understand cause-and-effect-relations of IS success. In this study, we built on this model and ask the following research question:

> ***RQ1:*** What are the success factors for idea generation, collaboration and evaluation in OI systems?

We extend the D&M model to integrate a variety of factors that prior research on OI has identified as relevant for process outcomes and success. We explore how extant literature has analyzed the determinants for idea generation, collaboration, and evaluation in OI – representing its key elements (Hrastinski et al. 2010) – to derive insights on how OI processes may be designed to yield benefits for individuals and organizations. In effect, we highlight emergent topics and areas for future research.

To do so, we review a total of 50 articles, identified by means of a structured literature review process (Webster & Watson 2002). In order to support researchers and practitioners in identifying well-studied and under-researched areas, we provide a structured literature table, summarizing the studies along dimensions such as the context of the OI process, sources of innovation/ ideas, the types of considered IT artifacts, as well as subject, target variables, and research methodologies.

Based on the reviewed literature, we extend this "traditional" quality-measure-based model for IS success by the notions of *user characteristics* and *system design*. On one hand, individual factors, such as personality and cooperative preferences have shown to determine OI system usage and idea quality. On the other hand, OI system success hinges

on the features that are available to users. Besides collaboration tools, these may be gamified systems or algorithms to enhance idea quality and rating accuracy. We find that research has unanimously established OI as being able to generate high quality ideas for various managerial and societal problems, applied for a variety of different target groups using a set of different mechanism design principles and concepts. Further, we find that OI success depends on factors from different dimensions such as system quality (e.g., ease of use), information quality (e.g., understandability of goal definitions), and service quality (e.g., feedback and responsiveness). These factors, in turn, are commonly found to drive key success indicators such as system usage, user satisfaction, as well as idea quantity, quality, and rating accuracy.

The remainder of this chapter is organized as follows. First, we illustrate the research subject at hand, its background, and a set of defining conditions in Subsection 2. We then introduce our methodological approach in Subsection 3. Subsection 4 reports our results. We then discuss implications for practitioners and future research and draw a conclusion in Subsection 5.

3.2 Theoretical Background and Related Work

For more than a decade, research on OI has been a rapidly emerging field of study in IS and various other disciplines, such as economics and management science (Hrastinski et al. 2010; Adamczyk et al. 2012; West & Bogers 2014). Unsurprisingly, scholars have proposed a number of definitions and models that aim to describe OI. For the purpose of this review, we draw on the definition proposed by Chesbrough (2006), who referred to OI as the "use of purposive inflows and outflows of knowledge to stimulate internal innovation, and expand the markets for the external use of innovation, respectively" (p. 1). Thus, OI operates at the early stages of innovation processes. Importantly, *customers* were identified as one potential source of ideas for marketable products (Lakhani & Jeppesen 2007; Leimeister et al. 2009). Moreover, research has also considered *employees* – often dispersed over many departments and locations – that can also contribute valuable knowledge through OI (Gressgård et al. 2014; Zuchowski et al. 2016).

There exists a host of practices to execute OI processes. Some of the most prominent include innovation contests, making use of the crowd's expertise, skills, and creativity (Leimeister et al. 2009; Adamczyk et al. 2012). Adamczyk et al. (2012) referred to innovation contests as IT-based and time-limited competitions, issued by organizations and calling on the general public or a specific target group to propose innovative solutions for a specified problem. Moreover, innovation communities (Von Hippel 2005; Blohm et

al. 2011) as well as the lead-user method (Von Hippel 1986) and Internet toolkits (Franke & Piller 2004) involve end-users to solicit innovative ideas.

Current technologies support OI with the help of a number of characteristic designs. Hrastinski et al. (2010) put that this "front-end" of innovation supports users in the generation, further development, and evaluation of ideas (Gordon et al. 2008; Hrastinski et al. 2010). Moreover, adequate use of technology can help with innovation development and evaluation. Users may be incentivized by gaining knowledge, extrinsic rewards, and social recognition to participate in OI engagements (Leimeister et al. 2009). Such systems may, for instance, be based on rating scales (Blohm et al. 2011; Riedl et al. 2013).

Often, OI systems are implemented in the public sphere, for instance, by governments and non-governmental organizations. Moreover, OI systems are especially popular with firms (e.g., IBM, Dell). Gassmann et al. (2010) stated that universities and other academic organizations engage in OI too. These three broad clusters of users point at possible target group segmentation. These are typically crowds, either internal to the facilitating organization (e.g., employees, members) or external (e.g., customers, citizens, general public). In addition, OI facilitators may involve an (independent) expert committee to evaluate user-generated content (Adamczyk et al. 2012). Thus, considering these three broad groups, research on OI is able to investigate various factors and their effects. Reviewing studies in economics and management science, Adamczyk et al. (2012) suggested that scholars are mainly concerned with (1) assessing the quality of idea generation processes, (2) the efficient design of OI processes, as well as (3) the users' motives to participate in OI engagements.

The large body of studies on OI systems prompts the question of the importance of different factors in OI process design to render it successful. Although few literature reviews have been published in recent years (Adamczyk et al. 2012; Pedersen et al. 2013; Zuchowski et al. 2016), none have explicitly focused on success factors. With this study, we set out to address this research gap. Since its inception in the early 1990s, the D&M IS Success Model (DeLone & McLean 1992) has been one of the most applied (and cited) models in understanding the tangible and intangible benefits of IS. The model not only enables a synthetization of prior research within a coherent structure but also offers guidance for future research (DeLone & McLean 2003; Petter et al. 2008). It measures IS success along the variables of system quality, information quality, service quality as well as intention to use, system use, and user satisfaction, eventually driving net benefits (DeLone & McLean 2003).

3.3 Study Design

In what follows, we describe our method for data collection, which builds the basis for the subsequent analysis. First, in order to provide a clear scope for this review, we define the boundaries of research (Webster & Watson 2002). We focus on what Hrastinski et al. (2010) referred to as the front-end of OI systems, that is, studies on computer-supported tools for the generation and evaluation of creative and valuable ideas and solutions in OI, including their collaborative development and rating. Thus, we consider the process from the point at which a facilitator opted to use an OI system until ideas are evaluated. Also, research on new product development that does not explicitly refer to an OI process (e.g., by using data from an OI platform) is hence beyond the scope of our study.

3.3.1 Data Collection

Following the principles of Webster & Watson (2002), we conducted an in-depth topic-based literature review focusing on the subjects of idea generation, collaboration, and evaluation in OI processes. As OI represents an interdisciplinary and emerging research field, we included all relevant research published in journals listed in the ABS Academic Journal Guide (Cremer et al. 2015) in the fields of (1) Economics, Econometrics and Statistics, (2) Information Management, (3) Marketing, (4) Innovation and (5) Operations Research and Management. As we focus on Information Systems in particular, we also included full studies published in the seven leading Information Systems conference proceedings as recognized by the Australian Council of Professors and Heads of Information Systems (2013), including ICIS, ECIS, HICSS, AMCIS, PACIS, ACIS and ISD. This list of conferences we extended by CHI, the leading conference on human-computer interaction. The search process was conducted on the ProQuest, Elsevier, IEEE, ACM, JSTOR, Web of Science, and EBSCOhost databases. Furthermore, the AIS electronic library was accessed to review relevant conference proceedings. Building on a preceding, informal assessment of relevant literature (see Table 1), we used the following logical combinations of keyword {“open innovation”} AND {generat* OR creat* OR produc* OR assess* OR vot* OR rat* OR rank* OR eval* OR filter* OR compet* OR tournament OR contest OR communit* OR collaborat*}, where the asterisk indicates stemming.

Table 1 Literature search

Search words	Reference
generat, creat*, produc**	Front-end of OI (Chesbrough 2006; Hrastinski et al. 2010)
compet, tournament, contest*	Innovation contests (Leimeister et al. 2009; Adamczyk et al. 2012)
communit, collaborat**	Innovation communities (Von Hippel 2005; Blohm et al. 2011)
assess, vot*, rat*, rank*, eval*, filter**	Front-end of OI (Chesbrough 2006; Hrastinski et al. 2010)

Our literature search was conducted in three steps from April to May 2016. First, keyword search resulted in 212 articles being selected based on their title and abstract. We then removed duplicates and articles that were clearly not in the scope of open innovation processes. For instance, many articles investigated creativity techniques in closed innovation environments (e.g., brain writing). Other publications analyzed managerial consequences or the implementation process of ideas (gained from OI), which is also beyond the scope of our study. Second, the remaining 37 articles were analyzed in greater depth, focusing on methodology and findings. Last, we conducted backward and forward searches, retrieving 13 additional relevant articles. In total, this structured review process resulted in a body 50 articles (29 journal publications, 21 conference publications).

3.3.2 Data Analysis

Following Webster & Watson (2002), we categorized the literature according to topic-related concepts as motivated in Subsection 2. First, all articles were classified based on application context, that is, either *public*, *corporate*, or *academic* (Gassmann et al. 2010). Second, the type of OI/idea source was examined and classified as either *external* or *internal*. Besides these crowds, an independent *expert panel* can also serve as a source of information (Adamczyk et al. 2012). Third, we also analyzed whether the research proposed and evaluated an IT artifact of some sort. The definition of IT artifacts is subject to debate in the Information Systems literature (Gregor & Jones 2007). Yet, we followed the definition offered by Peffers et al. (2007), describing an artifact as something artificial, constructed by humans, which can be "any designed object in which a research

contribution is embedded in the design" (p. 55). Furthermore, we adopted Gregor & Jones (2007) classification of artifacts in terms of models, principles, and methods. We also added the category of full system, which describes whether an artifact includes all required components to enable idea generation, collaboration, and evaluation. Fourth, studies were categorized by main research subjects. As we focus on the front-end of OI, the three categories are idea generation, collaboration, and evaluation. Moreover, each article investigated OI with regard to some form of testable proposition by introducing a quantitative, statistical analysis or through heuristic propositions (Gregor & Jones 2007; van Aken 2004). With regard to research on OI, we categorized the studies according to whether they (1) perform a quality assessment of ideas, (2) analyze the efficiency of a process, or (3) investigate user motivation (Adamczyk et al. 2012). Additionally, we analyzed in which sphere each study was conducted in. Finally, we categorized the identified literature according to the methodology used. Building on Palvia et al. (2004), we limited these categories to frameworks/models, literature reviews, case studies, surveys, mathematical models, and interviews. Two researchers classified the literature independently. Few inconsistencies were resolved within a joint re-evaluation.

3.4 Results

3.4.1 Descriptive Statistics

Our results point out that idea generation, collaboration, and evaluation have received increased attention by researchers in recent years. About half of all retrieved studies were published in conference proceedings (22), 28 in journals.

Table 15 in Appendix A provides an overview of all reviewed studies. First, classification by context shows that 22 articles deal with OI in an academic, 28 within a corporate, and 8 within a public context. Second, classification by concepts reveals that 26 articles consider idea generation, 19 consider collaboration processes, and 30 articles covered idea evaluation. Note that the total of these numbers is higher than 50 as many articles consider more than only one context or step of the broader OI process. With regard to the target variable, the vast majority of all articles covered at least some sort of idea quality.

The concept matrix follows the outline of our data analysis in that it is structured in terms of the sphere and source, the type of IT artifact as well as the subject of the study, its testable propositions and methodology. In terms of idea generation, we found 11 articles, compared to 16 articles investigating idea evaluation exclusively, whereas 21 articles covered both subjects at least partially. Interestingly, we found that researchers covered collaboration only in conjunction with either idea generation or evaluation, but never as a stand-alone research subject. Collaboration was investigated almost equally for

generation and evaluation (39 vs. 33). This arises from the fact that many articles investigate OI systems that rely on collaboration.

With regard to the testable proposition, the vast majority of all articles covered at least some kind of quality assessment. In many cases, studies analyzed the quality of user-generated ideas through evaluations by expert committees.

Figure 1 displays a stylized process model for a typical OI engagement.

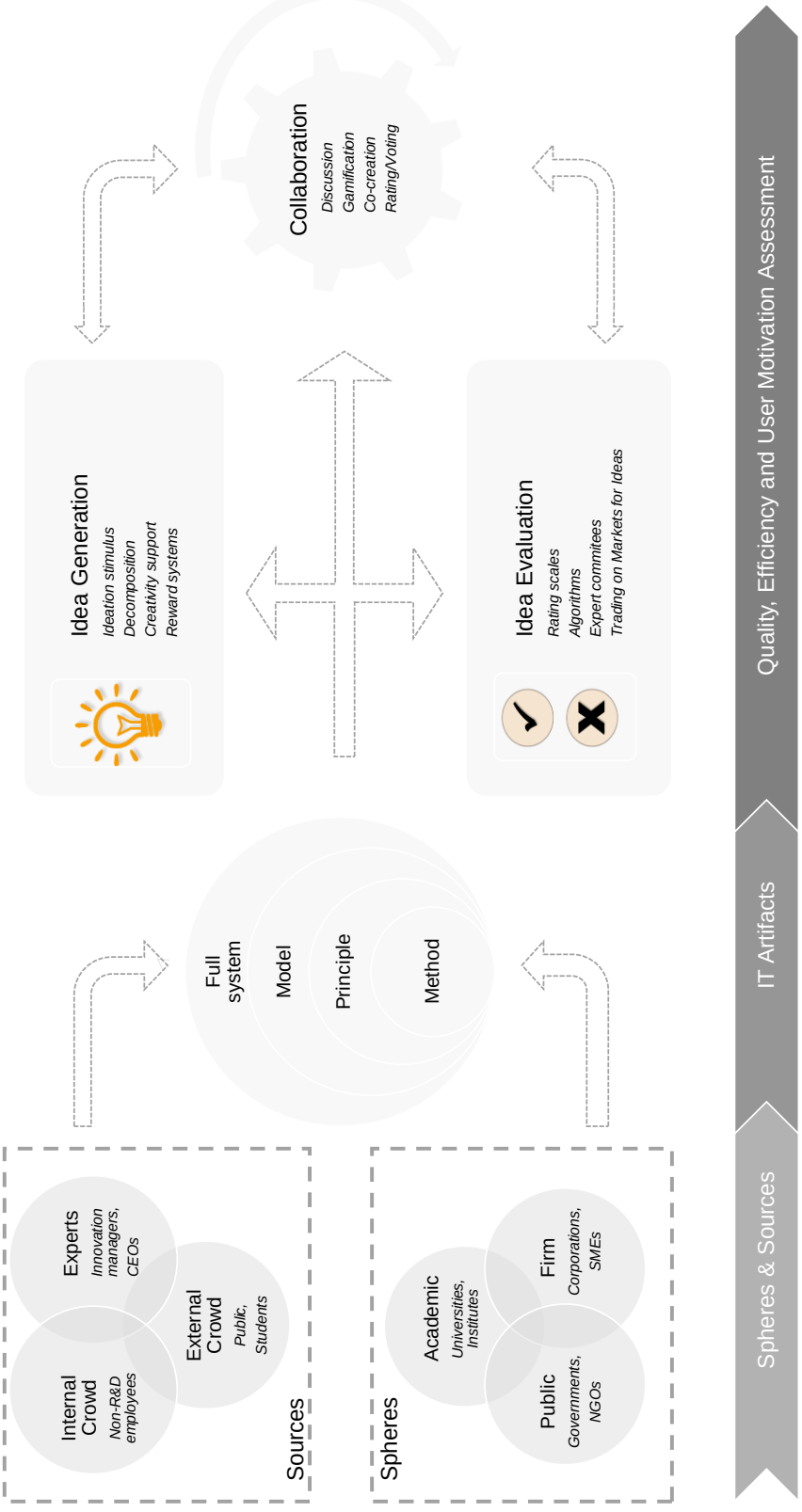

Figure 1 Process model

3.4.2 Open Innovation Success Factors

Based on the examination of the literature, we propose to apply and extend the D&M model for IS success to the specific domain of open innovation (DeLone & McLean 2003). As outlined above, the primary system users in OI applications are either external (e.g., customers, consultants) or internal (e.g., employees, members). They use these systems to generate innovative ideas, discuss, develop these ideas further, and decide on which ideas to follow-up on, and eventually to implement. Naturally, idea generation and evaluation have an impact on both the users as well as the organizations and the markets they operate in. The D&M IS success model with its six success dimensions is well-suited to represent a variety of factors that determine OI system success. It also helps us in deriving the emerging themes of our review (Webster & Watson 2002).

System quality refers to the characteristics of the OI system. While the D&M model incorporates measures such as system reliability and response time, such factors have not been investigated in the literature on OI. Most OI systems seem to be accessible via web browsers and technical issues are not subject to this research. Sufficiently fast response times and reliability are usually assumed to exist. Hence, system quality is rather in terms of usability, that is for instance, perceived ease of use (Blohm et al. 2011; Feldmann, Gimpel, et al. 2014; Görs et al. 2012).

Information quality describes the desired system output, for instance, relevance, understandability or usability of management reports and websites (Petter et al. 2008). In the context of OI, system output refers to the static web pages provided by the facilitators. Researchers analyzed whether goals and tasks for the OI users were formulated concisely and understandably (Jung et al. 2010; Luo & Toubia 2015; Natalicchio et al. 2014). Studies also measured the understandability of the information provided by the OI system in terms of the cognitive load users experienced (Blohm et al. 2011; Görs et al. 2012). Another approach was to analyze the timeliness of idea proposals (Bailey & Horvitz 2010). Furthermore, a number of studies designed, implemented, and tested the relevance and usability of information provided by decision support tools (Toubia & Flores 2007; Yu & Nickerson 2011; Xu & Bailey 2012; Görs et al. 2012; Walter & Back 2013; Horton et al. 2016; Siemon et al. 2016; Surowiecki 2005).

Service quality as the overall support offered by the service provider was rarely measured in the literature on OI. This might be related to the fact that many OI engagements are self-contained to the point that organizers just pose a problem to be solved and then only control for legally compliant usage of the system (Jung et al. 2010). However, some researchers analyzed the type of recognition, praise and feedback users received from the

OI system provider (Bayus 2013; Lee & Seo 2013; Leimeister et al. 2009). Others also measured the level of the management's commitment to the OI process in terms of resources or decision power (Bailey & Horvitz 2010; Muller et al. 2013; Soukhoroukova et al. 2012).

System use, according to the D&M model (Petter et al. 2008), originally measures the degree and manner in which staff and customers actually utilize the system. In OI processes, this can be applied to the entire user journey – from registration, to idea generation, collaboration, and evaluation. Research measured use in terms of number of users, number of generated ideas, level of user engagement, participation, and time spent on the OI system.

While system use is considered in almost all studies within this review, much fewer actually measure **user satisfaction** (Bailey & Horvitz 2010; Blohm et al. 2011; Riedl et al. 2013; Riedl et al. 2010; Lee & Seo 2013). They do so by asking users for satisfaction and attitude toward the by means of self-reported scales.

Net benefits, that is, the extent to which information systems contribute to the success of individuals, groups, or organizations (Petter et al. 2008), arguably represent the most important success measure. In terms of idea generation, most researchers focused on whether (and how) an OI system enabled the contribution of high-quality ideas for an organization. Researchers measured idea quality mostly based on novelty and relevance, while some also included feasibility and elaboration (Bailey & Horvitz 2010; Björk & Magnusson 2009; Blohm et al. 2010; Dean et al. 2006; Jung et al. 2010; Kathan et al. 2015; Kristensson et al. 2004; Magnusson et al. 2014; Poetz & Schreier 2012; Riedl et al. 2013; Siemon et al. 2016; Natalicchio et al. 2014; Lee & Seo 2013). Some studies also assessed idea creativity (Dean et al. 2006; Yu & Nickerson 2011).

Research also studied whether OI systems increase the accuracy of the idea evaluation process. Rating accuracy is usually assessed by comparing user evaluations with those of a panel of R&D executives, mostly only from within the company (Bayus 2013; Blohm et al. 2011; Görs et al. 2012; Klein & Garcia 2015; Lauto & Valentin 2016; Xu & Bailey 2012). One study explored redundancy of proposed ideas (Kornish & Ulrich 2011).

Another part of the literature measures net benefits in terms of increased effectiveness and decision quality in new product development (Blohm et al. 2010; Riedl et al. 2013; Yücesan 2013), consumer performance (Luo & Toubia 2015), consumer benefit (Poetz & Schreier 2012), as well as speed of the evaluation process (Görs et al. 2012; Klein & Garcia 2015). Moreover, some studies also measured success based on consumer brand

loyalty as well as trust and commitment (Sawhney et al. 2005; Scheiner 2015). Importantly, also negative impacts such as increased rivalry or competition are reported, which in turn reduced co-operation and knowledge sharing (Boudreau et al. 2011; Blohm et al. 2011; Hutter et al. 2011; Zimmerling et al. 2016).

Researchers also analyzed individual impacts of OI systems. They asked, for instance, whether participants developed positive or negative attitudes towards the system or whether user perceived the OI engagement as motivating (Leimeister et al. 2009; Scheiner 2015; Siemon et al. 2016; Riedl et al. 2013).

Although we find the adopted D&M model applicable in the OI context, we notice that a significant part of the findings of the research on OI in our literature review and, in particular, its correlations and causalities are not well reflected. Thus, we propose to extend the D&M model by two constructs. First, we include individual characteristics of the users that significantly affect system use, user satisfaction and eventually net benefits. Second, we incorporate the construct of system design in order to account for the various features for collaboration and their motivational affordances. Figure 2 shows the extended D&M model.

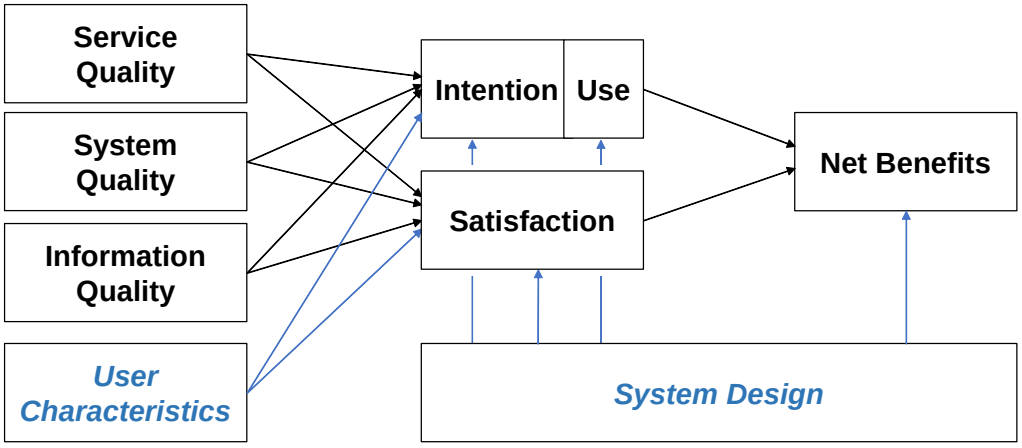

Figure 2 Updated D&M model (added constructs in blue and Italics)

User characteristics describe the characteristics of the individual users. For instance, researchers measured personality (Feldmann, Gimpel, et al. 2014) and personal competitive orientation (Bullinger et al. 2010; Hutter et al. 2011). Others focused on the individuals' domain-specific knowledge (Wu & Fang 2010; Luo & Toubia 2015) and hierarchical as well as network-related position within an organization (Kristensson et al. 2004; Björk & Magnusson 2009; Bailey & Horvitz 2010; Stieglitz & Hassannia 2016; Lauto & Valentin 2016). For instance, lower-level employees have been shown to contribute more content than more senior ones (Bailey & Horvitz 2010). Furthermore,

users with a cooperative orientation contribute more ideas than competitive-oriented individuals (Bullinger et al. 2010; Hutter et al. 2011). Also, users with a higher domain-specific knowledge tend to come up with more innovative ideas (Wu & Fang 2010; Luo & Toubia 2015). These individual factors significantly affect both intention to use and the eventual system effectiveness.

System design incorporates the characteristics of features which extend beyond system quality to account for the effects that certain design choices have on system use, user satisfaction, and net benefits. Thus, this construct refers to the design of certain OI system artifacts, providing information through what means an OI system met its ends (Gregor & Hevner 2013). Some studies measured the optimal number of users an OI system should have to produce best results, whereby more users were found to increase rivalry, yet also produced more innovative ideas when collaborating (Boudreau et al. 2011; Riedl et al. 2013; Riedl et al. 2010; Yücesan 2013). Moreover, Leimeister et al. (2009) provide a detailed description of standard functions which increase usage frequency. These include browsing, sorting and searching as well as implementing user profiles, idea descriptions, community ratings, and visualizations. All were found to relate to users' motivation, thereby increasing involvement. Most notably, Bullinger et al. (2010) and Blohm et al. (2010) suggest that collaboration features such as comments, editable wiki pages, and user-to-user communication enhance both user engagement and idea quality. Likewise, other forms of collaboration afforded by gamification and playful elements (such as rewards, badges and rankings) were also found to increase idea quality (Toubia 2006; Feldmann, Gimpel, et al. 2014; Scheiner 2015; Zimmerling et al. 2016). Similar results are found for idea markets (Blohm et al. 2011; Soukhoroukova et al. 2012; Stieglitz & Hassannia 2016) and crowdfunding campaigns (Muller et al. 2013; Feldmann, Gimpel, et al. 2014). As long as these OI system features were easy to understand, they increase user participation and idea quality. A series of studies also proposed decision support algorithms to increase idea quality and creativity as well as evaluation accuracy (Toubia & Flores 2007; Yu & Nickerson 2011; Xu & Bailey 2012; Görs et al. 2012; Walter & Back 2013; Horton et al. 2016; Siemon et al. 2016; Surowiecki 2005). Last, few studies tested different rating scales in this regard. Both multi-attributive rating scales (Riedl et al. 2010; Riedl et al. 2013) as well as down-rating (as compared to the more common up-voting technique) were able to increase evaluation accuracy (Klein & Garcia 2015). In Table 2, we illustrate our OI success model by highlighting a few criteria derived from the literature for all success factors and their effects and relations.

Table 2 Extended IS success model and its application in the context of OI
(+ *positive effect*, - *negative effect*)

Dimension	Criteria	(Intention to) Use	User Satisfaction	Net benefits		
				Idea Quantity	Idea Quality	Rating Accuracy
System Quality	Usability/ Ease of use	+	+		+	+
Information Quality	Understandability of goal or problem definition			+	+	
	Relevance and usability of (automated) suggestions			+		+
	Timeliness of idea proposals				+	
	Users' cognitive load				-	-
Service Quality	Organizers' responsiveness			+	+	
	Quality of organizers' feedback	+		+	+	
	Managerial commitment				+	
User Character-istics	Competitiveness	-		+		
	Network centrality				+	
	Seniority	-		-		
	Knowledgeability		+		+	
System Design	Granularity of rating scales		+			+
	Gamification		+			

3.4.3 Network Analysis

As a next step, we consider the body of literature from a network perspective. For this purpose, we construct a graph in which all 50 reviewed articles represent nodes. Edges between these nodes are formed based on common properties as depicted in Table A1. For instance, links are added among all studys that use "mathematical models" as methodology. Additional common properties result in additional weight on the edge between two studies. Edge thickness thus indicates how many joint properties a pair of

studys entails. Moreover, node size represents the number of citations (per year) a study has received, where larger nodes indicate higher citation counts.

Next, we run a greedy clustering algorithm to identify dense subgraphs, also called communities, by optimizing modularity (Clauset et al. 2004). The graph and the derived color-coded cluster assignment is depicted in Figure 3.

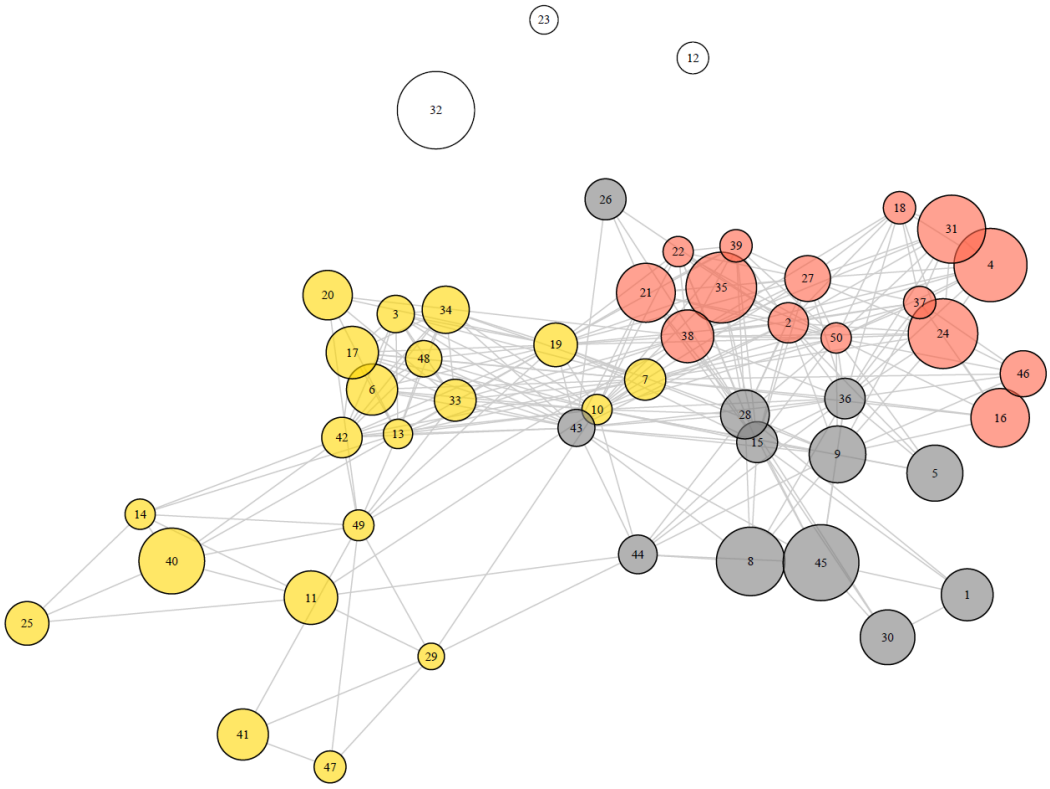

Figure 3 Literature graph (numbers refer to studys 1 to 50, please refer to Table 14 in Appendix A)

The grey cluster mainly comprises studies that deal with OI engagements on public or open platforms (e.g., TopCoder), also often representing literature reviews. Next, the red cluster refers to studies that involve an internal crowd as source of information, typically considering full OI systems. Next, the studys in the yellow cluster develop or analyze a certain method by means of a design science approach (e.g., rating techniques, features). Hence, such studys usually employ mathematical models and conceptional frameworks. Last, there exist few outliers with no marked connection to the other studys. Based on this structure, we can also quantify the studys' centrality within the network, that is, identifying *archetypical* studys for the field of open innovation. Using eigenvector centrality, we find the studys "Designing an Idea Screening Framework for Employee-

driven Innovation" (Ciriello et al. 2016), "High-speed idea filtering with the bag of lemons" (Klein & Garcia 2015), and "Increasing the Creative Output at the Fuzzy Front End of Innovation" (Zimmerling et al. 2016) to exhibit particularly high scores, representing archetypical studys and hence potentially suitable starting points for the exploration of the literature on open innovation.

3.5 Discussion and Conclusion

3.5.1 Discussion

The fact that research on OI has gained new traction underlines the importance of this research. Considering the large amount of studies from various backgrounds – including many case studies – OI can be considered an important and well-established means to create business innovations through high quality ideas.

OI system success is heavily dependent on the target audience, that is, the users it deals with, as researchers found that users' position within an organization, personality, and other individual factors are crucial drivers of system use and resulting net benefits. Likewise, system features that afford collaboration were found to increase participation and idea quality alike. In order to reflect these two emerging themes, we extended the D&M model (DeLone & McLean 2003; Petter et al. 2008) by the two structuring components *system design* and *user characteristics*. It is important to note that these components may interact when OI processes are implemented in practice. For instance, certain users (e.g., domain experts or newcomers within a company) may feel encouraged or inhibited when knowing that their idea contributions can (or cannot) be traced back to them personally. Moreover, as network centrality of users has been shown to increase idea quality (Björk & Magnusson 2009), platform facilitators might want to enhance their OI engagement with a network analysis (e.g., through their ESN). This also demonstrates the marked differences that distinguish OI systems as multi-sided platforms from older types of information systems, such as enterprise resource planning tools or electronic commerce websites (DeLone & McLean 2003). Our approach represents a first effort to further our understanding of open innovation process success by reviewing a well-studied research subject. It also links research on IS success with the field of DSR, which aims to provide prescriptive knowledge for the design and application of IS artifacts (Hevner et al. 2004; Peffers et al. 2007; Gregor & Hevner 2013).

Although a number of studies already helped to understand key collaboration features, there is still room for future research on gamified approaches as well as those that amplify the possibilities of automation, such as some text mining algorithms did. Moreover, although the short-term effects of collaboration tools are clearly positive, there is little

research on whether such OI systems are capable of engaging crowds in the long-term. This short-term focus also extends to another research gap. While Petter et al. (2008) suggest measuring net benefits based on improved productivity, profits or sales, we did not find a single study that effectively evaluated such a quantitative business-related factor. This might be due to the long-term character of idea implementation processes. Yet, in order to better understand the potentials of OI processes, such a long-term perspective is crucial.

The short-term focus also applies when studying idea evaluation accuracy. Many studies measured accuracy of user evaluations in comparison to those of an expert committee. Though very practical, this approach is rather subjective and depends on the expert selection and might be biased due their predispositions (e.g., having managers of a company evaluate suggestions for improvement by employees; Klein & Garcia 2015). This makes the reproduction of research very difficult. Despite this disadvantage, we acknowledge that it is a common method and very suitable as many studies were case-specific and, thus, might depend on inside-knowledge from selected experts to better grasp the value of proposals.

Finally, our review reveals that extant research considered various systems and models of open innovation. However, as such, these have rarely been adopted by other researchers. This might be related to the high specificity of contexts in which OI processes are used in, impeding a swift generalization of models and the associated findings. On the other hand, idea generation, collaboration, and evaluation represent common themes in IS research. There also exist a number of professional OI platform providers (e.g., Jovoto, Hyve, Exago). Gregor & Jones (2007) criticized the constant re-invention of artifacts and methods under new labels, which we see happening in the literature on OI as well. Thus, future research could build on pre-existing OI systems, allowing for higher degrees of reproducibility and cumulative knowledge building.

3.5.1 Conclusion

In summary, this study analyzed success factors for idea generation, collaboration, and evaluation in OI processes by conducting a structured literature review. Based on the D&M IS success model, we identified a number of main success factors along the six dimensions system quality, information quality, service quality, system use, user satisfaction, and net benefits. Research measured the latter in terms of improved idea quality, more accurate idea evaluation, and increased user involvement. As we found that significant parts of research on OI were not fully reflected by the D&M model, we extended it by two constructs. First, individual factors include users' personality,

knowledge, and position within an organization. Second, system design refers to design choices on an artifact or feature level (e.g., collaboration features).

We demonstrated that OI remains an emerging interdisciplinary research field, which is gaining new attention in the scientific community. Our analysis suggested that the majority of prior research investigated OI by means of case studies, often proposing an IT artifact. Our study contributes to the IS literature by providing a unified, structured framework that can help to reflect and classify past research and guide future studies on OI. We also contribute to the IS literature by identifying several research gaps, which could build a basis for future research. This includes a call to investigate the long-term effect of OI and to employ business-related quantifiable measures to evaluate idea quality.

Considering the recent changes in OI environments, for instance, the emergence of professional platform providers, OI will most likely remain a rapidly developing field for research. Our literature review also includes implications for practitioners, guiding the design of future OI systems. For instance, we highlight the well-proven efficiency of multi-attributive rating scales, the acknowledgement of the users' cognitive load and the emphasis on rewards, incentives, and other motivating components. Going forward, it will be interesting to see which OI system designs will yield the most creative and valuable ideas while still ensuring appropriate levels of effectiveness and user motivation in the long-run.

3.5.1 Limitations

This study needs to be considered in view of several limitations. First, we set strict research boundaries, following Webster & Watson (2002). Some relevant studies might thus have been missed, for instance, when not including the specific search keywords and not being referenced by the other analyzed studies – this may particular hold for more recent articles. For instance, idea evaluation can be framed as a group decision, which is a large area of IS research but is not necessarily conducted within an OI context. Furthermore, we found only few studies framing OI in the public sphere. However, as modern governments begin to involve their citizens in processes such as participatory budgeting more often (Niemeyer et al. 2016), future research could investigate how such engagements resemble OI.

4. Expert Interviews[8]

4.1 Introduction

The previous section extended our understanding of the underlying success factors of OI systems by building on the D&M model, adding two new constructs. This literature review gave us a first impression on where the bulk of research focused and which areas have received little attention. Thus, in terms of our DSRM, we have emphasized our theoretical basis (Nunamaker et al. 1990; Walls et al. 1992). However, as Hevner et al. (2004) stressed, DSR aims to solve business problems. Thus, it is worth establishing the relevance of our problem field in the business realm as well (Peffers et al. 2007).

Accordingly, in this chapter, we seek to validate and potentially extend the success factors derived in our literature review by actively including the business side through expert interviews. This will allow us to explore whether OOP is a relevant means to solve business problems and how firms apply it. In doing so, we can find practical use cases. More importantly, we aim to derive current problems in order to infer objectives of a design solution (Peffers et al. 2007). Thus, this chapter has the following research questions:

RQ2: What is the relevance of the success factors in practice?

RQ3: What are the objectives for a OOP solution design?

To this end, we conduct semi-structured guided interviews with 20 experts from a range of industries, including services as well as manufacturing. First, we derive a set of OOP use cases. Second, we investigate good and bad experiences with OP. Third, we derive success factors of OOP process and compare them with the factors deduced in our literature review. Finally, we formulate the main objectives of for a OOP design.

The remainder of this chapter is organized as follows. After having illustrated the theoretical background on organizational participation and group decision support in Section 2, we begin with our study design in Subsection 2, including information on our

[8] Earlier versions of this chapter have been published as Wagenknecht, Filpe, et al. (2016) and Wagenknecht, Filpe, et al. (2017). This study was part of the joint research project “Participation as a Service” (PaaS), funded by the German Federal Ministry of Education and Research (under grant no. 01IS150120). The partners of the project contributed to this study. They provided contacts to the experts, guidance on the design of the interviews and supported the recording of five expert interviews.

set data set, interview guides and the structure of the expert interviews. We report the results in Subsection 3. In Subsection 4 we discuss the theoretical and practical implications of our interviews. Moreover, we summarize our findings from Section 3 and this chapter in order to derive definitions of relevant problems and solution objectives that guide the following sections of this thesis. We also draw a conclusion and highlight limitations.

4.2 Study Design

In order to answer our research questions, we aim to capture both explicit and tacit knowledge from experts in organizations based on guided expert interviews (Weston et al. 2001). We consider this a promising and insightful method to derive business-relevant problems. We interviewed 20 participants that all had extensive experience with OP in practise. They were recruited through the network of the consortium of "Participation as a Service" (PaaS), a Government-funded research project with Liquid Democracy, partou, HRpepper Management Consultants and the FZI Research Center for Information Technology[9]. We interviewed 17 senior managers at leading German mid- and large-cap enterprises. Another two interview partners were working at non-profit organizations and another expert is a head of section in a large public organization. All organizations had more than 50 employees and operated in multiple locations. Only one of the organizations had less than 100 employees. Two thirds of the experts were working in the services and information and communication technologies industry. Production industry was home to five experts. In two thirds of the organizations, there was an active workers or personnel council.[10] Each of the interviewees had more than ten years of working experience and either specialised in human resources or information technology – sometimes both. Before interviewing the experts, we ensured that they had sufficient prior experience with OP. To qualify, participants had to be involved in at least one OP engagement with their current or former employer.

Based on the theory presented in prior chapters, we developed an interview guide, which functioned as a protocol that still allowed for flexibility in order to adapt to the unique background of the experts. Our interviews began by introducing the concepts of OP and asking for the level of workers' representation (i.e. trade unions, workers or personel council). We then continued with open-ended questions (Weston et al. 2001). First, we examined the corporate culture by asking for the hierarchical structure, typical decision-

[9] Thomas Wagenknecht was the lead researcher.
[10] A personnel council is the equivalent of a worker's council in a Governmental public organization.

making processes and the level of employee participation (Wegge et al. 2010; Wilkinson et al. 2010). Thereafter, we explored the usage of collaborative IT tools (e.g., ESN, crowdfunding, etc.) and how they contributes to decision-making as well as OP. Following this part, we interviewed the experts on their experience with prior OP processes and asked for challenges and opportunities of a possible computer-supported implementation.

Interviews lasted, on average, 45 minutes. We recorded them both in writing and audio. Three research assistants transcribed the interviews following the approach of Weston et al. (2001) that focuses on meaning rather than accents. The research assistants resolved discrepancies with the help of an independent third party. Transcriptions were then processed using MAXQDA, a software program for qualitative and mixed method data analysis (Corbin & Strauss 2008). We created a codebook with 98 codes. We took an iterative and dynamic approach, developing the codebook further as we went on to derive codes in vivo during the analysis of the interviews (Weston et al. 2001; Corbin & Strauss 2008; Kee et al. 2016). We coded snippets, phrases and paragraphs. As we asked open-ended questions, we took a bottom-up approach in coding. This ensured that we could concentrate on the interviewee's responses, rather than fitting every piece of text into a pre-determined hypotheses (Corbin & Strauss 2008). We began with careful reading of each transcript, followed by selective coding, sorting text according to the major themes derived from the theoretical background and related work (Weston et al. 2001; Corbin and Strauss 2008). Kee et al. (2016) compared selective coding to "sorting photographs into different albums on Facebook" (p. 3), where the photo could belong to more than one album. After selective coding, we followed up with open coding and axial coding (Corbin & Strauss 2008) in order to contrast and compare emerging themes as well as to create sub-themes. For instance, we focused on quotes about collaboration but soon realized that anonymity was an important sub-theme. In order to ensure reliability, one author began selective coding, which was then reviewed by a second author (Kee et al. 2016). Furthermore, inter-coder reliability was ensured by repeated crosschecks and multiple discussions in order to reach a common consensus on the final themes and sub-themes (Weston et al. 2001).

In what follows, we will present the results of our expert interviews and the subsequent systematic analysis, which build the ground for our more elaborate problem definition.

4.3 Results

All of the experts reported of some sort of OP. Table 3 shows the use cases for which they implemented participation processes. In the most common use case employees were

simply informed about firm developments. In a more advanced state, the interviewees reported that participative processes asked for the staff's well-being and for idea generation (i.e. suggestions for improvements of products, procedures and work conditions). In addition, experts said that employees were invited to set the agenda of board meetings and corporate events, propose mission statements and work on strategy plans or corporate policies. All of the use cases happened both with and without the support of IT tools. Also, most use cases were located at a corporate-wide level, while only few were relevant at the unit level. In most cases our interviewees told us about, employees were only able to decide on "light-weight" issues. This includes forms of employee voting on decisions that are less mission-critical, such as the color of the canteen walls, where to go for a Christmas party or the type of coffee to be bought. Although some experts reported that their employees were involved in the creation of mission statements and strategies, this level of advanced OP on highly business relevant subjects was rare. More often, OP was happening in form of suggestion schemes, surveys on well-being and by means of IS (e.g., virtual communities, ESN, etc.).

Table 3 Reported Use Cases for Organizational Participation
(X – *given*)

Use Case	**Using IT-Tools**	**Unit Level**	**Corporate Level**
Information	X	X	X
Idea Generation	X	X	X
Agenda Setting	X	-	X
Mission Statements	X	-	X
Strategy & Corporate Policy	X	-	X

The vast majority of the experts made positive experiences with OP. They reported positive reactions from their employees, who appreciated the effort as promoting equal opportunities. As expected, the interviewees said that participation led to increased job satisfaction and that employees committed more strongly to the decisions. Some experts also told us that they experienced a change in the corporate culture with more feedback and trust as well as an increased willingness for organizational transformation. Moreover, OP reportedly led to an increase in decision quality and more (product) ideas. Many

interviewees also said that OP was positively received by the organizations' leadership. Some senior managers were even surprised by the high quality of the results and the overall effects. A couple of experts told us that their firm would, thus, promote an active exchange between the leadership and employees . For instance, two firms invited their employees to regular "ask me anything"-sessions with the CEO. These experts dismissed the necessity of such a OOP tool because it might appear to be too formalized.

However, despite these positive results, our experts also saw many problems with OP. First, there are problems related to the organizational structure. Experts reported that some employees were unable to identify themselves and their job with the chosen topics of the OP process. Thus, they had no interest in participating and did not feel involved. More severely, many companies simply were not ready for OP as their corporate culture lacked the formal and informal framework (e.g. employees did not dare to express their opinion or were unable to do so because of hierarchical structures). For instance, if employees are used to a strict order of reporting and responsibility, experts suggested that employees might be hesitant to share their thoughts and ideas openly with other colleagues. Moreover, the experts interviewed stressed several times that some employees will be easily engaged in a participative process, while others might feel overwhelmed or remain hesitant during the entire process. Thus, some experts think that participation should be voluntary and competition between employees should be kept at compatible level. Moreover, our interviewees stressed that organizational structures need to be aligned to the OP process. For instance, if employees spent much time on participation, they could also ask for some rewards. Furthermore, experts suggest to include trainings and workshops in order to ease the on boarding for all employees. Moreover, the interviewees sometimes perceived discussions as off-topic and not constructive when there was a lack of priority and responsibilities were unclear. Experts regularly reported of a lack of commitment by the leadership because it was not clear how the senior management would deal with results or simply did not show much interest. Many experts think that the leadership could effectively block decisions or derail the participative process, so that employees lose interest and trust in the whole OP. All of this contributed to a low employee participation during the process.

Second, another problem occurred especially in the field of idea generation. In some cases, results were so disappointing that the experts assumed that employees did not have sufficient expertise to propose and discuss certain ideas. Instead the experts stressed that they faced a high workload in evaluating and eventually dismissing ideas. For example, one expert said: *"In such systems you will maybe implement 1% of the ideas proposed. That means, that you will have to reject ideas in 99% of the cases. To do this in a fair and*

transparent way, you need to thoroughly communicate why those ideas are rejected. Overall this results in a high workload and a low efficiency". Thus, another expert emphasized that systems would be needed where ideas can be quickly evaluated and easily merged with existing efforts of the firm.

Third, there were problems with the software tools organizations used to establish the participative process. We can decompose these problems in the two parts of ease of use and (lack of) trust. In terms of ease of use, OOP processes using Intranet or ESNs were often perceived as insufficient because of their high complexity in terms of both the time it took to learn the functions as well as the resources employees had to put into the process besides their normal job tasks. An expert stated: *"There are usually employees who say, they feel simply overloaded with the tasks they already have. They perceive the introduction of new software tools as an additional burden".* Some experts also reported that reticent employees were discriminated by the process, as they did not get equal opportunities to have their say. This is because they would not contribute as much content as more outgoing colleagues. Furthermore, employees that were less tech-savvy were disadvantaged too. Regarding trust, interviewees reported that some employees did not use the (technical) systems due to a lack of anonymity and, thus, fear of repression from their superiors if they share information that would oppose senior management.

Asked where the experts see most room for improvement, the experts acknowledged that the IS would generally need to maintain the positive effects of offline OP, while reducing some of its challenges. In particular, experts expect more constructive discussions as a result of peer rating of proposals and filtering of bad ideas. This in turn could lead to higher acceptance and approval from the leadership. Many interviewees also think that such software tools should support employees regardless of their position and social status. Some experts also ask for increased transparency in the decision-making process. In terms of talent management, one expert suggested that OOP could especially attract highly skilled and motivated employees who are not afraid to highlight problems in the company. This could allow senior managers to recognize high potential employees early on. Another expert suggested that a software tool, which could be hosted in the cloud, would particularly be interesting for workers councils as they could ensure that a firm's leadership would have limited access to the discussion.

Discussing the ways to decrease some of the main challenges mentioned above, recurring topics were anonymity and moderation. For instance, some experts assume that employees could use anonymous communication in order to caustically complain or even use the forum as a way to compromise and attack their superiors. As one expert stated: *"With anonymity we made the experience that a very small part of the participants who*

dislike everyone and everything can have a big negative impact on the discussion overall". In this regard, some experts generally dismissed anonymous communication because this would only spark misuse. Contrarily, other experts – notably those of companies with more experience in OP – emphasized the need for anonymity. An option for anonymous content contribution would be the only way to comply with legal requirements and, more importantly, enable open discussions on sensitive issues. In their view, anonymous comments would protect employees from repressions of their superiors. Notably, we found the same controversy among experts in terms of the need for moderators. Some experts could not imagine a participative process without moderation; others thought that users could keep discussions clean and lively by themselves.

On a more general level, many experts criticized that software tools are often difficult to integrate into the existing enterprise IT architecture. Moreover, the experts acknowledged that an OP process needs some marketing to attract users. An interviewee explained it the following way: *"When you put up something for discussion, you can be happy if there is some degree of participation at all. We call it the empty dancefloor: There always needs to be someone who starts dancing first, so that other people follow."*

4.4 Discussion and Conclusion

4.4.1 Discussion

We captured tacit and explicit knowledge on OOP from a variety of experts. They reported both positive and negative effects of participative processes, which were mostly in conjunction with the findings of previous research. We also found that firms rarely use dedicated software for OP, which leads to various problems. We argue that large parts of both the benefits as well as the challenges related to OP, which our experts mentioned, are also subject to current research in IS. Most of the benefits, such as increased job satisfaction and employee motivation, have also been reflected in the literature (Wilkinson, 1998; Wegge et al., 2010).

In terms of the organizational misalignments mentioned by the experts, studies on IS-enabled organizational transformation (OT) found that organizational culture and the associated leadership decisions during implementation can significantly affect the adoption and use of new information systems (Besson & Rowe 2012; Nevo & Wade 2010). Moreover, when organizational values are in a mismatch with the values represented by new technology – which might sometimes be the case with OP – employees might be reluctant to adopt the new system (Leidner & Kayworth 2006; Nevo & Wade 2010; Davison & Martinsons 2002; Silva & Hirschheim 2007). As both the information system and its use as well as the organizational structures influence one

another, information systems can positively contribute to a cultural change (Leidner & Kayworth 2006; Luna-Reyes et al. 2005). Research also supports the notion that leadership commitment is crucial in OP processes. For instance, extant research suggests that top managers should embrace a readiness for change, rather than fighting resistance, in order to increase motivation and reduce uncertainties and stress for their subordinates (Ke & Wei 2008; Cho et al. 2011; Leidner & Kayworth 2006; Erickson et al. 2012).

Extant research has also studied the problem of varying quality of user contributions in OOP engagements. Studies established that such processes tend to produce large idea collections that are highly redundant and greatly vary in terms of quality (Di Gangi & Wasko 2009; Blohm et al. 2010; Poetz & Schreier 2012; Riedl et al. 2013). Researchers consider only 10-30% of the ideas as being of high quality. However, following our interviews, there seems to be a limited understanding when to use which sort of rating scale in practise.

Furthermore, experts also talked about anonymous contributions in these processes. Anonymity is, of course, a well-established research subject in IS studies as well. While some scholars propose that anonymity can increase user participation due to the perceived "veil of protection" (Connolly et al. 1990; Haines et al. 2014), others criticize the anonymity-induced increase in hate speech and foul language (Siegel et al. 1986; Sæbø et al. 2010; Cho et al. 2012; Silva & Panahi 2017; Postmes & Lea 2000; Haines et al. 2014).

In our literature review, we already collected research on some of these issues mentioned by our experts. Having extended the D&M model to better understand OI system success, it is worth validating the success factors against the findings in our expert interviews. We suggest that the experts indeed corroborated the OI system success model. Furthermore, building on the interviews, we are able to extend the success factors even further in order to include current business requirements.

First, in terms of system quality, we extend the OI system success factors by the level of alignment between the new OI system and current IT infrastructure and architecture. Experts regularly said that they experienced greater acceptance if new OI systems perfectly fit to existing systems. Second, we extend service quality by the factors of fit to the organizational structures and culture to the OOP process. Moreover, we include timeliness of idea evaluation and feedback from peers or senior personnel as well as the quality of user training, onboarding and internal marketing measures. Third, we extend user characteristics by the factor of age as experts differentiated between tech-savvy youngsters and autochthonous employees that may be more sceptical to new systems.

Fourth, we suggest to include the level of anonymity to the system design factors. Lastly, experts referred to increased job satisfaction and commitment by employees, which extends net benefits. Table 4 summarizes the success factors of our literature review-based model and adds further factors suggested by our experts.

Table 4 OI system success factors
(added factors in *Bold and Italics*)

Variable	**OI Systems Success Factors**
System Quality	Ease of use ***Alignment with current IT infrastructure and architecture***
Information Quality	Understandability of goal or problem definition Timeliness of idea proposals Relevance and usability of (automated) suggestions Users' cognitive load
Service Quality	Organizers' responsiveness Quality of organizers' feedback Managerial commitment ***Fit of the organizational structures and culture to the OOP process*** ***Timeliness of evaluation and feedback*** ***Quality of user training, onboarding and internal marketing***
System Use	Number of users Frequency of use Quantity of user-generated content (ideas, comments) Retention time
User Satisfaction	User satisfaction with features Quality of user-generated content
User Characteristics	User personality User domain-specific knowledge User network position ***User age***
System design	Collaboration affordances of features

	Accuracy of rating scale ***Level of user anonymity***
Net benefits	Improved idea quality More accurate idea evaluation Increased consumer performance, trust, loyalty ***Increased job satisfaction, commitment (e.g., to decisions or organizational transformation)***

4.4.2 Problem Definition & Objectives of a Solution

Having established that IS research has already addressed the majority of OOP-related problems, we want to leverage the expert interviews to guide this thesis going forward. We suggest that there are three distinct areas promising for further research. These include (a) the influence of rating scales on the idea evaluation process, (b) the effect of anonymity on communication in OOP engagements and (c) organizational culture as an enabler as well barrier for OOP.

Rating Scales

OI engagements and similar forms of organizational participation regularly result in vast amounts of ideas, which significantly vary in terms of quality (Di Gangi & Wasko 2009; Blohm et al. 2010; Poetz & Schreier 2012; Riedl et al. 2013). In order to enable facilitators to manage even large corpuses of user-generated proposals, they need to introduce efficient evaluation schemes. IS literature has a well-established research stream on rating techniques. For example, IS scholars have studied complex approaches that initially require a lot of human oversight and implementation capacity, such as prediction markets (Blohm et al. 2016; Teschner & Rothschild 2013), or automated methods like text mining (Martinez-Torres 2015). However, popular websites and platforms often resort to offering more simple rating technqiues. For instance, ESN provider Yammer uses up-voting in the form of Likes, while Quora and Stackoverflow have up- and down-voting. Both Airbnb and Amazon employ Likert scales. Thus, given that users in crowdsourced processes have limited time resources and might be used to these evaluation features, both researchers and practitioners might want to know whether simple rating techniques would be an efficient tool to evaluate large idea corpuses as well. Analyzing how these rating techniques compare against novel, yet simple rating methods (e.g., “bag of lemons”) could be an interesting area for research. We will examine this research area in more detail in Section 5 of this thesis.

Anonymity

Another promising area for future research lies among the study of the effects of anonymity on the outcomes of OOP processes. Anonymity was a heavily debated construct in our expert interviews. While some pundits advised against it, others thought of anonymity as prerequisite for a successful OP engagement. However, anonymity was rarely the subject of analysis in our literature review on OI. Nonetheless, anonymity has been studied in IS research as well. For instance, scholars established that anonymity reduces conformity as well as ownership biases (Valacich, Dennis, et al. 1992; Sia et al. 2002), which could lead to increased group performance (Postmes & Lea 2000). Yet, anonymity in online discussions has repeatedly been shown to have detrimental effects on discourse quality due to polarization, hate speech and foul language (Siegel et al. 1986; Postmes & Lea 2000; Cho et al. 2012; Sia et al. 2002; Charness & Gneezy 2008; Haines et al. 2014). In effect, participation and satisfaction with the discussion might decrease (Omernick & Sood 2013; Haines et al. 2014; Kilner & Hoadley 2005). Hence, the challenges is to maintain the positive effects of anonymity while mitigating the negative sides. This thesis will turn to anonymity as a research topic in two studies, which are subject in Section 6 and Section 7.

Organizational culture

Usually, organizational cultures differ in terms of learning and development approaches, power sharing and participative decision making as well as support and collaboration, communication and tolerance for conflict and risk-taking (Hurley & Hult 1998). The experts have mentioned organizational structures and hierarchies numerously as the fertile ground for OP. That is, the organizational culture can both serve as an enables (e.g., in the context of the firms that had “ask-me-anything” session) as well as a barrier (e.g., when organizational norms do not fit the bottom-up approach of OP). Ke and Wei (2008) suggest that an organization should adopt a culture that encourages employees to participate in decision-making and generate innovative ideas, while simultaneously sharing information and knowledge openly and tolerating conflicts and risks. However, Davison and Martinsons (2002) question whether OP is suitable to all organizations. Thus, one problem is to design OOP in such a way so that it aligns with the organizational culture, while still enabling organizations to reap all the benefits. Section 8 of this thesis will analyze organizational culture’s influence on OOP in more detail.

4.4.3 Conclusion

Based on 20 guided expert interviews, we derived a set of use cases for OOP. These range from information to agenda setting, mission statement and even strategy development.

Taking the OI system success factors as a basis, we added more factors that our interviewees suggested. According to them, it is important that OOP systems align with broader IT architecture at the organization. Moreover, while confirming all success factors from the previous chapter, we found that the organizational structures needs to be adopted to the OOP process. This includes a timely evaluation and feedback of user-generated ideas as well as a thorough user training, onboarding (particularly for older users) and internal marketing. Furthermore, our expert interviews revealed that the provision of anonymous communication tools is another crucial success factors. Adding to the net benefits, the interviewees reported that both job satisfaction and employee commitment increased thanks to OOP engagements at their organizations. The latter may refer to single decisions, the employer or even to an organizational transformation.

Taking the results of the literature review as a basis and validating the success factors in business practise allowed us to establish the relevance of our research (Peffers et al. 2007). Moreover, we were able to derive promising areas for future research. Considering some parts of prior research in IS, we highlighted the potential of studying the effect of three distinct variables on the outcome of OOP processes. They include the organizational culture as well as anonymity and rating scales. We will explore these topics in more detail in the following chapters.

4.4.4 Limitations

This research needs to be considered against its limitations. Despite our best efforts to diversify our set of experts, our findings have a limited generalisability as we only interviewed selected German experts that were members of either the board, HR or IT managers, often concerned with organizing rather than (only) participating in OOP processes. Besides testing our model in practise, future research could also consider surveying a broader (and more international) set of employers and employees.

5. Rating Techniques[11]

5.1 Introduction

From strategic planning to product innovation, small and large firms as well as other organizations are involving their employees and stakeholders to propose novel ideas through digital platforms (Bjelland & Wood 2008; Di Gangi & Wasko 2009; Niemeyer et al. 2016). These processes are sometimes strictly limited to participation within the company or part of a larger open innovation campaign, including customers, suppliers, and other interested parties (Chesbrough 2003; Adamczyk et al. 2012). Regardless of their target group, these platforms all have in common that users face vast amounts of proposals of varying quality, but only a few can or even should be implemented (Di Gangi & Wasko 2009; Hossain & Islam 2015). Hence, there is a strong need for group decision support systems (GDSS) that enable users to filter ideas appropriately (Klein & Garcia 2015), i.e., that achieve high accuracy in identifying the best ideas and avoid to expose users to the adverse effects of information overload, including frustration and disengagement (Schultz & Vandenbosch 1998; Oldroyd & Morris 2012).

Accordingly, there exists a myriad of evaluation techniques. On the one hand, these include complex approaches such as prediction markets (Blohm et al. 2016; Teschner & Rothschild 2013), or automated methods like text mining that initially require a lot of human oversight and implementation capacity (Martinez-Torres 2015). On the other hand, approaches like voting and user ratings are easier to implement and widespread on various online platforms. For instance, many social media and community platforms offer simple up- and down-voting (e.g., Reddit, Quora, Stackoverflow, etc.) or up-voting only (e.g., Facebook and Yammer in the form of "Likes"). Other platforms use 5-point scales, similar to those by Likert (1932), often in form of star-ratings (e.g., Amazon, Airbnb, etc.).[12] Yet, these methods face inherent shortcomings, including biased distributions (Teubner et al. 2016), limited accuracy due to oversimplification, a possible disconnect between the goals of process organizers and raters, as well as reduced user satisfaction (Ebner et al. 2009; Riedl et al. 2010). In this vein, the video platform YouTube dropped

[11] An earlier version of this chapter has been published as Wagenknecht, Crommelinck, et al. (2017b). This study was part of the joint research project "Participation as a Service" (PaaS), funded by the German Federal Ministry of Education and Research (under grant no. 01IS150120).

[12] We follow Klein and Garcia (2015, p. 43-44) in referring to five-star rating simply as Likert scales because of the vast similarities in idea evaluation process, though there are methodological differences (Likert 1932).

its five star Likert scale rating system in 2009 as users mostly rated content as either very bad or very good – rarely using any measures in the middle of the 5-point scale. Since then, the platform switched to up- and down-voting (YouTube 2009).

Seeking to address some of the shortcomings of existing approaches, Klein and Garcia (2015) proposed a novel method. Their so-called "bag of lemons" (BOL) approach lets users in evaluation tasks allocate a predefined amount of lemons to those ideas they consider to be the worst. A lemon thus represents a negative assessment and a user can allocate multiple, indeed up to all of her lemons to one single idea. This way, the crowd is assumed to flag bad ideas, supposedly identifying a (remaining) set of high quality ideas. In fact, the BOL method outperformed Likert scales in terms of time for task completion and accuracy (Klein & Garcia 2015). To follow up on these first auspicious insights, this study systematically assesses the characteristics of the BOL method in comparison to up-/down voting and (conventional) Likert scales. In doing so, we focus on two factors. First, as crowd-based schemes rely on the laws of large numbers and the quality of collaborative evaluations usually increases in the number of independent assessments (Poetz & Schreier 2012), we consider user activity under the three mentioned rating method regimes. Second, as crowd-based approaches typically work on a voluntary basis and hence require a positive user attitude and engagement (Kamis et al. 2008; Riedl et al. 2013; Blohm et al. 2016), we consider the – potentially detrimental – effects on frustration as a key indicator of a non-positive attitude and user disengagement (Riedl et al. 2013). Such motivational variables are widely perceived as a crucial factor for user acceptance and usage of information systems (Venkatesh 1999; Hwang & Yi 2002). In this sense, this research is motivated by the following key drivers: First of all, there exists a clear research gap as BOL represents a novel method and its role in contrast to established methods is still unclear. However, organizations increasingly seek to involve their employees, citizens, or members in decision making in order to increase content, loyalty, identification, and productivity – often using those very collaborative voting techniques (Blohm et al. 2011). In consequence, as accruing informational charges grow constantly, such methods may expose participants to excessive informational load, yielding undesired results such as frustration, disaffection, and disengagement (Schultz & Vandenbosch 1998).

To connect the different rating methods with our target variables, we hence base our research on two intermediate, explanatory factors. First, as the BOL method represents a novel and commonly unknown rating technique, we consider the factor of perceived novelty, capturing potential user deterrence by the unknown, or a lack of comprehensibility. Second, as BOL requires users to deal with a host of informational

bits and pieces, information overload may be a concern. It was shown to yield adverse effects on employees as they are exposed to ever-growing amounts of unrestricted and unfiltered data (Schultz & Vandenbosch 1998; Oldroyd & Morris 2012). Thus, in this study, we pose the following overarching research questions:

> ***RQ4***: How does the BOL rating technique affect user activity and frustration in a crowd-based evaluation task?
>
> ***RQ5***: Which role do perceived novelty and information overload play in mediating these effects?

To address our research questions, we conduct an online-based field experiment, including the collection of survey data. As part of a real world open innovation campaign, employees of a private-public institution rated the idea proposals of their peers. We systematically vary rating methods, using up-/down voting, Likert scales (Likert 1932) and the BOL method (Klein & Garcia 2015) as our key IT artifacts (Peffers et al. 2007). We investigate the ramifications for user activity, frustration (Riedl et al. 2013), and task completion time, taking into account the factors perceived novelty and information overload (Schultz & Vandenbosch 1998). Exceeding previous studies (Riedl et al. 2010; Riedl et al. 2013; Klein & Garcia 2015), users in this scenario were not forced to rate all ideas, which promises a more realistic situation and novel findings. In consequence, this study makes three main contributions to the IS literature. First, we evaluate a novel, thus hardly researched method of idea evaluation (BOL) in comparison to more established methods (Likert scales, up-/down voting) in terms of the important indicators user activity and frustration, which has not or only scarcely been assessed by extant literature. By integrating these opposing factors within a joint research model, we enhance the understanding of collaborative evaluation processes in view of differentiated rating regimes (Adamczyk et al. 2012; Leimeister 2010; Straub et al. 2015). Second, by relating these key indicators to mediating factors, we provide starting points for understanding how the different rating methods affect the users' perceptions and behaviors. In particular, we identify perceived information overload as a potential mediating factor at play. Third, our study provides a show case of employee-driven innovation (Gressgård et al. 2014) and organizational online participation (Wagenknecht, Filpe, et al. 2016).

This chapter is organized as follows. We outline related work and the theoretical background in Subsection 2. Subsection 3 then illustrates our study design and elaborates on the artifact design. Subsection 4 presents the results of our study. Lastly, we discuss our findings in view of theoretical and practical implications, limitations, and starting points for future research in Subsection 5.

5.2 Theoretical Background and Related Work

In recent years, the IS literature has begun to systematically evaluate ways to exploit the wisdom of the crowd, including a broad strand of research on open innovation processes (Adamczyk et al. 2012; Wagenknecht, Filpe et al. 2017). Notably, a number of studies analyzed voting and rating techniques on open innovation contests (Blohm et al. 2016; Riedl et al. 2013; Riedl et al. 2010; Klein & Garcia 2015; Dean et al. 2006). Such approaches relate to GDSS in the sense that groups evaluate proposals which were generated by the group itself, which can have important ramifications due to personal or social attachment, preoccupation, and other biases (Sia et al. 2002; Sassenberg & Postmes 2002). With the emergence of large-scale open innovation contests, IS research revived its investigation of rating scales. Several studies in this line of research evaluated both quality and task completion time with regard to different rating techniques (Dean et al. 2006; Blohm et al. 2010; Riedl et al. 2010; Riedl et al. 2013; Bao et al. 2011). In this subsection, we describe the theoretical background of the concepts and factors that form the basis of our study. We begin with a brief introduction of open innovation contests.

5.2.1 Open Innovation

Adamczyk et al. (2012) define open innovation contests as IT-based and time-limited competitions by individuals or organizations calling on the general public or a specific target group to propose innovative solutions. Thereby the organizers make use of the expertise, skills, and creativity of distributed crowds. Engaging employees and customers in open innovation processes can have several benefits for the organizers, including increased loyalty, brand image, and success in recruitment (Fuchs & Schreier 2011). For an open innovation contest to be successful, previous research identified a number of factors. Organizers, for instance, need to express a sense of urgency and establish a trusted environment (Ebner et al. 2009; Hawlitschek et al. 2016). Moreover, users might be motivated by gaining access to the knowledge of experts as well as receiving appreciation for their input by peers and organizers of the process (Leimeister et al. 2009). Furthermore, extant research also established that collaborative tools drive increase the quality of results in open innovation engagements (Blohm et al. 2011).

Recently, several leading IT corporations engaged both their customers and employees in open innovation contests. For instance, IBM's "Innovation Jam" resulted in 46,000 product ideas proposed by 150,000 participants (Bjelland & Wood 2008), while users in Dell's ongoing "IdeaStorm" have generated more than 20,000 suggestions for product improvements thus far (Hossain & Islam 2015). Open innovation contests among employees of a company are one application of employee-driven innovation (Gressgård et al. 2014; Wagenknecht, Filpe, et al. 2016). In the broader context of organizational

online participation, these contests can be a way to actively provide employees the means to be part of the decision-making processes of their workplace, which was found to be related to increased employee commitment and productivity (Wagenknecht, Filpe, et al. 2016).

Considering the vast amount of ideas, it becomes more likely that an open innovation contest will produce more superior solutions than an innovation process limited to only few innovators (Lakhani & Jeppesen 2007). Thus, in line with the "wisdom of the crowds" paradigm, some user-generated ideas are able to compete with expert or core inside innovators (Poetz & Schreier 2012; Riedl et al. 2010; Leimeister 2010). However, assessing these crowd proposals can be costly. Some estimate that large corporations take about four hours working time and $500 just to evaluate one idea (Robinson & Schroeder 2004). Yet, only few ideas are really worth increased attention. Prior research established that open innovation processes tend to produce large idea collections that are highly redundant and greatly vary in terms of quality (Di Gangi & Wasko 2009; Blohm et al. 2010; Poetz & Schreier 2012; Riedl et al. 2013), where only 10-30% of the ideas tend to be of good or high quality (Blohm et al. 2010). Put figuratively, large-scale open innovation processes create excellent needles. They do, however, also create the corresponding haystacks. The main challenge then is to identify the valuable propositions. One common solution to this problem is to engage users in the evaluation process using voting and rating techniques (Bao et al. 2011; Riedl et al. 2010; Riedl et al. 2013; Klein & Garcia 2015; Blohm et al. 2016; Dean et al. 2006).

5.2.2 Rating Scales, Attitudes, and Intrinsic Motivation

The usage of rating scales transforms the process of idea evaluation into a concrete task of judgment, where individuals consider a finite set of alternatives (Blohm et al. 2016). In effect, this enables the organizers of open innovation contests to reduce their costs for idea evaluation by basing decisions on aggregated user ratings.

However, the gathered data may depend on the specific rating scale. Prior research suggests that rating scales are prone to selection biases and other dysfunctionalities (Dean et al. 2006; Blohm et al. 2010; Riedl et al. 2010; Bao et al. 2011; Riedl et al. 2013; Klein & Garcia 2015; Blohm et al. 2016). For instance, some researchers claim that rating scales often fail to properly distinguish between medium/good and excellent ideas (Bao et al. 2011; Klein & Garcia 2015). Moreover, there may occur discrepancies between the initiator's and the participants' goals and intentions. While initiators would like the participants to evaluate as many ideas as possible thoroughly, the latter are restricted both in terms of time and information available to them. Hence, organizers need to take

potential factors such as non-interest, distractions, lack of knowledge, and workload into account (Riedl et al. 2013; Klein & Garcia 2015). In consequence, they need to communicate clearly what, why, and how they would like their participants to do specifically.

Nonetheless, evaluation tasks are often described poorly and hence remain fuzzy. The rating scale itself hence become an important factor as participants are searching for potential cues (Schwarz 1996). In fact, participants tend to develop attitudes toward rating scales based on characteristics such as graphical elements and input variables (Kamis et al. 2008; Riedl et al. 2013; Blohm et al. 2016). Attitudes, in turn, can affect cognition and behavior (Solomon et al. 2006). In this context, Riedl et al. (2013) found that users perceive different rating scales as more or less exciting, entertaining, satisfying, and positive, which can be explained by flow theory (Csikszentmihalyi 1977), suggesting that people can become very immersed by an activity, accompanied by high concentration on a task, while losing self-consciousness. Another study suggested that flow states are related to increased intrinsic enjoyment and perceived control (Koufaris 2002). Both constructs are also related to intrinsic motivation (Deci & Ryan 2003). IS research established intrinsic motivation to be an important factor in creating favorable user perceptions, intention, and actual system use (Venkatesh 1999; Hwang & Yi 2002). In contrast, all too simple or overwhelmingly complex systems may deter users from entering such states, rendering system use a frustrating experience which is in consequence unlikely to be continued. Several potential antecedents of frustration come to mind. Given the structure of evaluation tasks with many diverse ideas, information overload is a concern which we further outline in the next paragraphs.

5.2.3 Information Overload

Information overload can be characterized as a state in which cognitive processing capacity is exceeded by the volume and speed of incoming stimuli that need to be processed (Schultz & Vandenbosch 1998). People continuously evaluate their usage of information systems and discontinue usage when experiencing techno stress (Beaudry & Pinsonneault 2005). For instance, Maier et al. (2012) found that users stop using social network services when experiencing, among other factors, exhausting levels of information disclosures by friends leading to information overload. Koroleva et al. (2010) found similar results for Facebook and Eckhardt el. (2012) did so, asking participants in an experiment on LinkedIn to extract specific information for a job application. The phenomenon of information overload might be especially pronounced in open innovation evaluation tasks as users need to process a manifold, diverse, partly contradicting, and often novel set of ideas. Aggravatingly, the proposers usually do not follow a common

schema, style, or language in describing their ideas. Comparing ideas across one another may hence be particular challenging.

Depending on the structure of the rating scale and evaluation task, perceived information load may thus differ (Schultz & Vandenbosch 1998). It has, however, not been investigated with regard to rating scales in IS studies thus far. In the following, we hence describe a design allowing to relate users' perceptions of information overload to different rating methods, forming the basis of the field experiment reported in this study.

5.3 Study Design

In this subsection, we outline an approach to address our research questions. Similar to Klein and Garcia (2015), our study is based on an (internal) open innovation campaign at an actual private-public research center. Both the ideation as well as the evaluation phase were part of a broader participatory process at this research center, which was embedded in a strategic change management project. The FZI Research Center for Information Technology (originally *FZI Forschungszentrum Informatik*) is legally incorporated as a foundation, disposes over a yearly budget of approximately €14 million, and employs a total of 280 people, including administrative staff (incl. facility management, public relations and corporate communications), research scientists and student research assistants. The researchers work on a variety of projects in the domains of computer science, information technology, robotics, and engineering. Having been established in 1985, the research center has amassed a remarkable reputation in Germany, Europe and the world. Note that while the author of this thesis is an employee of the FZI, and two contributors were or are affiliated with the research center,[13] the evaluation of the study was conducted independently. However, during the design of the study, the worker's council as well as senior management of the FZI provided useful suggestions and set the boundaries. For instance, we promised the worker's council that idea submissions could remain anonymous, if the users handing them in would like it this way. To this end, we set up a submission form (see below) that enabled anonymous contributions. Moreover, while the senior management did not want to implement all user-generated proposals, the managing director and the board agreed to comment on the feasibility of each idea. Over time, they aim to implement most of the user-generated ideas. The worker's council (of which this thesis' author is also a voting member) also promised to track progress on a dedicated website.

[13] We explain these affiliations in detail in the subsection on limitations below.

5.3.1 Artifact Design

We follow a DSR approach (Peffers et al. 2007) that is objective-oriented as we seek to evaluate the performance of an IT artifact – the BOL rating technique – in comparison to other design choices (i.e., up- and down-voting and Likert scales). This will enable us to provide prescriptive as well as descriptive insights to researchers and practisioners. Our artifact design closely follows the design proposed by Klein and Garcia (2015). Figure 4 and 5 exemplify our artifact design, showing the submission page as well as one of the three treatments (in this case the up- and down-voting treatment).

5.3.2 Stage 1: Idea Generation

Our study employs a two-staged approach. In the first stage, employees of this institution were invited to propose ideas on how to make the research center an (even better) employer via an online system. Each suggestions consisted of an introduction or abstract and a detailed explanation. We invited all employees to this online platform. In the second stage, all employees were invited again to rate the ideas in a condensed set, using either BOL, up- and down-voting, or Likert scales.

Employees of the institution were asked to propose ideas on how to make the center an (even better) employer. The corporate communications unit of the FZI provided posters and promoted idea generation in newsletters. Figure 4 shows our submission page. We received a total of 71 “raw” proposals. Before proceeding to the second stage, we eliminated hoax and proposals not compliant with the terms of use (e.g., including clear names of employees or foul language), consolidated redundant proposals, redacted grammatical and other language- and style-related issues, and in consequence, generated a condensed and workable idea corpus of 42 proposals. The proposals covered a wide range of topics, addressing organizational procedures, marketing, human resources, and many other areas. In this first stage, participants were able to propose ideas within a range of two weeks. Ideas were generally posted anonymously in order to both comply with German data protection legislation and to enable employees to speak their mind freely (Haines et al. 2014; Wagenknecht, Teubner, et al. 2016b).

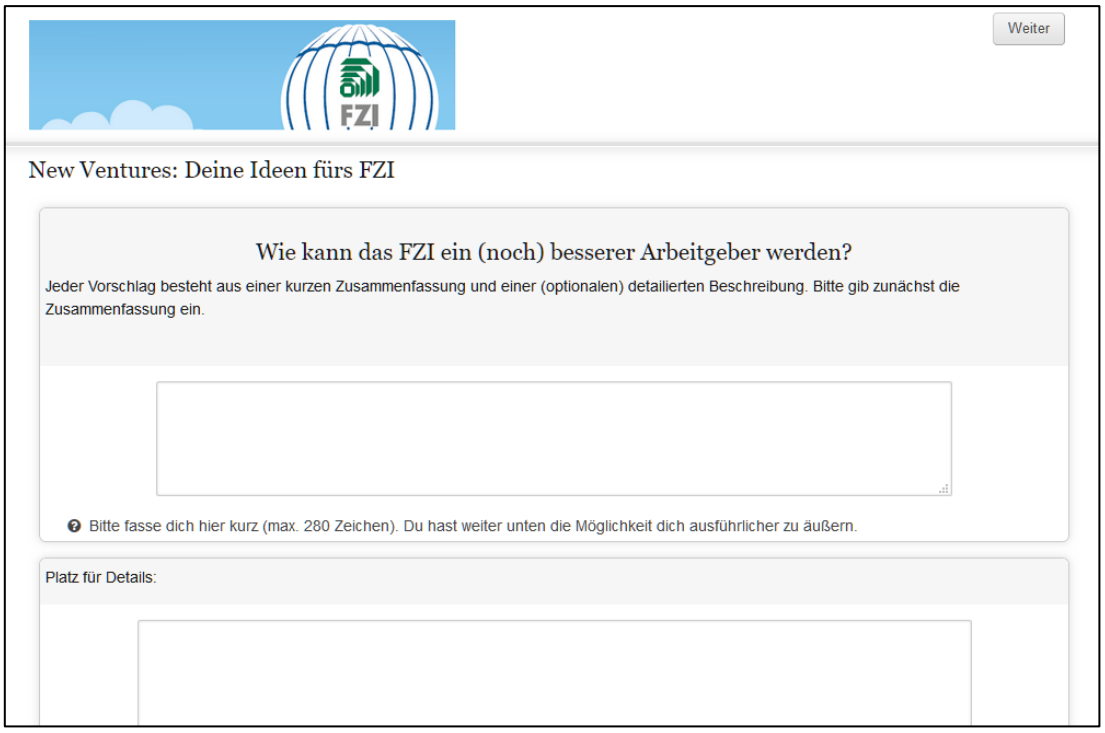

Figure 4 Submit Page for Stage 1

5.3.3 Stage 2: Idea Evaluation

In the second stage, employees were then invited to rate their peers' proposals on another online platform. This platform was accessible for two weeks, too. Here, each employee could participate only once. Participants were prompted to assess the ideas' overall quality, which may be based on subcategories such novelty, feasibility, or value to the company (Dean et al. 2006; Riedl et al. 2010; Poetz & Schreier 2012; Riedl et al. 2013). Note, however, that these sub-dimensions were not surveyed separately. In fact, idea evaluation was based on either bag of lemons, up- and down voting, or Likert scales. Figure 5 shows the up- and down-voting treatment as one example.

Each participant was allocated to only one of the three treatment conditions (between-subjects design). All participants were presented the same 42 proposals in all treatment conditions, using a random order for each participant in order to rule out sequence effects. Following Klein and Garcia (2015), participants in the BOL setting disposed over a total of eight lemons, representing approximately 20% of the total idea basket, which they were able to allocate to the ideas. They were able to accumulate a maximum of three lemons to an idea. Moreover, participants in this setting received a detailed explanation of the BOL approach. They were asked to complete a mandatory quiz before the actual rating task in order to ensure comprehension and hence validity. This quiz consisted of a short, artificial example where users had to replicate a preference order.

In the up- and down-voting setting, participants could either up-vote or down-vote each idea once. This setting replicates that of platforms such as YouTube. Participants in the Likert scale setting were able to rate the ideas on 5-point Likert scales, ranging from 1 (very bad) to 5 (very good). Similar to Klein and Garcia (2015), each of the points was depicted in the form of stars. Exceeding previous studies (Riedl et al. 2010; Riedl et al. 2013; Klein & Garcia 2015), participants in the Likert and up- and down-voting treatments were free to rate as many ideas as they liked, that is, there was neither a minimum nor maximum requirement.

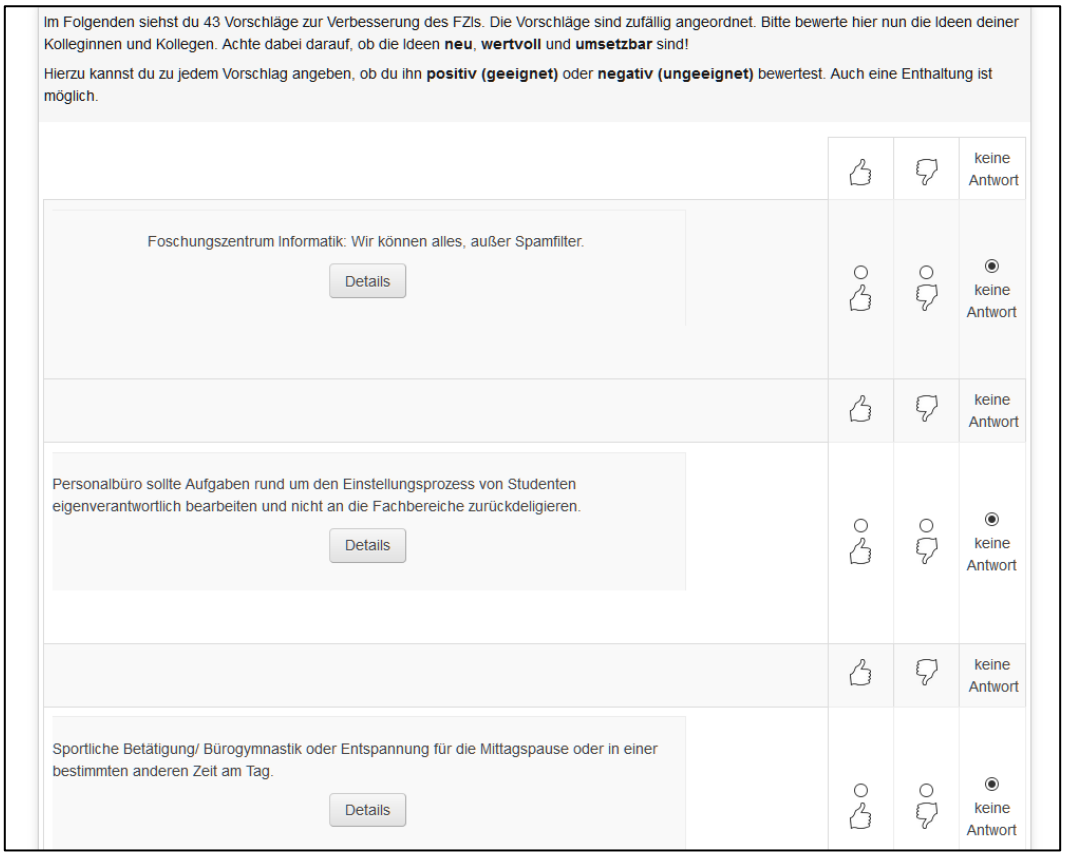

Figure 5 Up- and Down-Voting Treatment for Stage 2

5.3.4 Measures

After completing the rating process, participants were asked to conduct a brief survey. To ensure validity, previously validated scales were used and adapted to the context of this study. We assessed user attitudes towards the rating method, operationalized by the categories novelty and frustration (Riedl et al. 2013; Galletta et al. 2004). Information overload was adopted based on the items proposed by Schultz and Vandenbosch (1998). To assess user activity, we measured how many votes were casted in relation to the

maximum number of votes in the respective treatment. This index ranges between 0 and 1. The items are summarized in Table 5.

Table 5 Measurement items

Construct	Item	Source
Perceived Novelty	*Using the rating scale was a novel experience to me.*	Riedl et al. (2013)
Frustration	*Using the rating scale was a frustrating experience to me.*	Riedl et al. (2013)
Information Overload	*In using the rating scale, I was forced to concern myself my many idea proposals.*	Schultz & Vandenbosch (1998)
	In using the rating scale, I could not focus on the actual relevant idea proposals.	
	The rating scale overcharged me by too many idea proposals and too much information.	

5.4 Results

In total, 141 participants completed the questionnaire, representing approximately 50% of the total workforce at the institution. Altogether, 54 participants evaluated the ideas using BOL, 48 were in the Likert treatment, and 39 in the up- and down-voting treatment. In compliance with German privacy regulation, participants were able provide personal information on a voluntary basis. Thus, only part of our sample reported age (61.5%) and/or gender (71.5%). The age of the (reporting) participants ranged from 18 to 37 years (mean 28.9). Moreover, 80% of our participants were male. These characteristics did not differ significantly among the three treatments.

We first turn to the central target measures of this study, user activity and frustration. As illustrated in Figure 6, user activity was highest for the BOL method, and lowest for up-/down voting. A set of t-test confirms the significance of these differences ($t_{BOL/Likert}$ = 1.648, p=.103; $t_{BOL/U\&D}$ = 4.347, p<.001; $t_{Likert/U\&D}$ = 3.206, p<.001). As a first result, we thus note that the bag of lemons rating scheme facilitates higher levels of user activity than Likert scales or up- and down voting.

Next, we consider how frustrating users perceived the different rating methods. Figure 6 shows that BOL provokes markedly higher levels of frustration than the other methods, whereas Likert and up-/down voting yield comparable levels. A set of t-test confirms this impression statistically ($t_{BOL/Likert}$ = 2.498, p=.014; $t_{BOL/U\&D}$ = 2.783, p=.007; $t_{Likert/U\&D}$ = .283, p=.778). As a second result, we note that the bag of lemons rating scheme facilitates higher levels of perceived frustration than Likert scales or up- and down voting.

Besides these focal measures, we surveyed the participants in terms of how novel and how (informational) overloading they perceived the three rating methods. As can be seen in Figure 6, both for novelty and information overload, the bag of lemons method yields (marginally) significant higher levels than the other two (Novelty: $t_{BOL/Likert}$ = 11.033, p<.001; $t_{BOL/U\&D}$ = 11.711, p<.001; $t_{Likert/U\&D}$ = .983, p=.328*;* Overload*:* $t_{BOL/Likert}$ = 1.816, p=.072; $t_{BOL/U\&D}$ = 2.555, p=.013; $t_{Likert/U\&D}$ = 1.0613, p=.292).

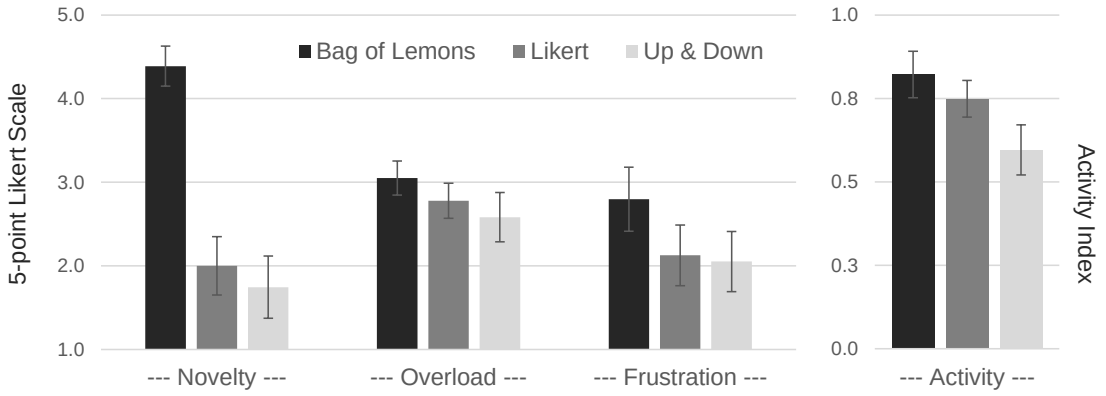

Figure 6 Overview of novelty, information overload, frustration, and activity scores (error bars indicate 95% confidence intervals)

We now turn to a structural analysis of the effects of rating scale on user activity and frustration. As we have outlined in Subsection 2, we hypothesize perceived novelty and information overload as potential mediators, that is, carriers and hence psychological determinants of the rating scale effects on the target measures. For doing so, we slightly simplify the analysis, comparing the bag of lemons method against both other methods simultaneously, that is, using only one binary dummy variable for "bag of lemons." Our model, along with the results, is depicted in Figure 7. We use structural equation modelling based on partial least squares (SEM-PLS) to operationalize this analysis. Specifically, SmartPLS 3.0 (Ringle et al. 2015) was used due to its flexibility in terms of sample size and its lack of assumptions regarding data and residuals distribution (Chin 1998). The sample size of this study (n = 141) exceeded the minimum required to validate a model in PLS, given the present structural model (Gefen et al. 2000). Confirming the

results from above, this analysis shows that the bag of lemons significantly increases the perception both of (rating scale) novelty (b=.743, p<.001) as well as information overload (b=.212, p<.010). Information overload, in turn, significantly drives frustration (b=.262, p<.010), whereas the direct path from BOL to frustration is insignificant. Thus, information overload fully mediates the method's direct impact on frustration (beyond its indirect effect via this path).

	Descriptives		**Composite Reliability**	**Cronbach's Alpha**	**AVE**	**R^2**	**Correlation Matrix**				
	Mean	**SD**					**AC**	**BOL**	**FR**	**PN**	**IO**
AC	.722	.232	.918	.976	.966	.087	**1.000**				
BOL			.992	.988	.976		0.279	**1.000**			
FR	2.324	1.287	.983	.991	.984	.138	0.132	0.256	**1.000**		
PN	2.711	1.108	.948	.939	.991	.552	0.148	0.743	0.284	**1.000**	
IO	2.803	0.817	.989	.956	.987	.045	0.055	0.212	0.316	0.454	**1.000**
Explanation: AC – Activity; BOL – Bag of Lemons; FR – Frustration; PN – Perceived Novelty; IO – Information Overload											

In contrast, there does not occur any mediation on user activity, neither via perceived novelty, nor via information overload – both paths are insignificant. There exists, however, a positive and significant direct effect from BOL to user activity (b=.390, p<.001).

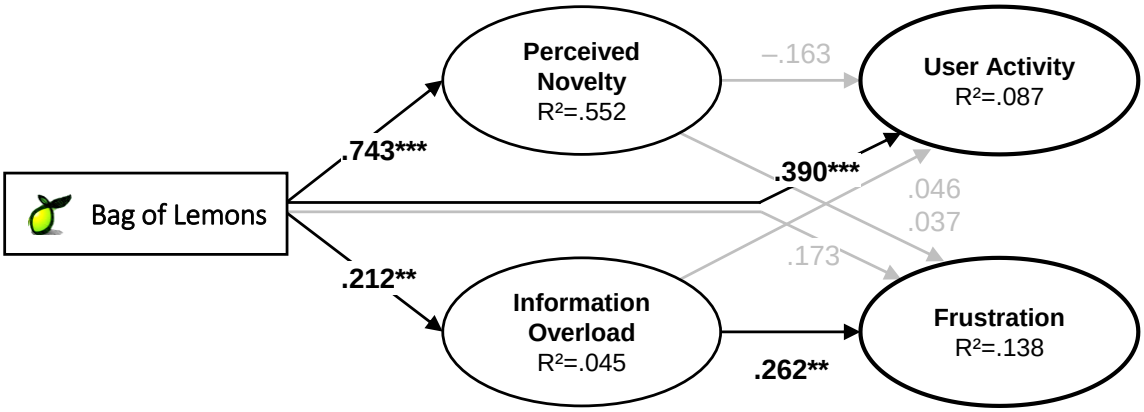

Figure 7 Structural Research model, including standardized path coefficients and R squared values (* p<.001; ** p<.01)**

Lastly, we considered the individual task completion times. Since this factor has an open-ended scale in one direction, Figure 8 depicts the main characteristics of the time distributions for the three treatment conditions in boxplot diagrams (indicating, median, as well as 25%- and 75%-quartiles). We find that the three conditions do not differ significantly in terms of completion time ($t_{BOL/Likert}$ = 1.564, p=.122; $t_{BOL/U\&D}$ = 1.467, p<.147; $t_{Likert/U\&D}$ = –.097, p=.923).

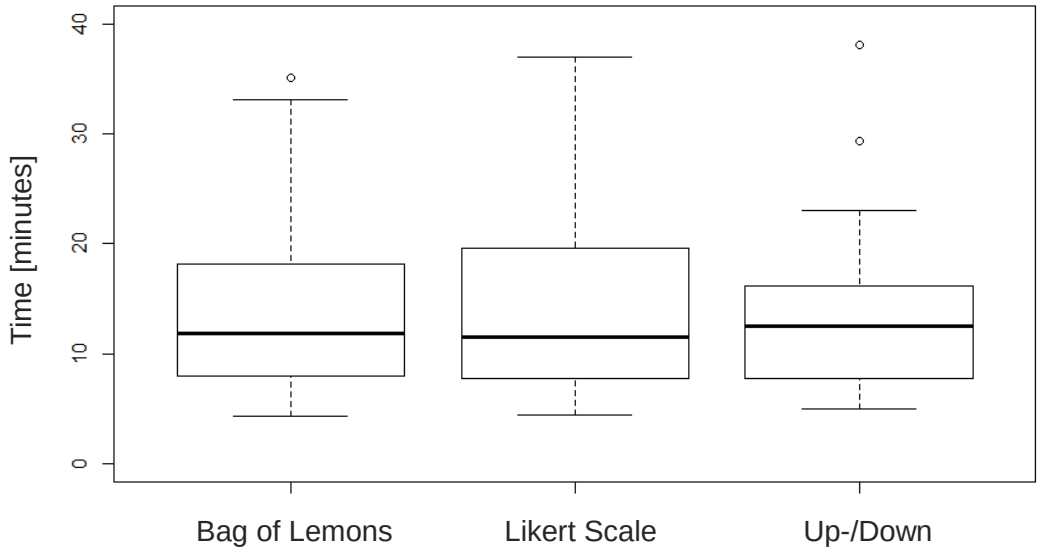

Figure 8 Boxplots of task completion times

5.5 Discussion and Conclusion

5.5.1 Discussion

In this study, we analyzed the effects of rating scales on users' activity, perceived information overload, perceived novelty, and frustration. In a field experiment in an open innovation campaign for a mid-size German research center, we assessed how BOL, up- and down-voting, and Likert scales differed in terms of these measures when employees were asked to evaluate a corpus of ideas created by their peers. All employees of the research center were invited to rate 42 proposals, being exposed to one of the above mentioned rating scales (between subjects design). Analyzing the behavioral as well as the post-evaluation survey data, we demonstrate that BOL, while stimulating activity, is also perceived as more frustrating than other rating techniques. We trace this result to the mediating factor of perceived information overload. Although participants were exposed to the same amount of information, that is, the identical corpus of 42 ideas, the bag of lemons method yielded much higher overload perceptions. We suggest that this may be due to deliberative and "pending" nature of the bag of lemons approach. While using Likert scales or up- and down-voting techniques, each idea can be assessed at a time, allocating lemons to a set of many ideas can be challenging since the desire to allocate a lemon late in the process may require to reassess previously rated ideas, for instance, to decide where to withdraw lemons from. This need for continuous cross-links requires to keep more ideas in mental "working memory," whereas they can be considered (and forgotten) sequentially when using the other techniques.

Coming back to our first research question of how the BOL rating method affect user activity and frustration in a collaborative evaluation task, we hence can summarize that BOL increases both user activity and frustration. With regard to the second research question, that is, the role of perceived novelty and information overload in mediating these effects, we see that information overload fully mediates the effect of the BOL method on frustration, while perceived novelty does not exhibit any mediating properties. Moreover, there do not occur any cross-mediating effects, that is, from novelty to frustration or from information overload to activity. Thus, from a design perspective, it is questionable whether OOP facilitators should include the BOL approach as our evaluation shows limited advantages compared to more common forms of rating techniques, while its frustrating nature might steer away users in the long-run. Moreover, from a practical perspective, it might be easier to implement up- and down-voting and Likert scales as they require less explaining upfront.

Overall, considering that approximately 50 percent of the employees of the institution evaluated their peers' proposals, this also hints at the high interest of employees in getting

engaged in the process of participating in the decision-making processes at their workplace.

5.5.2 Conclusion

This study contributes to the literature by evaluating a novel, thus hardly researched method of idea evaluation (BOL) in comparison to more established methods (Likert scales, up- and down-voting). We focus on the important indicators of user activity and frustration, which has not or only scarcely been assessed by extant literature in this context. By integrating these opposing factors within a joint research model, we enhance the understanding of collaborative evaluation processes in view of differentiated rating regimes (Adamczyk et al. 2012; Leimeister 2010; Straub et al. 2015). Next, by relating these key indicators to mediating factors, we provide starting points for understanding how the different rating methods affect the users' perceptions and behaviors. In particular, we identify perceived information overload as a potential mediating factor at play. Moreover, our study provides a show case of employee-driven innovation (Gressgård et al. 2014) and OOP. We confirm findings of Riedl et al. (2013), who suggested that people form attitudes towards rating scales. Our findings also lend support to Klein and Garcia (2015), underpinning BOL's novelty but, in contrast, do not confirm the method's superiority in terms of task completion time. Yet, we extend the authors findings by shedding light on users' perception of BOL's restraining character. Participants in our study expressed higher levels of frustration when evaluating ideas using the BOL as compared to Likert and up- and down-voting. This suggests that people might refrain from engaging in a BOL evaluation task in the future. Accordingly, practitioners should be aware of the possibly detrimental effects of BOL when designing an open innovation platform. This effect, as it is mediated by perceived information overload, may substantially be driven by the relatively high number of idea. We suggest that idea evaluation tasks with fewer ideas (e.g., 6 to 12), may yield different results.

As this study finds rating scales to affect user frustration, we suggest that it is worth for future research to explore the antecedents of scale-related techno-stress. The noteworthy differences for information overload between BOL and up- and down-voting already lend some support to this presumption. We suggest further starting points for future research in our limitations.

5.5.3 Limitations

Our study needs to be considered against several limitations. First, we compared the different rating methods in terms of user activity, frustration, and time, however, could not consider the evaluations' accuracy, that is, a match between the crowd's assessment

versus how good the ideas actually were. This limitation points at several paths for future research, very much in the sense of prior studies (Riedl et al. 2013; Klein & Garcia 2015). Future work needs to take into account accuracy, for instance by comparing the collaborative results with an expert rater panel.

Next, as we have shown in this study, BOL facilitates higher levels of (relative) user activity than other rating methods. Nonetheless, on average, Likert and up-/down votes yield a higher overall numbers of idea evaluations. Systematically varying the amounts of ideas and "lemons" to distribute could thus shed more light on the strengths and weaknesses of the BOL approach and its robustness against different set sizes.

Due to strict German data protection legislation at the workplace, we were only able to capture some demographic characteristics of our participants. Thus, the data set is somewhat incomplete and restricts us from fully taking into account potential age or gender effects. Based on the data we have, these characteristics did not differ between treatments, so that at least a treatment bias due to demographic factors could be ruled out. Another limitation relates to the fact that part of the correlation between the item-based measures may be due to common method bias as most data was collected using standard questionnaire items. User activity represents an exception; correlations here will not exhibit common method bias.

Furthermore, our study as well as previous ones (Bao et al. 2011; Riedl et al. 2010; Riedl et al. 2013; Klein & Garcia 2015; Blohm et al. 2016) asked participants to rate ideas in the absence of any indication on whether and how other users already rated proposals. Future research could thus investigate the impact of information cascades, that is, users being able to see the evaluations of other (earlier) users (Bikhchandani et al. 1992), which may significantly impact results (Duan et al. 2009).

On a final remark, readers should also be aware that Thomas Wagenknecht is an employee of the FZI and is a voting member of its worker's council. Jan Crommelinck was a student research assistant at the FZI. Christof Weinhardt is a director at the FZI. Timm Teubner is head of a research group at Christof Weinhardt's research chair at Karlsruhe Institute of Technology. Each author took every effort to adhere to scientific standards in the design of this study. While both the senior management as well as the worker's council were involved in the setup of this study, the examination of the results was conducted independently. Moreover, the whole engagement was part of a larger strategic change management initiative. Thus, it is unlikely that participants only followed the call for participation (in either of the two stages) as a personal favour.

6. Anonymity - Study 1: Evaluating Anonymity and Persuasion[14]

6.1 Introduction

As today's employees demand higher degrees of involvement in terms of how, when, and where they work, participatory elements such as enterprise social software, internal crowdsourcing, or simple online discussion platforms are being widely adopted (Leonardi & Barley 2013; Riemer et al. 2015; Kuegler et al. 2015; Zuchowski et al. 2016; Wagenknecht, Filpe et al. 2017). This development is in line with the increasing prevalence of computer supported cooperative work (CSCW) (Behrendt et al. 2014) and group decision support systems (GDSS) (Postmes & Lea 2000), where success hinges on how employees use such systems. As an important design feature of interaction in this regard, the users typically decide on how *anonymous or identifiable* they wish to appear individually, whereas in some cases, the stage is set equally for all by the platform provider (Rains 2007; Tegarden et al. 2016).

Anonymity, in this sense, represents a double-edged sword, particularly in an organizational context (Rhee & Kim 2009). On the one hand, it can protect employees' privacy and reduce detrimental side effects within non-anonymous discussions and group decision making. For instance, anonymity was found to lead to reduced levels of conformity as well as decreased ownership biases, that is, people evaluating their own information more favorable than the information of others (Valacich, Jessup, et al. 1992; Sia et al. 2002; Van Swol et al. 2003). Moreover, lower-level yet knowledgeable employees may be reluctant to argue against superior managers in a non-anonymous online discussion, leading to fewer expressed arguments (Nunamaker et al. 1991). An "option for anonymity" in corporate discussion platforms may thus encourage junior or reticent members as well as minorities to participate more actively in debates, bring forward their ideas (Connolly et al. 1990; Haines et al. 2014), and to express hard truths (Weisband & Kiesler 1996; Acquisti et al. 2015). However, anonymity also poses several

[14] Earlier versions of this chapter have been published as Wagenknecht, Teubner, et al. (2016a) and Wagenknecht, Teuber, et al. (2016b). There is also a version of this chapter under review with the Information & Management journal. This study was part of the joint research project "Participation as a Service" (PaaS), funded by the German Federal Ministry of Education and Research (under grant no. 01IS150120).

challenges to the facilitators of online discussions. For instance, anonymous discussions are typically more polarizing (Charness & Gneezy 2008; Sia et al. 2002) and sometimes tend to exhibit hoax and foul language (Siegel et al. 1986; Sæbø et al. 2010; Cho et al. 2012; Silva & Panahi 2017; Postmes & Lea 2000; Haines et al. 2014).

Beyond such considerations from the operator's perspective, anonymity can also alter the *users'* perceptions, for instance in terms of communication persuasiveness, which renders the design variable of anonymity highly relevant for them too. Anonymity is usually subject to the users' decisions, where common factors include the provision of profile images, names, or other personal references to one's person (Jessup & Tansik 1991; Teubner et al. 2014; Benbya & Leidner 2016; Hernández-Ortega 2018). While the literature has mainly considered the effects of anonymity on user behavior in discussions (Wilson et al. 2012; Valacich, Jessup, et al. 1992), credibility, and persuasiveness in computer-mediated communication separately (Jiang et al. 2013; Walther et al. 2001; Postmes & Lea 2000), only few studys have thus far jointly approached these aspects. Thus, our study seeks to investigate how (a sender's) anonymity affects (his or her message's) persuasiveness in online discussions (Rains 2007; Haines et al. 2014). We propose that this effect is mediated by the users' involvement and how they perceive the sender's credibility. The first refers to the extent that a certain topic is personally relevant and cognitively engaging for an individual (Petty & Cacioppo 1979). Based on the sender's social cues when identifiable, the second represents a self-imposed handicap signal (Spence 2002).

This study's main research objective is to investigate actual opinion change as the main dependent variable in view of different conditions of user representation (anonymous vs. identifiable) in the context of a corporate discussion forum. We pose the following overarching research questions:

RQ6: How does anonymity (as compared to identifiability) affect communication persuasiveness in a corporate discussion environment?

RQ7: Which role does social presence play in this context?

RQ8: How is the effect on communication persuasiveness mediated by perceived user credibility and personal involvement?

To this end, we conduct a two-staged online survey, using a set of controversially discussed topics in the daily media (e.g., executive compensation, etc.). We simulate a corporate discussion forum and ask participants to state their opinion on these topics. Several weeks after that initial assessment, participants are re-invited for a second survey,

in which they are exposed to different versions of a semi-fictional online discussion about one selected topic with comments from fictive colleagues. In these discussions, the discussants (fictive characters) 1) are either represented by profile image and name or remain anonymous, and 2) either argue in favor or against a certain opinion. Participants are then asked to state their own opinion again. We find anonymity to be a double-edged sword in corporate discussion forums, affecting message persuasiveness in intricate ways. When limited on the overall impact of user anonymity, there appears to be no significant effect. When differentiated by pro and contra arguments, however, we find that identifiable users are significantly more persuasive than anonymous users in the pro conditions, whereas this effect is also observable, yet insignificant, for contra arguments.

This study makes two main contributions to the IS literature. First, we present a quasi-experimental study design that allows us to trace communication persuasiveness based on *actual opinion changes*, extending existing research by overcoming the common limitation to perceptional assessments of persuasion (e.g., "How persuasive is this argument?" or "Would you change your opinion…?"). Second, drawing upon the elaboration likelihood model of persuasion and signaling theory, we then propose a model which offers an explanation for *how specifically* anonymity affects persuasion. We illustrate the role of perceived social presence – a key construct in this regard – affecting persuasion through both involvement and credibility. These two factors highlight the intricacies of anonymity, as involvement reduces, while credibility promotes persuasiveness. In this regard, our study has important theoretical and practical implications for the understanding, design, and use of online discussion platforms.

The remainder of this chapter is organized as follows. In Subsection 2, we outline the theoretical background of our research and, based on the theoretical perspective of the elaboration likelihood model (Petty & Cacioppo 1986) and signaling theory (Spence 2002), derive our research model and hypotheses. Subsection 3 presents our methodological approach and survey design. We report the results in Subsection 4 and draw theoretical as well as practical implications, discuss limitations, and outline paths for future work in Subsection 5.

6.2 Theoretical Background and Research Model

In the following, we outline the elaboration likelihood model of persuasion and signaling theory, based on which we then develop our research hypotheses.

6.2.1 Elaboration Likelihood Model and Signaling Theory

The elaboration likelihood model (ELM) of persuasion proposes differences in persuasion due to how messages are processed by the recipients (Petty & Cacioppo 1986). While some messages are assumed to be processed via a "central route" enabling careful reasoning and evaluation, other messages take a "peripheral route." When processed through the central route, messages experience the recipient's close attention and arguments need to be logically and factually convincing in order to elicit opinion changes (Petty et al. 1981; Petty & Cacioppo 1986). In contrast, when processed through the peripheral route, the recipients pay less attention to the message's content but rather rely on heuristics and cues not directly linked to the message's content such as its presentation or the sender's attributes (Petty et al. 1983; Chaiken 1980). It is commonly assumed that persuasion is more likely to be successful when a message is processed through the peripheral route (Blasio & Milani 2008; Cheung et al. 2012; Bhattacherjee & Sanford 2006; Ho & Bodoff 2014; Zhang et al. 2018; Petty & Cacioppo 1986).

Signaling theory assumes two parties with different levels of information and potential conflicts of interest (Spence 2002). In (electronic) commerce, sellers signal to potential buyers that their products or services are of high quality in order to generate sales. Signals can be differentiated as (1) evaluations by independent third-parties (e.g., electronic word of mouth, certificates), (2) strategies of self-commitment (e.g., warranties, social liabilities), and (3) conventional assurances (Mavlanova et al. 2012; Dunham 2011). In the context of online discussions, attaching one's actual identity (i.e., name and profile image) to a post can be seen as a self-commitment strategy, as the author allows any false statement to fall back on him or her personally, potentially resulting in loss of social status and public embarrassment.

6.2.2 Research Model and Hypotheses Development

We apply and incorporate these theoretical approaches within a structured research model, as depicted in Figure 9. Our starting point is perceived anonymity (i.e., the recipients inability to identify the sender (Yoon & Rolland 2012)), which we suggest to affect persuasion in two ways. First, anonymity is associated with a lack of social presence, as typical social cues such as faces or names are absent in anonymous communication (Short et al. 1976). Consequently, non-anonymous communication is associated with higher degrees of social presence than anonymous communication, which renders the communication's content more interesting and engaging to the recipients (Petty & Cacioppo 1979). This, in turn, activates more elaborate mechanisms of reasoning at the recipient which, according to the ELM, impedes persuasion. Second, non-anonymity (and thus, social presence) can also be interpreted from a signaling

perspective, where the sender's willingness to be held liable for their statements serves as a signal of credibility, which should promote persuasion (Flanagin & Metzger 2000; Fogg & Tseng 1999; Pornpitakpan 2004; Schlosser 2011).

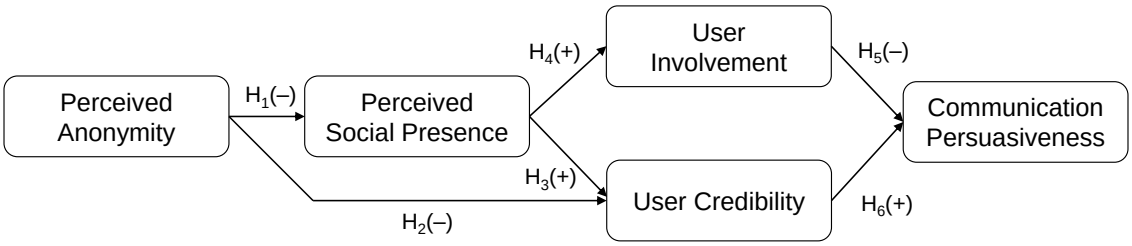

Figure 9 Research Model

All constructs and sources are provided and defined for the context of our study in Table 6 Context-specific construct definitions. We develop our research hypotheses in the following subsections.

Table 6 Context-specific construct definitions

Construct	**Context-specific definition**	**Source**
Perceived Anonymity	*Perception of how well a user's identity is concealed and cannot be tracked back to his or her actual person.*	Sosik et al. (1998)
Perceived Social Presence	*Perception of a personal, sociable, and sensitive human contact as conveyed through the online discussion forum.*	Gefen & Straub (2004)
User Credibility	*Attributed degree of trustworthiness and expertise with the originator of an online comment.*	Schlosser (2011)
User Involvement	*Perception of how involving an online discussion is, that is, how well the user refers to and engages with it personally.*	Petty et al. (1981)
Communication Persuasiveness	*Difference between stated levels of agreement before and after treatment exposure (also understood as opinion change)*	–

The impact of Perceived Anonymity on Perceived Social Presence and User Credibility

Anonymity is derived from the Greek word *anonymia*, referring to "namelessness." For the specific context of online discussions, we relate anonymity to privacy, confidentiality, and secrecy and view it as "one polar value of a broad dimension of identifiability versus non-identifiability" (Marx 1999). Due to the lack of social cues such as faces or names in anonymous communication, it is associated with lower perceptions of social presence than non-anonymous communication (Short et al. 1976). The perception of social presence depends on intimacy and immediacy (Jessup et al. 1990; Tu & McIsaac 2002). While intimacy is related to shared interests, conversation, physical proximity, and eye-contact (Argyle & Dean 1965), immediacy can be established through verbal and nonverbal cues (Tu & McIsaac 2002). It is arguably more difficult to evoke feelings of intimacy and immediacy through computer-mediated communication than through real life interaction, in particular when the social cues to identify and relate to one's counterpart are missing.

Several studies support this reasoning. Teubner et al. (2014), for instance, found user anonymity to be a negative driver of social presence in peer-to-peer interactions. Social presence can also be infused using socially rich descriptions and pictures (Gefen & Straub 2004). Displaying images of human faces and (seemingly) personal texts has been shown to increase perceived social presence in e-commerce (Hassanein & Head 2007; Cyr et al. 2009; Qiu & Benbasat 2010; Sia et al. 2002). Under conditions of anonymity, such elements simply do not exist. For online discussions, we hence suggest that user anonymity (as compared to non-anonymity) reduces perceived social presence.

H_1: *Higher levels of perceived anonymity decrease perceived social presence.*

In line with previous research, we refer to user credibility as the level of trustworthiness and expertise associated with a user (Flanagin & Metzger 2007; Fogg & Tseng 1999; Pornpitakpan 2004; Schlosser 2011). In their seminal study, Hovland et al. (1953) investigated persuasive communication by asking: "Who says what to whom with what effect?" Users in anonymous communication can answer the "what" part easily as they are able to examine message's content. Nonetheless, the sender (i.e., the "who") remains concealed. In this regard, Cialdini (1993) found that messages are more persuasive if communicated by an authority that can be trusted and holds expertise. Similarly, several other studies found that source identification can be of great value for the perception of credibility, and that besides its effect on social presence, anonymity tends to reduce credibility (Fogg et al. 2001; Weber et al. 2012; Walther et al. 2001; Jiang et al. 2013).

This effect can be attributed to the concept of signaling, where a message's sender establishes a strong signal of credibility by attaching her personal identity to the message (Mavlanova et al. 2012). In this case, making false claims or statements could backfire, for instance, due to public embarrassment or loss of social status (Zhao et al. 2018). However, source identification is inconceivable in anonymous communication. This line of thought is consistent with results from e-commerce research on user reviews, where information from identified sources was found to be perceived as more useful and credible (Racherla & Friske 2012; Kuan et al. 2015; Cheung et al. 2012; Hernández-Ortega 2018). Also for the context of group support systems, Dennis (1996) found anonymity to reduce user credibility.

One popular explanation for this is connected to the halo effect, according to which the evaluation of a specific attribute of another person (e.g., attractiveness) can drive the evaluation of other, unrelated attributes of that person (Nisbett & Wilson 1977; Kwon & Lennon 2009). In this regard, people derive personality traits, trustworthiness, and competence from the appearance of another person (Graham et al. 2016; Duarte et al. 2012; Cialdini 1984). For instance, students with bad presentations were graded worse by university staff on unrelated written exams than their peers with good presentations (Malouff et al. 2013). Thus, if a message is communicated together with an appropriate profile photo, its recipients are likely to judge the message as being more credible and socially close (Rains 2007; Hernández-Ortega 2018). This effect is most likely amplified by the positive selectivity expectable for online profile pictures.[15] If, however, such visual clues are missing, anonymity may have negative effects on credibility all the more since users cannot form impressions (Jiang et al. 2013) – and the mere fact that someone deliberately chose to not upload a photo may be interpreted as an indication that this person has to hide something. Accordingly, we hypothesize:

H_2: *Higher levels of perceived anonymity decrease user credibility.*

The impact of Perceived Social Presence on User Credibility and User Involvement

Beyond the direct impact of anonymity, we suggest user credibility to be affected by perceived social presence. In the literature on electronic commerce, it is argued that social

[15] Wu et al. (2015), for instance, found that Facebook users choose profile pictures that make them look more attractive. It is conceivable that some profile photos may have a detrimental effect on message persuasiveness, if, for instance, the depicted person appears unreliable, or unpleasant. Given that in virtually all online platforms, users upload a photo of their own choice, this representation can be expected to be biased in a complimentary, favorable way.

presence promotes trust by developing personal, sociable, and human feelings among the interacting parties (Cyr et al. 2007; Gefen & Straub 2004; Hassanein & Head 2007). Moreover, if high degrees of social presence are conveyed through a website, users tended to judge the service provider as of high integrity. Specifically, Hassanein and Head (2007) showed that social presence on websites is driven by displaying socially rich descriptions and pictures, that is, by representations not even of actual users but by dull stock imagery. In a study on C2C e-commerce, Jones and Leonard (2008) argued that information on personal beliefs provides valuable social cues that drive trustworthiness. Moreover, Zhao et al. (2018) found that social presence also drives readers of online reviews to trust the reviewers. As trustworthiness has been recognized as one of the key components of user credibility (Pornpitakpan 2004; Schlosser 2011), we contend this principle to extend to online discussions. For online discussions, we thus hypothesize:

H_3: *Higher levels of perceived social presence increase user credibility.*

User involvement describes the level of personal relevance of a certain discussed topic and the recipient's associated cognitive engagement (Petty & Cacioppo 1979). As social presence highlights the existence and active role of another human and hence the possibility of a two-way communication, it becomes socially more important to form and express an own opinion about a given subject if others discuss it (Petty et al. 1983). We contend that user involvement is affected by the heuristic of social proof, that is, regarding the actions of others as clues for what could be an appropriate or beneficial action to take for oneself (Cialdini 1993). From an evolutionary stance, whenever we observe other humans gathering, we tend to assume underlying circumstances which could also benefit us, for example, the distribution of prey or the availability of fresh water – crucial factors for survival. The social proof mechanism is especially effective under conditions of uncertainty. For instance, Rao et al. (2001) demonstrated that Wall Street analysts use social proof heuristics when following the investment decisions of their peers. Despite poor returns, the analysts adapted their investment decisions according to what others found important, and hence got involved in investing in – otherwise irrelevant – stocks. Thus, observing others considering a certain matter can trigger humans to consider and elaborate on it as well. In the context of online discussion, the presence of others is highly associated with perceived social presence, which may hence drive user involvement.

Furthermore, Fortin and Dholakia (2005) found strong effects of social presence on consumer involvement when these were exposed to web-based advertisements. Similar effects may occur in online discussions. Observing one's peers' statements and opinions, in this regard, enhances feelings of involvement by making a subject more salient and present. Prior research has also considered the role of social presence in the related field

of e-learning, where social presence of teachers and non-anonymity of learners both promote learning success (Landers & Callan 2014; Clark & Mayer 2011), usually associated with increased levels of receptivity and better learning outcomes. In a broader sense, people are arguably triggered to get involved with a topic the more people close to them are involved in that topic too. Thus, we posit that higher levels of social presence increase user involvement:

H_4*: Higher levels of perceived social presence increase user involvement.*

The impact of User Involvement on Communication Persuasiveness

As people derive personal relevance based on social proof heuristics, a topic becomes more relevant for them if others deem it to be relevant, for instance, by discussing it. This, we suggest, motivates a more thorough analysis of the arguments exchanged (Petty et al. 1983). However, a more active (internal) elaboration is associated with a decreased likelihood of persuasion based on others' arguments (i.e., external sources). This is in line with predictions of the ELM (Petty & Cacioppo 1986). Empirically, opinion change is often less pronounced in such cases as individuals examine arguments more closely and critically (Mondak 1990; Blasio & Milani 2008), also bringing to mind own, previously formed views and opinions more vividly.

Supporting this notion, scholars in communication science found that highly involving, thus mentally motivating topics inhibit persuasion (Andrews & Shimp 1990; Stoltenberg & Davis 1988; Petty & Cacioppo 1979). That is, if individuals believe that a topic at hand has great personal relevance for themselves, they tend to have strong opinions towards it, which leads to a high probability of incoming new messages to be rejected (Petty & Cacioppo 1979). Topic involvement, in other words, invigorates own, prior experiences, assumptions, and beliefs connected to a certain topic, which reinforces existing opinions. This effect might further be amplified when people have a strong pre-disposed opinion, as they tend to assess arguments more critically, even skeptically, than those who have not formed an opinion before (Petty et al. 1983). Sherif et al.'s (1965) social judgment theory pins down this effect as an extended latitude of rejection. Consequently, our fifth hypothesis states that:

H_5: *Higher levels of user involvement decrease communication persuasiveness.*

The impact of User Credibility on Communication Persuasiveness

While high involvement, as suggested by the ELM, leads to processing on the central route, the existence of social cues as heuristics can trigger peripheral processing. The sender's perceived credibility might serve as such a cue. Under this condition, user

credibility can be expected to increase persuasiveness. In an extensive meta-study, Pornpitakpan (2004) found that sources of high credibility were consistently considered more persuasive than those with low credibility. Communication science also provides support for a greater persuasiveness of more credible information sources. Cialdini (1993) named authority in the form of expertise as one of the main principles of persuasion. He argues that in an age of information overload, a person perceived as an expert offers a helpful shortcut for information processing (Cialdini 2001). Hence, people may simply apply such peripheral heuristics to assess a message. This line of thought is also largely consistent with findings from social psychology and exemplifies the concept of dual process models of thought (e.g., Kahneman & Tversky 1979; Sloman 1996), suggesting that people make analytical, logical, and rule-based decisions with a comparatively high mental effort in some situations, while relying on diverse, often affective and subconscious procedures in others. Moreover, this notion supports the idea of halo effects that influence credibility and, essentially, message persuasiveness. In summary, credible users can be characterized as more persuading than less credible users. We suggest this effect to extend to the messages originating from these users. Our sixth hypothesis hence reads:

H_6: *Higher levels of user credibility increase communication persuasiveness.*

Additionally, argument direction, i.e., whether an argument is formulated in favor or against a certain question at hand, may serve as an important control variable here. Haines and Mann (2011) proposed that group influence will already be pronounced by the simple act of having others communicating their opinion. Moreover, we expect that opinion change follows the direction of the arguments a subject was exposed to (Brinol et al. 2012). More importantly, controlling for argument direction allows to differentiate the effects of positively and negatively framed arguments.

Taken together, we suggest that the effect of user anonymity on communication persuasiveness is strongly connected to the concept of social presence. This factor, however, represents a double-edged sword. While we expect higher social presence to increase (message) persuasiveness via higher levels of (sender) credibility, it also activates (recipient) involvement with the present topic, which in turn hinders persuasion. From an ex-ante perspective, it is not evident which of both paths prevails. We suggest, however, that the case for sender credibility is stronger and that, hence, anonymity will overall reduce communication persuasiveness.

6.3 Study Design

In this subsection, we outline our study design for addressing the hypotheses as presented in the previous subsection empirically.

6.3.1 Artifact Design

We adopt a DSR approach, following Peffers et al. (2007). Taking a problem-oriented approach, we seek to evaluate whether anonymity negatively affects communication persuasiveness. Our evaluation could inform design decisions for OOP system facilitators as well as the broader scientific community. Our artifact at hand is a simple design feature of representing users by means of either a photo and a name or anonymous (depicted by stylized icon in grey). We also display discussion texts to our study participants, though they are kept in a very simplistic design. Figure 10 shows these design features as applied in our study.

Since this study is located in the field of business communication and online platforms in particular, we create a scenario using a (fictive) company's online discussion forum, in which arguments in favor and against different corporate decision paths are presented and discussed. The survey participants are asked to put themselves into the situation of employees, entering such a corporate online forum. Addressing our main research questions, we manipulate the degree to which the other (fictive) users are represented as either anonymous or identifiable in this forum, where half of the survey participants is confronted with anonymous, and the other half with identifiable users. First, the survey participants are introduced with the general topic, some background information on that topic, and the two conflicting paths of actions the company may take. We take topics that do not require insight knowledge of a company, but that are sufficiently complex (see below). The participants then get to see and read the other users' arguments in form of written posts in this forum. In the last step, participants state their opinion on the discussed matter (i.e., their level of agreement to following one of the two proposed corporate strategies). A meaningful assessment of communication persuasiveness is difficult, if not impossible, in a static approach. To measure such an effect, it is crucial to measure the difference of a user's stated opinion before and after the manipulation (Stiff 1993). We thus employed a two-stage design approach.

6.3.2 Stage 1: Initial Assessment of Opinions

In a first survey, participants were exposed to a set of six (at least somewhat) controversial topics of the public debate, for which their company was thinking about deriving strategic consequences. These topics covered minimum wage, crowd funding, divestment from

fossil fuel, extra-occupational study support, work-on-holidays rules, and CEO/worker pay ratios. For each topic, the survey participants read a short text which described the matter at hand. The texts worked out two contraire positions and ended with a clear-cut question whether the fictional company should implement this specific controversial policy or not (e.g., to follow a divestment strategy, or to publish data on pay ratios). Participants were then asked to state his or her agreement with implementing the described policy on an 11-point Likert scale, ranging from 1 (strongly disagree) to 11 (strongly agree).

6.3.3 Stage 2: Post-Treatment Assessment of Opinions

In a second survey several weeks later, all respondents of the first survey were invited again. They were presented with a selected of the six initial topics, whereas now they entered a (semi-fictional) discussion forum, in which they faced the written posts of fellow employees, writing about their opinions on the topic (a sketch of this is depicted in Figure 10). After being exposed to the treatment manipulation (either anonymous or identifiable user representation), participants were asked to indicate their agreement (again, 11-point Likert scale) for the same statement as in stage 1 of the survey. Moreover, in this stage, participants also indicated their perceptions of social presence, anonymity, user credibility, and user involvement regarding the displayed discussion forum, users, and arguments.

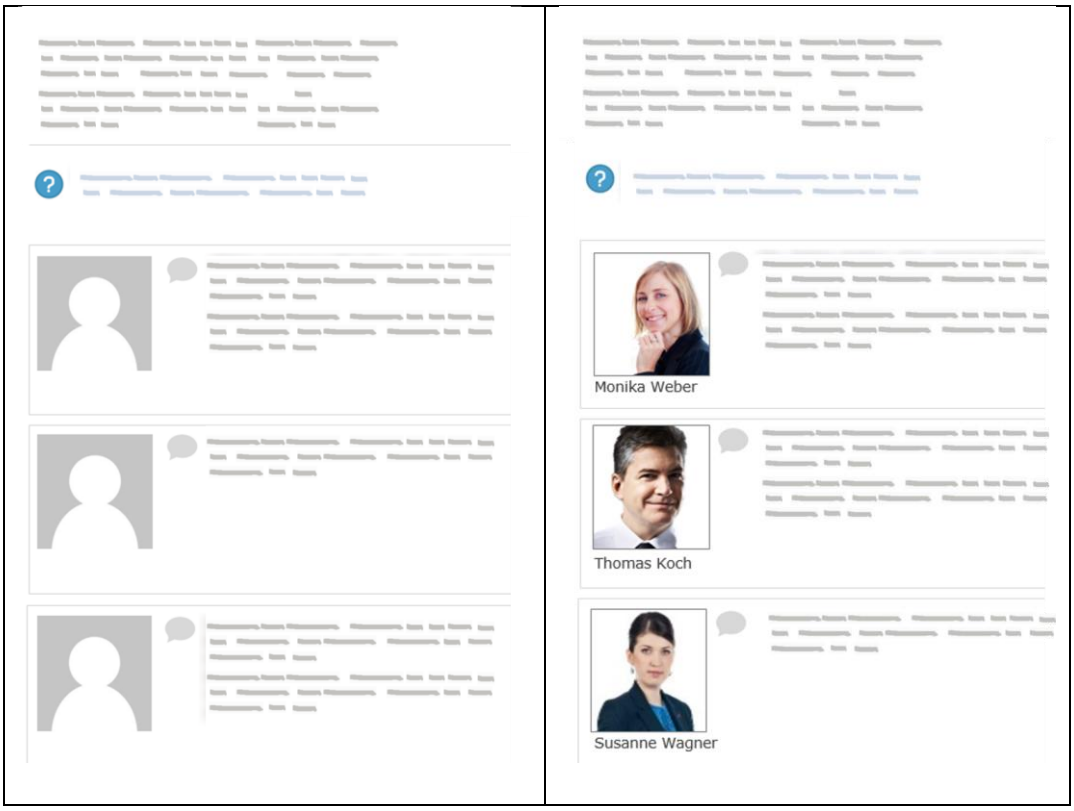

Figure 10 Schematic view of screens in the anonymous (left) and identifiable (right) treatments

Participants neither knew they would be invited a second time when they participated in the first survey, nor could they access their initial answers then. It is hence rather unlikely that they were able to consciously replicate their initial agreement scores, for example, in an attempt to appear consistent.

6.3.4 Treatment Design

Our main treatment dimension, user representation, is varied using a between-subjects design. Every participant is assigned to only one treatment. The respective authors of the posts are either represented by a grey avatar and no name (anonymous) or a photograph along with a name (identified), as depicted in Figure 10.

In a secondary treatment dimension, we varied argument direction (pro vs. contra), which refers to whether the presented posts argued in favor or against the policy proposition raised in the discussion. Note that either all arguments were in favor or against the policy proposition. This 2 × 2 full factorial design yielded four treatment conditions.

6.3.5 Stimulus Material

We retrieved six articles from the popular German weekly newspaper website *ZEIT Online* corresponding to the six topics mentioned above. In order to replicate a corporate

decision scenario, we re-framed them as business strategy propositions (e.g., “Should our company follow a fossil fuel divesting strategy?” or “Should crowd funding platforms be regulated by government supervision?”). Second, we extracted several comments from the discussion sections of the online articles – both arguing for and against the proposition. These comments were then revised and harmonized in language and tone; also grammatical and spelling errors were corrected to avoid unwanted influence (Wu et al. 2011; Hernández-Ortega 2018). All introductory texts (English translation) are summarized in Appendix B. Pictures and names are presented in Appendix C.

To establish different levels of anonymity, we employ different forms of user representation as typically found on discussion platforms. In the “anonymous” treatment, users are represented by a default image sketching the shape of a head in only two grey colors (see Figure 10, left-hand side). No names are displayed. In the “identified” treatment, users are represented by a profile picture and full name. All profile pictures were obtained from a stock photo provider. Their appearance is limited to smiling, middle-aged Caucasian men and women in business attire (see Figure 10, right-hand side). We varied the displayed pictures to equally represent male and female pictures. User names are based on combinations of the most common first and last names in the German speaking countries, excluding the top three to avoid overly artificial impressions.[16]

6.3.6 Measurements

While in the first survey (assessment of baseline opinions), we assessed the agreement for the different corporate policies, the second survey (evaluation of opinion change, depending on treatment manipulations) was much more comprehensive. Whenever possible, and to ensure content validity, we use previously validated scales and adapt them to the context of this study. Perceived anonymity was adapted from Sosik et al. (1998). Perceived social presence was adapted from Gefen and Straub (Gefen & Straub 2004). User credibility was adapted from Schlosser (2011). User involvement was adapted from Petty et al. (1981). All constructs were operationalized by items with 7-point Likert scales. A list of all measurement items is provided in the Appendix D.

As a means to limit potential common method bias and to allow for sufficient gradation, the participants’ agreement is assessed on an 11-point Likert scale. We approximate

[16] The set of last names included Weber, Wagner, Fischer, Becker, Koch, Neumann, Bauer, Schäfer, whereas Müller, Meyer, and Schulze were omitted. The set of female first names included Monika, Susanne, Karin, and Claudia. The set of male first names included Thomas, Stefan, Andreas, and Michael.

communication persuasiveness (i.e., opinion change) as the *difference* between a participant's stated agreement levels between first and second stage of the survey (Stiff 1993).

6.3.7 Procedure

Participants were recruited vie email from a pool of registered volunteers at Karlsruhe Institute of Technology. Participation was incentivized by a gift card lottery among all subjects, finishing the survey. In the first survey, 1,600 participants were invited and 583 completed it. We invited those 583 participants to a second survey, which was conducted four weeks after the first was closed. From these, 337 completed the second survey; 242 were male (72%) and 95 were female (28%). The age of our participants ranged from 18 to 31 years, with a mean of 23.3 years and a standard deviation of 2.68 years.

6.4 Results

6.4.1 Manipulation Checks

In a first step, we establish that agreement before and after exposure to the stimulus material is correlated, that is, subjects did not change their opinion at random. A Pearson correlation confirms this ($r = .424$; $p < .001$). Next, we establish that the binary treatment manipulation (identified vs. anonymous) was effective with regard to perceived anonymity. In fact, perceived anonymity in the anonymous treatment ($mean_A = 5.70$) was significantly higher than in the identified treatment ($mean_I = 2.81$; unpaired T-test; $T = 20.08$; $p < .001$; see also Figure 11, left hand side).

6.4.2 Overall Effects

On an individual subject level, communication persuasiveness is operationalized as the difference between the stated agreements in the first and second stages of the survey (both on 11-point Likert scales). Note that simply summing up across all participants of the anonymous/ identified conditions would not be meaningful, since this would involve both pro and contra conditions (where we expect a positive delta for the pro, and a negative delta for the contra condition which would tend to cancel each other out). As a first step, we thus consider average *absolute* opinion changes (Figure 11, right hand side). Surprisingly, this analysis suggests that there does not occur a significant

difference with regard to user representation ($mean_A = 2.05$; $mean_I = 2.16$; unpaired T-test; $T = 0.42$; $p = .337$).

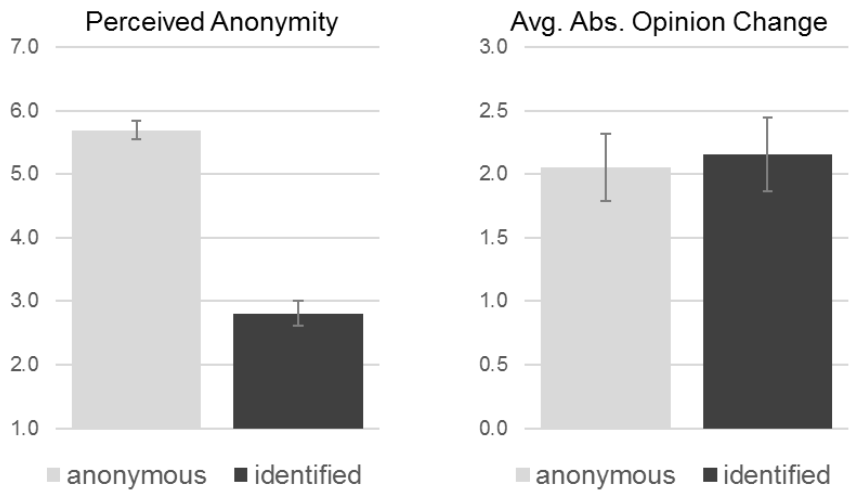

Figure 11 Perceived anonymity (left) and average absolute opinion change (right) by user representation (anonymous, identified) (error bars indicate 90% confidence intervals)

This leads us to considering actual (i.e., non-absolute) opinion changes, necessitating a differentiation of argument direction (pro or contra). In fact, looking at the differences between first and second stage of the survey within the full 2 by 2 treatment design (user representation *and* argument direction) yields a more insightful picture. First, for each of the $2 \times 2 = 4$ conditions, we compare the participants' stated agreement before and after being exposed to the stimulus material for each combination of user representation and argument direction individually. The results of these comparisons are summarized in Table 7 (paired t-tests). We observe significant (or marginally significant) changes in all four combinations of user representation (anonymous, identified) and argument direction (pro, contra). As expected, opinion changes are positive for the pro, and negative for the contra treatments. Moreover, the differences are generally larger for the identified than for the anonymous conditions.

Table 7 Average stated agreement by user representation and argument direction (based on 11-point Likert scales), differences, and significance levels (paired-sample t-tests; *** p < .001; * p < .05; + p < .10).

User Representation	Argument Direction	Before	After	Δ (sig.)
Identified	Pro	7.560	8.560	+1.000 ***
	Contra	8.146	6.444	–1.704 ***
Anonymous	Pro	8.163	8.620	+.457 +
	Contra	7.912	6.725	–1.187 *

In a second step, we further explore the role of the main treatment variable therein (user representation). Figure 12 depicts average opinion changes for each treatment condition. An overall regression analysis controlling for interaction between user representation and argument direction reveals a non-significant difference between the anonymous and identified treatments for the contra condition (t = –.517, p = .292) and a marginally significant interaction effect (t = 1.060, p = .098). When tested separately by independent sample t-tests, opinion changes induced by the identified user representation are stronger (marginal significance) than those induced by anonymous representations in the pro condition (delta = .543, t = 1.492, p = .069) while there occurs no significant difference in the contra condition (delta = .517, t = .934, p = .176).

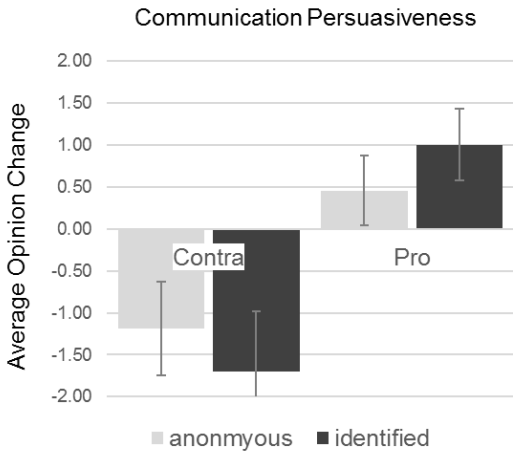

Figure 12 Average opinion change by user representation (anonymous, identified) and argument direction (contra, pro) (error bars indicate 90% confidence intervals)

6.4.3 Model Evaluation (H1 – H6)

After this first assessment of the focus variable, we now assess *how* its effect is conveyed specifically, based on our research model. The research model was validated using Partial Least Squares (PLS), conducted in SmartPLS 3.0 (Ringle et al. 2015) due to its flexibility in sample size and regarding data and residuals distribution (Chin 1998). The sample size of this study (n = 337) exceeds the threshold to validate a model in PLS, according to which sample size should be at least 10 times larger than (1) the number of path coefficients impacting a dependent variable or (2) the number of items of the most complex construct (i.e., ≥ 60 participants, considering the six path coefficients impacting trust in our model; (Gefen 2000)).

Table 8 provides construct descriptives, reliability measures, and correlation coefficients. Composite reliability (> .60) and construct reliability (using Cronbach's alpha, > .70) were established (Nunnally & Bernstein 1994; Bagozzi & Yi 1988). Next, construct validity was established by testing convergent validity (Average Variance Extracted, AVE > .50 for all constructs) and discriminant validity (square root of AVE larger than any correlation between that construct and any other construct; (Fornell & Larcker 1981)). Table 9 summarizes the item loadings and cross loadings. We verified item reliability by checking for indicator loadings larger than .70 (Chin 1998), where only the value of the user credibility construct (UC) fell slightly below this threshold. For discriminant validity, main item loadings were larger than on any other construct (Gefen et al. 2000).

Table 8 Construct Descriptives, Reliability Measures, and Correlations

	Descriptives		Composite Reliability	Cronbach's Alpha	AVE	R^2	Correlation Matrix			
	Mean	SD					PA	PSP	UC	UI
PA	4.377	1.930	.932	.896	.820	.560	**.906**			
PSP	4.349	1.183	.834	.709	.626	.010	-.108	**.791**		
UC	4.980	0.808	.796	.621	.566	.129	-.065	.359	**.752**	
UI	4.458	1.364	.887	.809	.726	.122	-.054	.350	.254	**.852**

Note: diagonal elements contain the square root of AVE (average variance extracted) for each construct.

Table 9 Item Loadings and Cross Loadings

Construct	Item	PA	PSP	UC	UI
PA	PA1	**.862**	-.090	-.029	-.053
	PA2	**.945**	-.121	-.092	-.064
	PA3	**.907**	-.060	-.026	-.010
PSP	PSP1	-.022	**.735**	.192	.243
	PSP2	-.130	**.836**	.259	.268
	PSP3	-.090	**.800**	.365	.308
UC	UC1	-.030	.327	**.804**	.192
	UC2	-.072	.209	**.716**	.165
	UC3	-.054	.256	**.733**	.214
UI	UI1	-.022	.252	.252	**.728**
	UI2	-.047	.293	.293	**.891**
	UI3	-.062	.341	.341	**.924**

6.4.4 Structural Model and Hypotheses Testing

The results of the structural model are provided in Figure 13. As can be seen, all but one of the hypothesized effects were confirmed by the data. First, perceived anonymity has a (marginally) significant and negative effect on perceived social presence (H_1, $\beta = –.108$, $p < .10$), whereas we do not observe a significant direct effect from perceived anonymity on user credibility (H_2, $\beta = –.027$, n.s.). However, user credibility is driven by perceived social presence (H_3, $\beta = .356$, $p < .001$) – as is user involvement (H_4, $\beta = .350$, $p < .001$). Lastly, communication persuasiveness emerges as the result of these two competing paths, where user involvement decreases (H_5, $\beta = –.148$, $p < .05$) and user credibility increases communication persuasiveness (H_6, $\beta = .169$, $p < .001$).

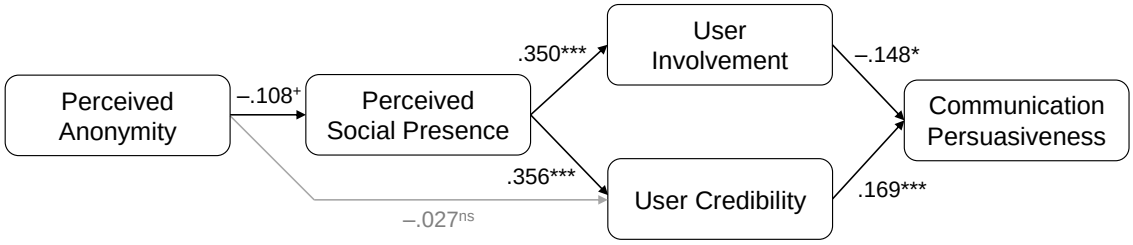

Figure 13 PLS Research Model Testing Results

As shown in Table 8, the associated R^2 values are comparably low. This may due to two reasons. First, communication persuasiveness was assessed on a different scale than all other constructs in our research model (i.e., absolute difference between stated agreements vs. multi-item constructs on 7-point Likert scales). Second, prior research established that various aspects influencing perceived social presence, including the personal appearance of a person and the tone of a message (Hess et al. 2009; Sia et al. 2002; Gefen & Straub 2004), which were, however, beyond the scope of our study. Overall, the effect sizes obtained in the model are consistent with results of previous research in social sciences (Ferguson 2009). The Stone-Geisser criterion (Q^2) was used to evaluate the structural model. All Q^2 measures exceeded the threshold of 0, hence meeting the criterion for predictive validity in terms of how well observed variables are reconstructed by the model (Chin 1998). Since our main theoretical argumentation puts forward a dual, partly contradicting effect from perceived social presence (PSP) on communication persuasiveness (CP) through personal involvement (PI) and perceived user credibility (PUC), a mediation analysis in fact helps to better understand the full picture. Adding an additional path from PSP to CP shows that there occurs no significant direct effect (b = -.071, p = .259), while both effects from personal involvement (b = -.133, p < .05) and perceived user credibility (b = .196, p < .001) remain stable in sign, magnitude, and significance. Thus, there occurs full mediation, where specifically, the effect of PSP on CP is fully carried through the paths via personal involvement and perceived user credibility.

Table 10 summarizes all hypotheses, path coefficients, significance values, f^2, q^2, and HTMT values, as well as the conclusions we derive from these observations. As can be seen from Table 10, the effect sizes of the significant paths can be classified as between "small" and almost "medium" for H_3 and H_4.

Table 10 Summary of path hypothesized relationships

Hypothesis	Path	Coef. Sig	f^2	q^2	HTMT	Conclusion
H_1 (–)	PA ⟶ PSP	–.108 +	.012	.006	.012	Supported
H_2 (–)	PA ⟶ PUC	–.027 n.s.	.001	.000	.083	Rejected
H_3 (+)	PSP ⟶ PUC	.350 ***	.144	.067	.504	Supported
H_4 (+)	PSP ⟶ PI	.356 ***	.139	.091	.450	Supported
H_5 (–)	PI ⟶ CP	–.148 *	.021	.007	.143	Supported
H_6 (+)	PUC ⟶ CP	.176 ***	.031	.025	.157	Supported

6.5 Discussion and Conclusion

6.5.1 Discussion

We investigated the effect of user anonymity on communication persuasiveness in corporate online discussion forums through the lens of the elaboration likelihood model, building on perceived social presence, user credibility, and user involvement. We developed a structural equation model, which was evaluated by means of a two-stage online survey with 337 participants. We systematically varied user representation and showed that perceived anonymity (via social presence) affects communication persuasiveness via the two distinct paths of user involvement and user credibility. While involvement markedly *reduced* persuasiveness, credibility had a significant positive effect. Overall, anonymity did not drive persuasiveness in one or the other direction. However, as we control for the argument direction (i.e., pro or contra), we find that identified users trigger stronger opinion changes than anonymous users. By demonstrating that anonymity alters user perceptions of messages, our study sheds light on the intricacies of user representation in corporate settings. Extending previous research, we measure opinion changes explicitly by implementing a two-stage survey with a distinct time lag of several weeks, in each stage assessing participants' agreement for a certain corporate policy (in our case, executive compensation). Therefore, our method goes beyond prior studies on message persuasiveness that remained conditional and only focused on immediate, short-term opinion changes.

Our study contributes to the literature by linking (online) user representation to the behavioral pattern of opinion change through well-established theories of computer-mediated communication. Both the ELM (Petty & Cacioppo 1979) and signaling theory (Spence 2002) contribute to our research model. Prior research has either hailed

anonymity for its potential to protect reticent users and to bring hard truths to light (Connolly et al. 1990; Acquisti et al. 2015; Weisband & Kiesler 1996), or has warned that anonymous discussions could lead to more polarization and disinhibited language (Cho et al. 2012; Postmes & Lea 2000; Sæbø et al. 2010; Silva & Panahi 2017). In contrast, only few studies have thus far investigated the effect of anonymity on message persuasiveness (Haines et al. 2014; Rains 2007). By conflating the constructs of perceived social presence, user credibility, and involvement, we were able to illustrate the intricate effects of anonymity on persuasion online.

Overall, our findings are in line with current research on the link of anonymity and social presence perceptions (Gefen & Straub 2004; Hassanein & Head 2007; Teubner et al. 2014; Cyr et al. 2007). Regarding the effect of social presence on persuasiveness, however, our findings are contrary to some earlier findings. In line with previous research, we find that higher levels of social presence promote credibility, which drives persuasion (Pornpitakpan 2004; Petty & Cacioppo 1986; Cialdini 1993). Perceived social presence, however, seems to play a more complex, dual role, since it also promotes user involvement, which in turn inhibits persuasion by involving readers in a topic as arguments are examined with more mental effort and care (Mondak 1990; Blasio & Milani 2008). By highlighting the role of the argument direction (i.e., pro vs. contra), we consider an additional important dimension, extending prior research. In effect, our study enhances the current understanding on how user anonymity affects communication persuasiveness.

Our study sheds new light on the effects of anonymity in a corporate discussion context (Sia et al. 2002; Sæbø et al. 2010; Haines et al. 2014). Demonstrating the intricacies of anonymous communication, we echo prior research in questioning whether the potentials of enabling participation for reticent employees by protecting their identity is worth the potential negative side effects of anonymous user representation.

Thus, practitioners should take into consideration that anonymously contributing employees might be perceived as less persuading in corporate discussions than identifiable colleagues. Thus, users may want to identify themselves in online discussions to put credibility and weight on their statements – a relation which has previously been observed in the domain of consumer reviews (Racherla & Friske 2012). Also, this could prevent discussions from foul language and hoax comments (Sæbø et al. 2010; Siegel et al. 1986; Cho et al. 2012; Haines et al. 2014).

This in mind, firms may want to use anonymous discussions only if necessary, for example, when debating sensitive topics. We also acknowledge that some user groups

could benefit from anonymous discussions disproportionally, such as new or reticent members, with no or little reputation yet, who might benefit from a focus on their arguments (Haines et al. 2014). Nonetheless, the default could be set to non-anonymity, which allows for easier assessment of credibility (especially in terms of expertise). Although this all speaks for avoiding anonymous discussions, it is important to stress that the long-term effects of anonymity have been found to be positive. For instance, groups were found to form social norms when social identities became more salient over time (Postmes et al. 2000; Racherla & Friske 2012). Hence, negative effects such as an increased number of socially less desirable remarks might disappear. Furthermore, as we observed an impact of argument direction, it might be wise to frame one's argumentation positively, that is, *in favor* (of the opposite), rather than *against* a certain statement, as this may turn out to be more persuasive.

There exist several promising paths for future research. First, it is worth exploring the study design with different topics as well as in other cultural backgrounds. We conducted our study with predominantly German students. Yet, participants from countries with different work ethics and characteristics might act differently (Liu et al. 2016; Leung & Cohen 2011; Cho et al. 2012). Second, complimentary features to mitigate the detrimental effects of anonymous user representation should be designed and evaluated. For instance, badges indicating the level of expertise might prove valuable for establishing credibility, even in the absence of profile pictures (Riemer et al. 2015). Moreover, social presence is responsible both for attributing credibility to unknown users as well as for fostering user involvement. Therefore, our study highlights the unabated importance of investigating social presence in the domain of information systems further.

6.5.2 Conclusion

We investigated the effect of user anonymity on communication persuasiveness in corporate online discussion forums through the lens of the elaboration likelihood model and signaling theory, building on perceived social presence, perceived user credibility, and personal involvement. Our main research objective was to analyze how different forms of user representation (anonymous vs. identified) lead to opinion changes. To this end, we developed a structural research model, which was evaluated by means of a scenario-based, two-stage online experiment with 337 participants. We find that anonymity per se did not drive persuasiveness in one or the other direction directly. Interestingly, however, we showed that for understanding the role of user representation (anonymity/ identifiability) within online discussions, an assessment of the users' perceptions of social presence is essential. In particular, social presence is instrumental in affecting communication persuasiveness via personal involvement and perceived user

credibility which both are positively affected by social presence. While involvement markedly reduces persuasiveness, credibility exerts a positive effect, in effect, stalemating the user representation's overall influence. Importantly, as social presence is responsible both for attributing credibility to unknown users as well as for fostering personal involvement, our study highlights the unabated importance of investigating the role of social presence for the design of information systems in general and online communication in particular.

By demonstrating that anonymity alters user perceptions of messages, our study sheds light on the intricacies of user representation in corporate discussion settings. Extending previous research, we measure opinion changes by a two-staged approach with a time lag of several weeks, in each stage assessing participants' agreement for a certain corporate policy. As such, our approach extends prior studies on message persuasiveness which focused on immediate, short-term opinion changes. Our study hence contributes to persuasion research and the broader IS literature by linking (online) user representation to the behavioral pattern of opinion change and well-established theories from computer-mediated communication. Demonstrating the intricacies of anonymous communication, we echo prior research in questioning whether the potentials of enabling participation for reticent employees by protecting their identity is worth the potential negative side effects of anonymous user representation. In view of increasing corporate intents to better involve and hence tap into their employees' capacities, this sheds new light on the role of online user representation. Overall, our results inform both the facilitators as well as the participants of online discussions whenever the goal is to hear, gauge, or weigh the pro and cons of all sides and – ultimately – persuade a majority for a joint strategy to follow. Our findings corroborate that the pivotal construct of perceived social presence is strongly affected by how users are represented in online discussions. Users and organizers of online discussions alike should hence be aware of where, when, and how to design for and position themselves on the spectrum between anonymity and identifiability.

6.5.3 Limitations

Our study must be seen in view of several limitations. First, participants in our experiment were all students, framed to put themselves into a corporate environment. Although many were majoring in Economics or Information Systems and many have gained work experience from internships, the effects might set out differently in real corporate settings where people are presumably more mature and could actually know each other in person. However, we suggest that the differences due to user representation would most likely only be more pronounced when based on actual and not fictive user profiles. Furthermore, we acknowledge that the measured constructs in this study yield low R-squared values.

For the case of perceived social presence, it must be said that it solely represents a mediating factor and is based only on the single construct of perceived user anonymity. While we find significant and consistent effects via this path, other factors appear to cause variance too. With regard to communication persuasiveness, its low R-squared value is presumably due to a disruption of methods. While all other constructs are assessed on Likert scales and are self-reported by the participants, communication persuasiveness emerges inherently as the difference between the participants' stated agreements in stage 1 and 2, that is, in a much more involuntarily way. Participants were not asked how much they shifted their opinion – but this shift was observed naturally. This lack of a common method, which we consider as strength of our approach, may well cause a lower overall R-squared value.

7. Anonymity – Study 2: Designing for Anonymity[17]

7.1 Introduction

Both private and public organizations are restructuring their decision-making processes to find new ways of building a more meaningful and productive workplace for their employees (Bock 2016). At the same time, employees increasingly seek to participate more closely in the decision-making processes of their employer (Tumasjan et al. 2011). In this thesis, we already established that OP is an effective means to enable both (Wilkinson et al. 2010) as it increases job satisfaction, employee motivation, productivity and innovation (Wilkinson et al. 2010; Wegge et al. 2010; Erickson et al. 2012; Hurley & Hult 1998). Moreover, we have discussed that, in practice, there are various social software solutions to facilitate participation and collaboration, such as ESN, prediction markets and (internal) crowdsourcing platforms (Leonardi & Barley 2013; Muller et al. 2013; Feldmann, Gimpel, et al. 2014; Richter et al. 2016; Wagenknecht, Filpe et al. 2017; Zuchowski et al. 2016). Research suggests, however, that a significant part of the employees might be reluctant to participate on such platforms due to fear of repression if their contributions are incongruent with their superiors' opinions and beliefs (Nunamaker et al. 1988; Connolly et al. 1990; Postmes & Lea 2000; Haines et al. 2014).

Providing an option to contribute their ideas and opinions anonymously might encourage reticent and lower-level employees to participate actively (Valacich, Jessup, et al. 1992; Dennis 1996; Acquisti et al. 2015). In this sense, anonymity reduces conformity as well as ownership biases (Valacich, Dennis, et al. 1992; Sia et al. 2002), which could lead to increased group performance (Postmes & Lea 2000). Yet, user anonymity might have both positive as well as negative effects. It has repeatedly been shown to affect discourse quality in online discussions negatively due to polarization, hate speech, and foul language (Siegel et al. 1986; Postmes & Lea 2000; Cho et al. 2012; Sia et al. 2002; Charness & Gneezy 2008; Haines et al. 2014). Thus, when designing information systems for internal crowdsourcing, developers and platform facilitators have to leverage the potential benefits while mitigating the downsides of user anonymity. The challenge is to

[17] An earlier version of this chapter has been published as Wagenknecht, Levina, et al. (2017b). There is also a version of this chapter under review with Electronic Markets – The International Journal of Networked Business. This study was part of the joint research project "Participation as a Service" (PaaS), funded by the German Federal Ministry of Education and Research (under grant no. 01IS150120).

include and engage as many employees as possible in order to elicit creative ideas, while simultaneously keeping the discussion at a well-behaved, comfortable level (Postmes et al. 2001). In this study, we want to answer the following research question:

> ***RQ9:*** How does a feature for optional anonymity affect participation and the choice of language in a OOP engagement?

In order to address the research question, we apply a DSR approach (Peffers et al. 2007) to explore "Opt-in anonymity", a feature of an IT artifact that aims to significantly improve current state-of-the-art information systems designed for participation in organizational contexts by reaping the positive effects of user anonymity. We design and evaluate an internal crowdsourcing website (Zuchowski et al. 2016) that enables employees of a public organization to contribute various proposals for the strategic planning of their organization. They can propose, develop, and vote on ideas. The organization's leadership then discusses the best-voted proposals in their regular board meeting in order to expedite their implementation. By default, users contribute content identified by their (real) name. However, we also design a feature that enables users to contribute content anonymously by simply ticking a box. Besides increasing usability, we mainly seek to engage otherwise reticent employees by establishing anonymous contribution as an accepted way of communication. Following the conceptual framework of group support system anonymity by Valacich, Jessup, et al. (1992), we analyze the effect of this feature on the crowdsourcing process and outcomes during a five-month field test. In line with previous research on IT implementations in public organizations (Ulbrich 2010), we conduct (1) an in-depth qualitative study on the user-generated content, (2) a comprehensive survey on the employees' perceived usability and acceptance of our artifact, and (3) a series of individual as well as (4) focus group interviews to gain a deeper understanding of drivers and obstacles during the implementation. Adopting a DSR approach allows us to study both technical as well as non-technical aspects by developing an information technology (IT) artifact (Hevner et al. 2004; Peffers et al. 2007).

In doing so, this study makes two main contributions to the IS literature. First, we present a rigorous approach to studying the effects of anonymity and trust in internal crowdsourcing systems by demonstrating the perceptual effects triggered by anonymity (Wilson et al. 2012; Teubner et al. 2014; Zuchowski et al. 2016; Wagenknecht, Teubner, et al. 2016b). Second, our results shed new light on earlier research on anonymity in group support systems, highlighting its intricate effects (Nunamaker et al. 1988; Connolly et al. 1990; Valacich, Jessup, et al. 1992; Dennis 1996).

The remainder of this chapter is organized as follows. In Subsection 2, we illustrate the theoretical background, including literature streams on user anonymity and internal crowdsourcing. Subsection 3 then outlines our research method and also describes the proposed artifact in detail. We present our evaluation results in Subsection 5 and discuss both theoretical and managerial implications in Subsection 6, where we also draw a conclusion and highlight areas for future research.

7.2 Theoretical Background and Related Work

As we already noted in Section 6, anonymity, as the inability of a user to identify another user (Marx 1999), was studied in great detail in various disciplines, including IS research (Nunamaker et al. 1988; Valacich, Jessup, et al. 1992; Haines et al. 2014). On one hand, factors affecting the perception of anonymity include technical properties of the information system such as disabling observers from identifying authors by means of removing names, pseudonyms or labels (Jessup & Tansik 1991; Hiltz et al. 1989). On the other, although the distinction between anonymous or non-anonymous communication seems straightforward, group interactions cannot be viewed as either one or the other (Valacich, Dennis, et al. 1992). Rather, Valacich, Jessup, et al. (1992) propose that there are two types of anonymity, process anonymity and content anonymity, which are affected by group size, group proximity, group history and composition (see Figure 14). In the following subsections, we will explore their conceptual framework in light of current research findings and in the context of internal crowdsourcing in more detail.

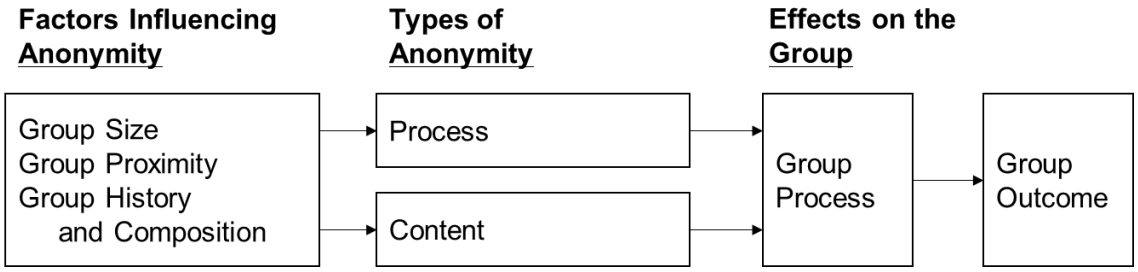

Figure 14. Conceptual framework for group support system anonymity (Valacich, Jessup, et al. 1992)

7.2.1 Factors Influencing Anonymity

First, research suggests that *larger* groups are affected more heavily by anonymity then *smaller* groups (Nunamaker et al. 1991; Dennis et al. 1990). This effect happens because people in smaller groups will be able to detect and identify others more easily than members of larger crowds will. Second, in terms of group proximity, anonymity will have even greater effects in a dispersed environment as group members are unable to note who

is currently contributing content (Jessup & Tansik 1991). Third, group composition can exert various effects on anonymity. Groups regularly form social norms over time. Even in ad-hoc groups, people form social norms and identities become salient over time (Postmes et al. 2000; Racherla & Friske 2012). Even more so, people in long standing teams will be able to identify each other based on various cues (e.g., style of language, typically relevant issues, etc.). Thus, anonymity is assumed to have greater effects on newly composed groups (Valacich, Jessup, et al. 1992). All of these factors are crucial in determining how anonymous communication can enfold. Yet, Valacich, Jessup, et al. (1992) propose that there are two different types of anonymity in group support systems.

7.2.2 Types of Anonymity

First, *process anonymity* refers to the extent to which group members are able to determine who is participating by direct observation. Second, *content anonymity* refers to the extent to which group members are able to trace back the source of a specific contribution by detecting cues from the contribution. Thus, process anonymity is related to the setting (e.g., group size, group proximity), whereas content anonymity relies on identifiers embedded in user contributions, such as characteristic tones, grammatical oddities, or familiar attitudes and opinions (Valacich, Jessup, et al. 1992; Nisbett & Wilson 1977; Kwon & Lennon 2009). For instance, if a colleague is always complaining about the air conditioning system, his co-workers might associate a similar complaint in an online forum with this colleague – even though his name and photo are not attached. Thus, process anonymity is strongly related to group composition and the common history of a group. Both the factors as well as the type of anonymity present eventually influence the group elaboration process and outcomes. In the context of internal crowdsourcing, this means that anonymity would influence the entire engagement.

7.2.3 Internal Crowdsourcing

Internal crowdsourcing is an effective and engaging collaboration tool that uses human-centric information systems to address organizational, individual and societal problems (Pedersen et al. 2013). It has recently gained increased attention in the IS literature (Zuchowski et al. 2016). Crowdsourcing leverages the expertise, skills, and creativity of the general public or a specific target group (Adamczyk et al. 2012). While target groups might also be customers, several corporations have launched *internal* crowdsourcing platforms only for their employees (Muller et al. 2013; Feldmann et al. 2013; Feldmann, Gimpel, et al. 2014; Zuchowski et al. 2016). Instead of limiting research and development to a dedicated unit, companies thus can tap into the wisdom of their entire work force via crowdsourcing. In effect, they are able to gain more knowledge, make better informed decisions, and generate more diverse and higher quality ideas and solutions (Lakhani &

Jeppesen 2007; Adamczyk et al. 2012; Pedersen et al. 2013; Poetz & Schreier 2012; Leimeister 2010; Wagenknecht, Filpe et al. 2017).

7.2.4 Positive Effects of Anonymity in Internal Crowdsourcing

Providing an option for anonymous communication in these internal crowdsourcing processes can be beneficial. Anonymity offers a low-threat communication environment with a broader range for diverse ideas and opinions (Jablin et al. 1977; Diehl & Stroebe 1987; Valacich, Jessup, et al. 1992; Eden & Ackermann 2014; Tegarden et al. 2016). For instance, people face a number of hurdles due to discrimination at work, for example because of their age, gender or ethnicity. Anonymity is able to cover these observable characteristics, leading to perceived increase of the quality of debates for discrimination-prone users (Koch et al. 2005; Connolly et al. 1990; Haines et al. 2014). Moreover, internal crowdsourcing might favor more senior staff while disdaining reticent employees (Erickson et al. 2012; Feldmann, Gimpel, et al. 2014; Tegarden et al. 2016). Conversely, anonymity was found to reduce conformity bias and group think, eliciting more (truthful) arguments (Nunamaker et al. 1991; Valacich, Dennis, et al. 1992; Haines et al. 2014; Tegarden et al. 2016; Sia et al. 2002). Moreover, anonymity has been shown to de-fuse horizontal as well as structural power within organizations (Tegarden et al. 2016). Coined as separating the people from the problem (Fisher & Ury 1983), studies demonstrated that people are more willing to express opinions that are incongruent with the group – especially with more superior group members – under anonymity (Baltes et al. 2002; Tegarden et al. 2016; Valacich, Jessup, et al. 1992; Wilson et al. 2012; Hiltz et al. 1989). Notably, employees reported decreased fear of embarrassment, disapproval or repressions from their peers because of possibly poorly-received contributions (Diehl & Stroebe 1987; Jablin et al. 1977; Nunamaker et al. 1987). Accordingly, anonymity has widely been found to increase group efficiency and broad-base participation (Diehl & Stroebe 1987; Valacich, Jessup, et al. 1992; Wilson et al. 2012; Nunamaker et al. 1987; Nunamaker et al. 1988; Haines et al. 2014). However, despite these many benefits, anonymity does not only elicit positive results.

7.2.5 Negative Effects of Anonymity in Internal Crowdsourcing

Anonymous communication was regularly found to increase the expression of strong language, hate speech, hoax, and the like (Siegel et al. 1986; Sæbø et al. 2010; Cho et al. 2012; Haines et al. 2014). This might be related to the fact that anonymity is usually achieved in information systems by omitting a profile name and picture. However, such social cues significantly contribute to the establishment of trust in human interactions, which is closely related to the perception of social presence (Teubner et al. 2014; Sia et al. 2002; Gefen & Straub 2004; Hassanein & Head 2007). Social presence can be

described as a feeling of a personal, sociable, and sensitive human contact when using a communication medium (Short et al. 1976). However, in the absence of personal and social cues, it is more challenging for people to develop feelings of social warmth (Postmes & Lea 2000; Blasio & Milani 2008). Following to deindividuation theory (Festinger & Metzger 1952), the lack of identifiability of another person leads to decreased social presence (Reicher et al. 1995; Haines & Mann 2011; Wagenknecht, Teubner, et al. 2016b). Furthermore, anonymous content might be less persuading than identified arguments due to trust and credibility biases (Teubner et al. 2014; Wagenknecht, Teubner, et al. 2016b). Moreover, in some studies, anonymity – especially in larger groups – resulted in more critical, yet at times even embellishing, overly caustic comments (Valacich, Dennis, et al. 1992; Nunamaker et al. 1988; Jessup & Tansik 1991).

Thus, as previous research presents somewhat controversial results and as research on anonymous communication in the context of internal crowdsourcing is still scarce, we propose that an extension of the body of knowledge is required.

7.3 Study Design

Wilson et al. (2012) suggest that the richness and reality of a field setting appear to provide a more useful environment to study anonymity than laboratory experiments, as power relationships as well as perceptual effects influence the way users perceive the usefulness of anonymity. Following this line of thought, we adopt a DSR approach for our study, which enables us to capture both the technical as well as the social systems – and the interaction of the two – in practice (Hevner et al. 2004; Peffers et al. 2007; Gregor & Jones 2007). Applying rigorous IS research methodologies, we develop an internal crowdsourcing website, which entails a special feature for anonymous communication as our artifact, for a public organization that seeks to engage their employees in the strategic decision-making processes (Gregor & Jones 2007; Gregor & Hevner 2013).

We begin by identifying the relevant problem in a search process based on a thorough literature review and in collaboration with a public organization (Peffers et al. 2007). In an iterative process, we gather system requirements from future users, making use of multiple mock-ups and clickable prototypes, in order to pre-evaluate the relevance of the business problem and design an IT artefact as a solution. More specifically, to evaluate our artifact we apply the DSR evaluation framework by Venable et al. (2012), choosing the ex-post naturalistic approach.

In detail, we implement an internal crowdsourcing system at a German public-sector organization. Serving a constituency of more than 200,000 people in a rural area. The vast

majority of approximately 110 employees is located at the headquarters, with only about 10 employees working in the three satellite offices. The organization is one of 156 federal agencies in Germany, tasked with placing and training people of various backgrounds for new jobs.

We run a two-week pre-test with a small team of employees, followed by a five-month (main) test open to the entire organization from August 2016 to January 2017. The system implementation was supported and partly run by our technical and consulting partners within the joint research project PaaS, Liquid Democracy, partou and HRpepper Management Consultants.[18] By the end of the test phase, we collect and analyze data from user-generated contributions. Two research assistants code and classify each contribution in terms of tone and content (Weston et al. 2001). Ensuring reliability, an independent third party crosschecks the analysis and resolves disagreements. Moreover, we survey all employees on the usability and utility of the crowdsourcing system (within the course of two weeks in mid-January 2017). In order to ensure construct validity, we use previously validated scales whenever possible. We adopt the measures for the users' behavioral intention to use the system as well as performance and effort expectancy, that is, perceived usefulness and perceived ease of use, from Venkatesh et al. (2003). We also collect the users' perception of the credibility of their peers (Schlosser 2011). Furthermore, we assess whether the users were reluctant to speak against the opinion of their superiors. All items are measured on 5-point Likert scales. Moreover, we include a control questions, checking whether users noticed that proposals and comments could be submitted anonymously. Note that we intended to scrutinize our feature for anonymous communication more closely, yet the organization asked us to restrain from this due to privacy concerns. Finally, we conduct two individual interviews with the managing director and the head of the worker's council of the organization as well as a focus group with eight users of the system (consisting of four regular employees and four senior managers). We record, transcribe, code, and analyze all interviews according to established methodological standards (Weston et al. 2001).

[18] Note that while we collaborated with our partners in the design and implementation process, we ran the examination of the evaluation results independently.

7.3.1 Artifact Design

The artifact under consideration here is a technical feature to post a proposal or a comment to an internal crowdsourcing platform anonymously. It is embedded in and likewise relies on a broader crowdsourcing system.

Background: At the public organization, a management board meets monthly to discuss and decide on strategic issues for the entire organization. All employees are free to join these meetings as auditors as well as contributors. Nonetheless, decision-making was limited to three board members. However, attendance by the staff was very low. Thus, in order to increase employee participation, the managing director decided to implement a software system for internal crowdsourcing to increase employee engagement in the decision-making process. Therefore, the expected main users of our artifact are the employees of the public organizations.

Design Process: We aim to design an artifact that closely interacts with its sociotechnical environment (Niederman & March 2012; Gregor & Hevner 2013). In order to do so, we gather the artifact's requirements from future users (Markus et al. 2002). We conduct a series of interviews with the organization's managing director and the head of the worker's council and a subsequent workshop with additional staff members. In conjunction with the literature on internal crowdsourcing systems (Zuchowski et al. 2016; Wagenknecht, Filpe et al. 2017; Pedersen et al. 2013), we derive the following design principles:

1. an employee-centric view,
2. enabling participatory decision-making,
3. evaluation of the user-created content (i.e. voting),
4. generating proposals and interacting with other users anonymously, and
5. accommodating diverse users.

To accommodate these requirements into our system design we build on an existing open source software project called "Adhocracy" by Liquid Democracy, a German non-profit organization, and expanded the given structure. The crowdsourcing system affords participatory decision-making: Once registered, users can propose ideas, comment on, like or dislike them and – after a fixed period – vote on which proposal is selected as a winner. The management board committed to include this winning proposal on its board meeting agenda and to provide feedback about the discussion and potential actions to

implement the proposal shortly afterwards. It is interesting to note, that the senior management proposed to develop a system which would allow users to post anonymously *only*. However, in line with previous research, we argue that this would make the system vulnerable to a multitude of negative effects (J Siegel et al. 1986; Cho et al. 2012; Haines et al. 2014; Valacich, Dennis, et al. 1992; Jessup & Tansik 1991; Nunamaker et al. 1988). Thus, we allowed for anonymous posting as an *option* to reap the positive effects of anonymity while simultaneously mitigating the negative sides. In order to do so, we designed a feature coined "opt-in anonymity," representing our artifact.

By default, users attach their user name to each proposal and comment. Although users were free to choose any nickname they liked, in our case, employees always used their actual names as user names. Hence, each contribution was identifiable in the default setting. However, by ticking a "post anonymously" box next to the "Submit" button, users could submit their proposal or comment anonymously. The system then stored the contribution to an overall anonymous user account and displayed the post with the user name "Anonymous User" (see Figure 15). Thus, there was no link to a specific user profile. Moreover, users were also able to change the default setting for their account so that each contribution was published anonymously. Using our feature, users could contribute both new idea proposals as well as comments on these proposals anonymously without switching the system. Liking and voting was entirely anonymous in any case. In effect, we argue that our artifact accommodates to the first four design principles. Moreover, in order to account for the diverse background of users and employees at the organization, we support the implementation of our artifact by means of a comprehensive manual, a user helpline and a special point of contact in each team of the organization. These special points of contact took a distinct training, covering all functionalities of the crowdsourcing system. The communications team also communicated the progress of proposal implementations in the internal, organization-wide newsletter and Intranet.

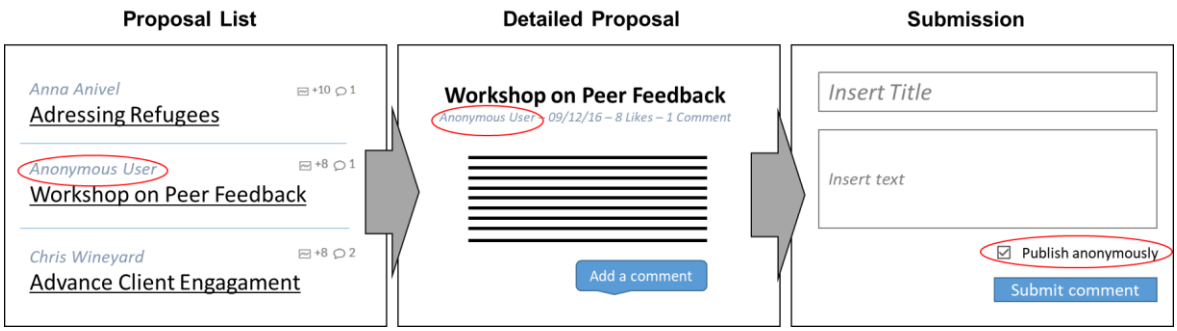

Figure 15. Stylized artifact illustration (feature functionality highlighted in red)

7.4 Results

The evaluation follows the approach by Venable et al. (2012), focusing on the quality of the artifact according to the gathered requirements. More specifically, we aim to investigate the effect of the anonymous communication afforded by our artifact. Following the conceptual framework by Valacich, Jessup, et al. (1992), we find that the organization has a medium group size of about 110 employees, most of which are working in close spatial proximity within the one office building of the headquarters. The employees follow highly formalized processes and a fixed hierarchical system (Hurley & Hult 1998). As public organizations often have a high retention rate, employees spend many years in an organization. As this holds in our case too, users already developed a long common history. By means of our "opt-in anonymity" feature, process anonymity (i.e., who is contributing) is effectively hidden. However, employees might still be able to identify users contributing anonymously based on their individual content or style of language. Figure 16 shows the outset.

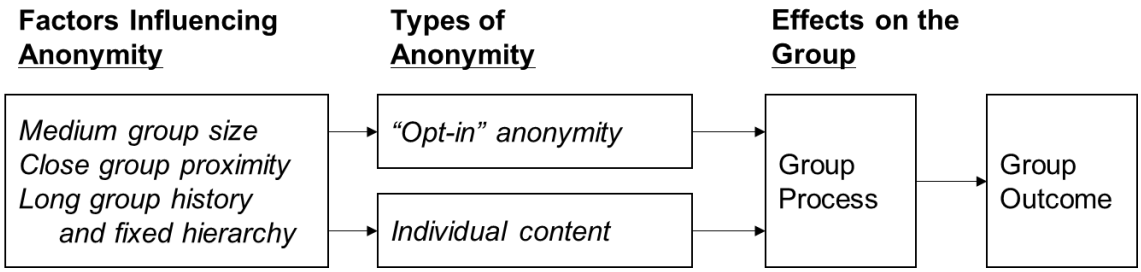

Figure 16. Applied conceptual framework for the study of anonymity effects

In order to evaluate the effects of this configuration on the group process and outcomes, we take a four-steps approach. First, we analyze the user-generated content by means of qualitative content analysis. Second, we invite all employees to a survey in which we evaluate the usability and usefulness of our artifact. Third, we conduct a set of individual interviews with the managing director and the head of the worker's council. Fourth, we organize a focus group with eight users of our internal crowdsourcing system (four of which are senior staff members and four regular employees).

First, we examine the content of user contributions to the internal crowdsourcing system. Eighty-one users registered for the internal crowdsourcing system and contributed 13 unique idea proposals, 20 comments and 77 likes. We analyze the hierarchical level of users and find that lower-level employees (i.e., non-managers) contributed five proposals, while senior managers (i.e., team leads) posted three. Five ideas were submitted anonymously. During the course of our five-month test phase, the organization conducted

seven board meetings and, thus, included seven winning proposals on their agenda. Six of these proposals were posted non-anonymously, only one was posted anonymously. In our qualitative content analysis, we did not find any proposal or comment that included any form of disinhibited language, swearwords, insults, or defamation. Furthermore, while three proposals and four comments had a more critical tone, the majority of 16 comments were affirmative, positive, and friendly. Highlighting the organizational culture, two proposals posted in the system asked for workshops on peer feedback and supervision. One of the proposals claimed that many colleagues spoke about other colleagues' performance behind their back. Interestingly though, this proposal was not submitted anonymously.

Second, we invited all employees to take a survey on their experience with the internal crowdsourcing system. Thirty-seven people started the survey, yet just 23 participants completed it. Twenty of those answered our control question correctly, reporting that they had noticed a feature allowing for anonymous posting. Thus, we limit our subsequent analysis to these 20 subjects. We find that 60 percent of participants were not afraid to post something. Nonetheless, a marked subset of 30 percent report that they are indeed afraid or very afraid. Thus, our feature for anonymous contribution might meaningfully support these users. Moreover, we evaluate the artifact's usability by asking for whether users believe that the identity of users contributing proposals or comments anonymously was completely untraceable. We find that the vast majority of users (80%) believes that the identity of users submitting anonymously was intractable. Most users (90%) also agreed that content posted by anonymous users was credible, while 10 percent were undecided. In terms of user acceptance (Venkatesh et al. 2003), we find that most participants (45%) report high perceived usefulness for the organization. However, many others are undecided (40%) and a small portion (15%) reports low usefulness. Overall, participants report low (10%) or even very low (50%) satisfaction with the number of user-generated contributions during our test period. Yet, participants also report a high (55%) or very high (35%) perceived ease of use acceptance (Venkatesh et al. 2003) with the internal crowdsourcing system, only 10 percent are undecided. Table 11 shows all results in terms of user acceptance, usage intention and ease of use.

Table 11 User acceptance

	Perceived usefulness		**Usage intention**		**Perceived ease of use**	
Very low	1	5%	2	10%	0	0%
Rather low	2	10%	1	5%	0	0%
Neither low, nor high	8	40%	6	30%	2	10%
Rather high	6	30%	7	35%	11	55%
Very high	3	15%	4	20%	7	35%
Total	20	100%	20	100%	20	100%

Amid these mixed results, we need to explore the non-technical factors influencing the users' perceptions in more detail. Thus, third, we conduct two individual with the organization's managing director and the head of the worker's council. The interviewees reported that the attendance of employees to the board meetings slightly increased. In particular, employees who had been rather reticent in the past were found to participate. They also confirm that they liked the design of the internal crowdsourcing system. Both interviewees reported that without the "opt-in anonymity" feature, they think that users would not have accepted the system. They also felt that contributing anonymously would allow for a more neutral evaluation of an idea, contributing in a low-threat environment that focuses on the value of an idea rather than the person behind it. For one proposal, the managing director said that he even decided to setup a dedicated task force that will review the idea in detail and propose an implementation plan. Moreover, the managing director claimed that he encouraged senior staff members to implement winning proposals quickly. Moreover, both the managing director and the head of the worker's council said they were satisfied with the level of participation. They promised to continue the usage of the internal crowdsourcing system in the future.

Fourth, we conduct a focus group – in the form of an interactive workshop (e.g., using flipcharts, thinking out aloud) – with eight selected key users from seven different teams of the organization. We took an interactive approach in order to activate and engage participants. We used white boards and posters (see Figure 17).

Figure 17 Picture of Interactive Focus Group Element

Half of the participants were regular employees, while the other half were senior managers. They confirmed that employees were unable to personally identify other users contributing anonymously. However, through content specificity, employees stated to receive initial cues that enabled them to match some users with some of the organizational teams. For instance, participants in the focus group assigned one proposal on opening hours to the reception team. Although we are unable to verify whether this assignment is correct or not, it indicates that our feature warranted process anonymity but only limited content anonymity (Valacich, Jessup, et al. 1992). This is precarious because participants also reported that there was widespread anxiousness for criticism and feedback by colleagues. Moreover, the focus group said that it felt awkward for them to communicate with anonymous users. Not knowing whom they speak to supposedly complicated commenting and interacting. Furthermore, participants confirmed earlier findings from the survey that employees were discouraged by the low perceived up-take. Some blamed the organizational hierarchical structure and poor feedback culture (as mentioned earlier). Others said that the implementation of winning proposals proceeded too slowly. However, this was contrasted by others saying that senior managers continuously promoted the system. The communications team also wrote about the progress of proposal implementations in the Intranet and internal newsletter.

7.5 Discussion and Conclusion

7.5.1 Discussion

We followed a rigorous research process that allowed us to detect the specific requirements for future users early in the artifact design. The evaluation results demonstrate that the IT artifact feature at hand – "Opt-in anonymity" – was willingly included into the daily workflow by the employees. We established the relevance of our artifact as a significant subset of employees reported being afraid to speak against their superiors. As many of the winning proposals came from lower-level employees, we arguably established broad-base participation by de-fusing power relationships (Tegarden et al. 2016; Feldmann, Gimpel, et al. 2014; Wilson et al. 2012; Nunamaker et al. 1988). Moreover, we successfully mitigated the negative effects of anonymity. In contrast to previous studies, we neither found disinhibited language (J Siegel et al. 1986; Cho et al. 2012; Haines et al. 2014) nor overly caustic comments (Valacich, Dennis, et al. 1992; Nunamaker et al. 1988; Jessup & Tansik 1991). However, considering that employees of the public institution know each other well, their long-standing social norms and group history might have contributed to the prevention of foul language too (Jessup et al. 1990; Valacich, Jessup, et al. 1992). Although participants found anonymous users credible as well, it is noteworthy that the number of anonymous proposals among the winning ideas is markedly smaller than the number of winners identified by a real username. Thus, identified proposals might still be more persuading (Teubner et al. 2014; Wagenknecht, Teubner, et al. 2016b).

However, despite the "opt-in anonymity" feature, employees were still afraid of their colleagues' feedback. This is in contrast to earlier studies that found perceived peer critique to be decreased by anonymity (Diehl & Stroebe 1987; Jablin et al. 1977; Nunamaker et al. 1987). However, as our IT artifact was evaluated as easy to use and anonymous users as credible, we argue that the reason for the employees' insecurity is related to the organizational environment. As employees work in a medium-sized group, at close proximity and have a long-established history, our feature only warranted limited content anonymity (Valacich, Jessup, et al. 1992). Users were able to de-anonymize some of the proposals based on the specific content, language cues and other signs. Thus, while we initially thought that users needed an option for anonymous posting because of fear of their superiors, the organization's managing director might have just been as much of a "threat" to employees as their colleagues might have been. The reduced content anonymity might have also hampered a wider system up-take. However, going forward, the organization might well adopt to an internal crowdsourcing system that promotes

rather flat hierarchies and an open feedback culture (Zuchowski et al. 2016), which is in contrast to its current fixed processes and hierarchical structures.

Our study contributes to the IS literature on two levels. First, we are one of the few field studies that explores the effects of anonymity on group support systems (Wilson et al. 2012), and one of the first studies to do so in internal crowdsourcing systems (Zuchowski et al. 2016) and in a public organizations. Second, we support earlier findings from Valacich, Jessup, et al. (1992) and Connolly et al. (1990), applying their framework and model in practice. We also shed light on the literature on trust-related issues of anonymous user interactions (Teubner et al. 2014; Wagenknecht, Teubner, et al. 2016b).

For practitioners, we suggest that our study setting as well as the open source foundation of the software at hand is applicable in other contexts and organizations – both in the public as well as private sector. Implementing (low-level) participative decision-making might enhance the innovativeness of an organization (Hurley & Hult 1998; Erickson et al. 2012). The organization's leadership echoed this. Offering an option for anonymous contributions, organizations can enable broad-base participation, especially encouraging otherwise reticent employees. Yet, managers should be aware that their subordinates might not only be reluctant to contribute ideas that are incongruent to their opinion. They might also be afraid of critique from their peers. Our proposed feature, "Opt-in anonymity," might be one helpful option to reap the benefits of anonymity while limiting the negative effects. Nonetheless, managers should also consider implementing further measures that support an open feedback culture and low-threat environment (Zuchowski et al. 2016). For instance, prior research suggested workshops on peer feedback (Nunamaker et al. 1988), which was also a suggestion in our proposal set.

7.5.2 Conclusion

In summary, following a rigorous DSR approach, we investigated the design of an IT artifact that supports anonymous contributions in an internal crowdsourcing system at a public organization. We developed "opt-in anonymity" as a key feature, which permitted seamless switching between identified and anonymous posting and analyzed how it affects the process and the outcome of the participatory decision-making engagement at the organization. Combining qualitative content analysis, a survey, and interviews with key personnel as well as a focus group, we found that our IT artifact successfully mitigated the negative effects of anonymity, while reaping some of the benefits. Our analysis showed no disinhibited language (e.g., hoax, foul language, etc.) or caustic comments. Instead, user contributions were perceived as innovative, constructive and mostly positive. Nonetheless, a third of survey participants reported that they are afraid

to post content incongruent with their superior's opinion. Thus, we argue that a feature for anonymous posting meaningfully supported them. Moreover, users rated "opt-in anonymity" to hide users' identity effectively. However, some employees were still able to de-anonymize users to a certain extent based on the content of their contribution. Applying the conceptual framework by Valacich, Jessup, et al. (1992), we are able to demonstrate that this is due to the organization's group size, proximity, history and composition. Many employees signaled that there is widespread anxiousness of criticism from their colleagues. We explore the influence and effects of the organizational culture during the test run in Section 8.

In summary, our study contributes to the IS literature on anonymity (Nunamaker et al. 1988; Dennis et al. 1990; Jessup & Tansik 1991; Valacich, Jessup, et al. 1992; Wilson et al. 2012; Haines et al. 2014), trust (Teubner et al. 2014; Wagenknecht, Teubner, et al. 2016b), internal crowdsourcing (Zuchowski et al. 2016; Erickson et al. 2012) and the wider literature on DSR (Hevner et al. 2004; Peffers et al. 2007; Gregor & Hevner 2013).

Going forward, future research could investigate how our artifact is used over time. Moreover, we could implement further incentives, such as badges and other gamified elements, to increase user participation (Zuchowski et al. 2016). Future research could also extend our efforts by testing the "opt-in anonymity" feature in different organizations.

7.5.3 Limitations

This study needs to be considered against its limitations. First, despite our best efforts, only a subset of the employees registered for the crowdsourcing system and even fewer filled out the evaluation survey. Yet, with about 80% and 20% of the workforce, respectively, we still gathered a large proportion of employees. Moreover, due to German privacy protection laws at the workplace, the organization's leadership and worker's council asked us to exclude questions on the user-specific usage of our "opt-in anonymity" feature. Thus, despite our best efforts to leverage indirect questions, our results can only be considered an approximation.

8. Transformation and Culture[19]

8.1 Introduction

In the previous chapter, we designed an artifact for optional anonymous content contribution in an internal crowdsourcing system. Our evaluation of the artifact was positive overall. However, one might wonder whether the modest rate of participation could have been increased if the organizational culture of the public organization at hand would have been more open – both in terms of feedback and information sharing as well as tech-savviness. Organizational culture can be a hindering factor in various information systems implementation projects. For instance, a recent survey by IBM suggests that the majority of IT change management projects fails, with almost half of the 1,500 executives from 15 countries reporting that organizational culture is one of the biggest challenges in this context (Jørgensen et al. 2014).

In the IS literature, studies on IS-enabled organizational transformation (OT) have repeatedly stressed that organizational culture and the accompanying leadership decisions during the implementation can significantly affect the adoption and use of new information systems (Besson & Rowe 2012; Nevo & Wade 2010). If organizational values are in a mismatch with the values represented by new technology, users will be reluctant to or even actively resist the adoption (Cooper 1994). This clash of values might be especially pronounced when it comes to OP, which promotes decision-making by all employees, including novices and lower-level staff, in order to benefit from the wisdom of the crowd. Despite recent efforts by many organizations to implement such a culture in the wake of "New Work" trends that promote more flexibility and empowerment (Bock 2016), OP is far from being widespread as it builds on flexible processes and flat hierarchies (Erickson et al. 2012). When OP is implemented through online systems, then coined OOP in this thesis, entails ideating, developing and evaluating new ideas, similar to open innovation and internal crowdsourcing (Adamczyk et al. 2012; Zuchowski et al. 2016). Although these topics enjoy increased attention by researchers and practitioners,

[19] An earlier version of this chapter has been published as Wagenknecht, Levina, et al. (2017a). There is also a version of this chapter under review with the Electronic Markets – The International Journal of Networked Business. This study was part of the joint research project "Participation as a Service" (PaaS), funded by the German Federal Ministry of Education and Research (under grant no. 01IS150120).

studies have only narrowly explored what type of organizations can reap most benefits from OP systems and whether and how organizational culture affects the implementation of internal crowdsourcing systems (Nevo & Wade 2010). This is even less the case for crowdsourcing in public organizations, which often build on fixed processes and hierarchical structures.

In this chapter, we re-examine the internal crowdsourcing system mentioned in Section 7. We describe the requirements engineering for this software system and test usage and acceptance, following a DSR approach (Peffers et al. 2007). Our research objective is to identify organizational culture characteristics that need to be taken into account when implementing such an internal crowdsourcing system. To this end, we ask:

> ***RQ10:*** How does organizational culture affect the usage and acceptance of an internal crowdsourcing system?

More specifically, we seek to explore whether an information system is capable of transforming organizational information and knowledge sharing for (internal) innovations. As a result, our findings extend the research within the theory of IT culture conflict (Leidner and Keyworth 2006); provide important insights into user acceptance research (Venkatesh et al. 2003), as well as system design and implementation. Therefore, although rooted in DSR, our study bridges into behavioral and management sciences, incorporating various sociotechnical aspects. In effect, our study contributes to IS research in IS-enabled OT as well as CSCW.

We structure our chapter as follows. We begin by reviewing prior research on OT with regard to organizational culture and leadership and explore crowdsourcing studies in Subsection 2. Thereafter, we present our study method in Subsection 3 and describe our artifact. We evaluate the artifact in Subsection 4 and discuss our results in Subsection 6, where we also draw a conclusion.

8.2 Theoretical Background and Related Work

OT can have various effects on the organization, leading to both operational as well as strategic improvements (e.g., efficiency, responsiveness, flexibility) (Cha et al. 2015; Gregor et al. 2006). While technology can contribute to changing organizational processes and structures in order to achieve such outcomes, IS research suggests that IT assets do not create value in isolation (Luna-Reyes et al. 2005). In this sense, IS-enabled OT also entails a realignment of organizational routines to reach a level of diffusion for new software implementations (Nevo & Wade 2011). OT studies need to take a variety of social and other non-technical elements into account (Cha et al. 2015; Markus 2004;

Besson & Rowe 2012; Gregor et al. 2006; Silva & Hirschheim 2007; Ulbrich 2010). IT can only produce beneficial effects when the technology fits the organizational characteristics, especially its culture and related working routines (Nevo & Wade 2010). If there is a mismatch between the system's values and the cultural norms, implementation of new IS can fail (Cooper 1994).

In this subsection, we describe how the organizational culture and the leadership play an important role in IS development and implementation. Moreover, we briefly summarize prior research on OP and systems for crowdsourcing and open innovation.

8.2.1 Organizational Culture

Organizational culture can be defined as a set of shared assumptions and a common understanding about organization functioning, encapsulated in a complex system of norms and values (Deshpande & Webster 1989; Schein 1985; Ke & Wei 2008). It is both pervasive and elusive (Hofstede 1980; Davison & Martinsons 2002). Both information flows and information technologies are closely connected to culture (Leidner & Kayworth 2006). In effect, culture influences employees' perception and behavior (Schein 1985), determines how social groups interact with IT (Leidner & Kayworth 2006) and, thus, has a profound effect on the IS implementation process (Cooper 1994; Ke & Wei 2008; Cha et al. 2015; Leidner & Kayworth 2006; Jackson 2011; Iivari 2005). Employees are more likely to adopt a technology if they perceive its value to match the cultural norms of a given team or the entire organization (Leidner & Kayworth 2006; Nevo & Wade 2010; Davison & Martinsons 2002; Silva & Hirschheim 2007). In case of a misalignment, systems might remain unused and employees could even resist implementation (Tyworth 2014; Cooper 1994; Markus 2004). Thus, as cultures vary between organizations, the same IT can produce different effects depending on the specific organizational context (Leidner & Kayworth 2006). Usually, organizational cultures differ in terms of learning and development approaches, power sharing and participative decision making as well as support and collaboration, communication and tolerance for conflict and risk-taking (Hurley & Hult 1998). Although it is relatively stable, an organization's culture can be consciously designed and (slowly) transformed (Schein 1985; Nevo & Wade 2011; Tyworth 2014). If the emergent work practices change the power relations of the organization, technologies are able to alter the underlying social systems (Leonardi & Barley 2010). However, these dynamics are recursive so that the design, implementation and use of IT affects the organizational structures – and vice versa (Luna-Reyes et al. 2005). Although conflicts may emerge during IS implementation projects, they can positively contribute to a cultural change (Leidner & Kayworth 2006). In order to implement an information system successfully, Ke and Wei (2008) propose that an

organization should adopt a culture that encourages employees to participate in decision-making and generate innovative ideas, while openly sharing information and knowledge and tolerating conflicts and risks. Executive leadership can meaningfully contribute to reaching such a culture.

8.2.2 Leadership

Leadership is crucial for the effectiveness of IT adoption and organizational change as leaders attitudes and behavior influences their employees' perception and IS adoption (Ke & Wei 2008; Erickson et al. 2012). In the wake of an IS implementation, adoption and diffusion often depends on employees' perception of uncertainty about benefits and costs of the new systems and technologies (Ke & Wei 2008; Leidner & Kayworth 2006; Polites & Karahanna 2012). Thus, it is the leadership's responsibility to define the facilitation of and interactions with the new systems (Nevo & Wade 2010). For instance, extant research suggests that top managers should embrace a readiness for change, rather than fighting resistance, in order to increase motivation and reduce uncertainties and stress for their subordinates (Ke & Wei 2008; Cho et al. 2011; Leidner & Kayworth 2006; Erickson et al. 2012). Leadership can achieve this by formulating a vision and roadmap, generating awareness, modifying organizational structures, creating incentives or by allocating time and resources to the implementation (Ke & Wei 2008; Leidner & Kayworth 2006; Nevo & Wade 2010; Erickson et al. 2012).

8.2.3 Organizational Participation

In order to shape its strategy, processes and culture, employees increasingly seek to be involved in various decision-making processes of their organization (Tumasjan et al. 2011). Extant research has argued that OP is appropriate to all organizations and circumstances (Wilkinson 1998). However, this notion has been called into question as OP-related outcomes depend on organizational variables, such as organizational culture and business processes (Davison & Martinsons 2002). For instance, employees need to be motivated and need to have the necessary skills and knowledge in order to be able to contribute in participatory decision-making. The distribution of power relations and management commitment to employee-generated proposals is equally relevant (Davison & Martinsons 2002).

8.2.4 Internal Crowdsourcing

As mentioned above, Pedersen et al. (2013) define crowdsourcing as a collaboration model that uses human-centric information systems to address organizational, individual and societal problems by engaging on a crowd of interested people. Thus, internal crowdsourcing leverages the expertise, skills and creativity of the employees (Adamczyk

et al. 2012; Zuchowski et al. 2016). However, Erickson et al. (2012) suggest that internal crowdsourcing in order to be successful requires a shift in traditional practices as organizations often build on *hierarchical* structures and *fixed* processes. Thus, the open and democratic nature of internal crowdsourcing might be in contrast to the less egalitarian communication in place in many organizations (Riemer et al. 2015). Crowdsourcing shifts these norms, structures and processes, valuing informal individual contributions – both tangible and intangible – while also enforcing *flat* hierarchies and *flexible* processes (Erickson et al. 2012; Zuchowski et al. 2016; Riemer et al. 2015).

Thus, leadership should actively support the implementation of crowdsourcing systems in order to overcome barriers due to the current organizational culture and structures by promoting openness, transparency and social feedback (Zuchowski et al. 2016). Moreover, for a crowdsourcing engagement to be successful, the information systems needs to convey a motivational and trusted environment (Ebner et al. 2009). However, some employees might be reluctant to share their opinion openly because they might be afraid of their superiors or peers (Haines et al. 2014). Thus, crowdsourcing facilitators choose to let users contribute content anonymously. Yet, anonymous communication has been shown to have various effects on human perceptions and, eventually, decision-making processes (Postmes & Lea 2000; Wagenknecht, Teubner, et al. 2016b). While it might protect user privacy and encourage reticent employees to speak their mind, user anonymity has more recently been identified as a major deterrent in online discussions as it also provides a vail of protection for those using foul language, polarizing arguments and hate speech (Cho et al. 2012; Haines et al. 2014).

While IS research on crowdsourcing has overwhelmingly focused on the effectiveness and quality of idea evaluation processes, studies on how crowdsourcing systems affect organizational culture are scarce (Erickson et al. 2012; Benbya & Leidner 2016). In particular, as crowdsourcing entails sourcing peer knowledge, organizations with hierarchical structures and fixed processes might struggle with the implementation of a crowdsourcing system.

8.3 Study Design

In order to explore the relationship between organizational culture and an internal crowdsourcing system in more detail, we conduct a case study of an OT process at a public organization. Besson and Rowe (2012) recommend describing and conceptualizing both the process of OT as well as the construction phase. We address this recommendation by adopting a DSR approach (Peffers et al. 2007). In our case, we implemented an internal crowdsourcing system at a public-sector organization. As mentioned above, the

organization has three offices in rural Germany and more than 150 staff members, who are tasked with placing and training people of various backgrounds for new jobs. The organization has a rather high degree of formalization and hierarchy (Hurley & Hult 1998). That is, both strategy as well as some operational procedures are defined by a federal agency. This federal agency also appoints the senior management. However, the public organization is free to define how, when and where employees engage with their clients. At the public organization, a management board meets every month to discuss and decide on strategic issues for the entire organization. Although final decision-making is limited to three board members, all employees are invited to join these meetings as auditors and contributors. Yet, attendance by the staff was very low.

Following the DSRM process prescribed by Peffers et al. (2007), we identify the low employee participation in this strategic decision-making process as our relevant problem. Based on interviews with the organization's managing director and the head of the worker's council, as well as a literature review, we implemented an internal crowdsourcing platform. The implementation was supported and partly run by our technical and consulting partners within the joint research project PaaS, Liquid Democracy, partou and HRpepper Management Consultants.[20] We collaboratively designed and implemented an IT artifact as a solution, which draws from extant research. Prior to the main software implementation, we ran a two-week pre-test with a small team of employees. Thereafter, we refined our artifact based on user feedback. Then, we ran a five-month test from August 2016 to January 2017, which was open to all employees of the organization.

Our evaluation is similar to the study design in Section 7. We evaluate our IT artifact in four steps. First, we collect and analyze data from user-generated content, such as proposals and comments. Two research assistants code and classify the contributions in terms of tone and content (Weston et al. 2001). In order to ensure reliability, an independent third party crosschecks the analysis and, if necessary, resolves disagreements. Second, we invite all employees (including those that did not register for the system) to fill out a survey on their experience with the system. We ask for users' behavioral intention to use the system as well as performance and effort expectancy, i.e. perceived usefulness and perceived ease of use, following Venkatesh et al. (2003). Furthermore, we asked survey participants to evaluate the quality of ideas and comments. We measured all items on a 5-point Likert scale. The worker's council of the public

[20] Note that while we collaborated with our partners in the design and implementation process, we ran the examination of the evaluation results independently.

organization approved the survey. Note that due to strict privacy regulation, we were restricted from requiring survey participants to report their gender, age and other personal data. Third, we conduct interviews with the managing director and the head of the worker's council. Fourth, to gain an even deeper understanding, we also conduct a focus group interview with eight lead users of our artifact (as defined by Von Hippel 1986). We record, transcribe, code and analyze all interviews. In what follows, we describe our artifact design and evaluation in detail.

8.3.1 Artifact Design

Our goal was to design a system for internal crowdsourcing that enables employees to contribute to the strategic decision-making of their organization. Please refer to Section 7.3 for a detailed description of the organization's background and design process. In this subsection, we only summarize the design components most relevant for the following analysis. Following prior research, our design embraced the principles of participatory decision-making with a strong emphasis on collaboration and open feedback (Hurley & Hult 1998). We designed an artifact that closely interacts with its socio-technical environment (Niederman & March 2012; Gregor & Hevner 2013). In order to increase employee participation, we designed a crowdsourcing system that enables users to contribute, develop and evaluate ideas and proposals for change (Zuchowski et al. 2016; Wagenknecht, Filpe et al. 2017).The expected users of the artifact are the employees (i.e., non-board members) of the public organization. The IS development is based on an open source project called "Adhocracy," developed by Liquid Democracy, a German non-profit organization, and partou, a German co-operative for the design of participatory software design – both part of the joint research project "Participation as a Service" (PaaS). We collected user requirements starting with prior research in CSCW and enriched them based on individual interviews with the managing director of the organization as well as the head of the worker's council. Thereafter, we consolidated these requirements with the current software architecture.

Adapting an OT perspective, we are able to identify three major requirements. First, the management board wanted to leverage the existing structures in the organization. Employees should be able to contribute ideas, which would be taken up for discussion and decision-making in the regular strategic board meetings. Thus, using the system, users were able to contribute proposals, like and comment them. After a fixed period of time (usually two to three weeks), users were invited to vote on which proposal should be discussed in the following strategic board meeting. The management board agreed to include this idea on its agenda and provide feedback to the employees whether and how it will implement the idea. Each user had one vote per cycle and only the idea that received

most votes would be added to the meeting's agenda. The system saved all other ideas in a stack and users are able to re-nominate them.

Second, as the organizations has a relatively high average employee age, the software needed to be easily useable. Thus, we opted to follow common design patterns and choose a minimalistic, clean style sheet. We also provided training before the implementation to a number of key employees that would function as multipliers. We show the final design of our artifacts in Figure 18 and Figure 19 (names of the contributors are blurred).

Third, both the management board as well as the worker's council stressed the importance of privacy protection. This had two implications for the artifact design. In terms of user registration, we personally invited each employee to sign a written document approving our terms of use. We only setup an account if users gave their explicit consent. Moreover, we designed a feature that enabled users to contribute proposals and comments anonymously. We explained the design of our "Opt-in anonymity" feature in Section 7. In order to ensure a better readability, we summarize its main features here. Acknowledging prior research on user anonymity, we wanted to leverage the positive sides while mitigating the negatives effects. Thus, the software should both encourage reticent members and still avoid foul language and hoax. By default, the system displayed a user name (which usually represented an employee's full name) next to every proposal and comment. Conversely, by checking a dedicated box ("post anonymously"), users could save their content to the overall profile of an anonymous user. In effect, neither the system administrator nor the management would be able to trace back the content originator. However, once submitted, users could not edit posts. Furthermore, we supported the implementation in several ways. There were multipliers in every team and all were regular employees, rather than team leaders, in order to facilitate a grassroots movement. Team leaders on their side were encouraged by the managing director to promote the system as well. The managing director also encouraged employees to use the system through a talk in front of all employees and a series of internal newsletters.

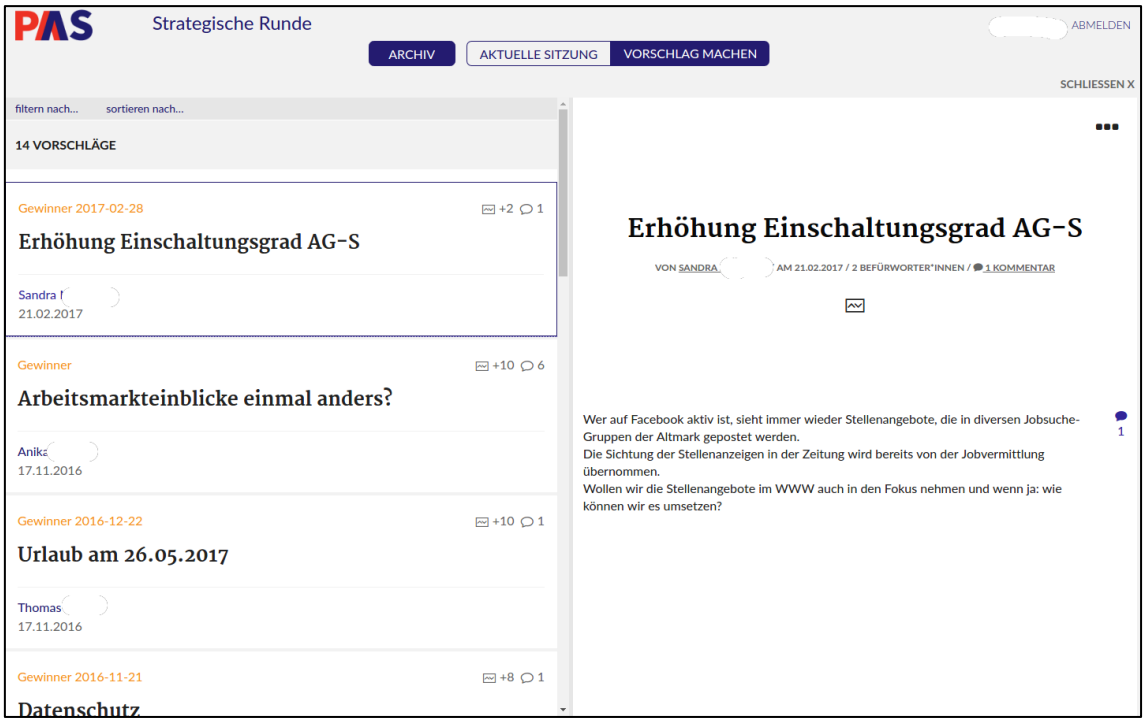

Figure 18 Design of Proposal List and Proposal View

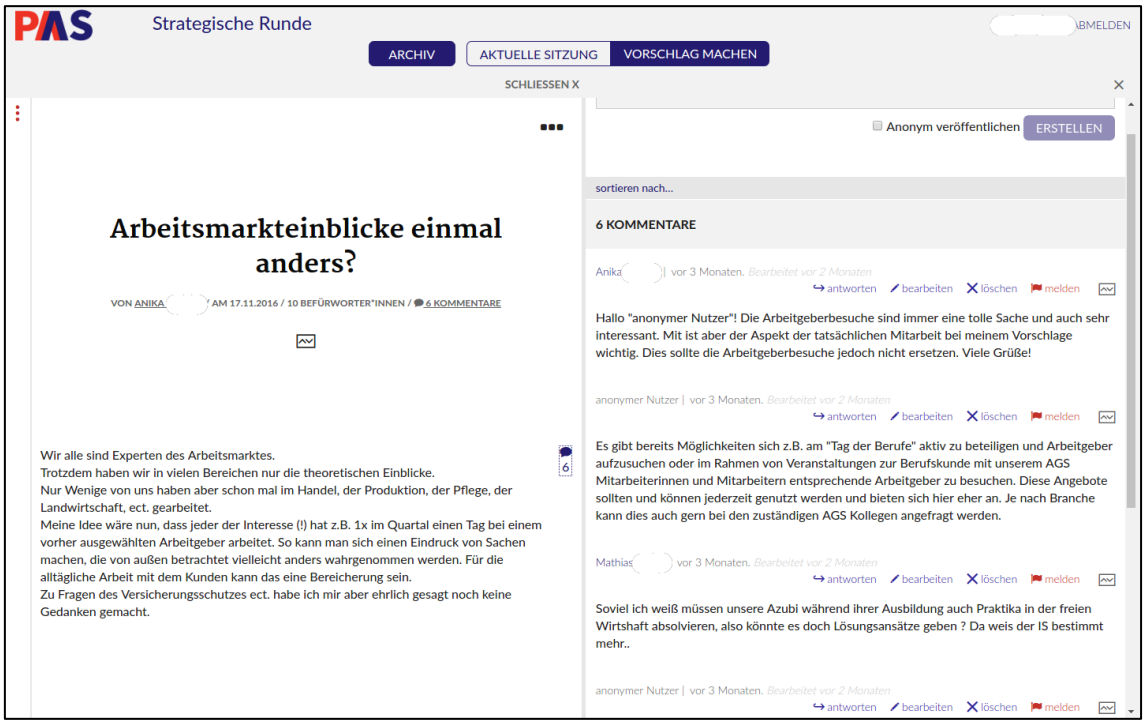

Figure 19 Design of Proposal and Comments View

8.4 Results

We already presented some of the study results in Section 7. Again, for the purpose of easier readability we single out those that are relevant from an OT perspective, explain why and include new findings from the interviews and focus group (which were irrelevant to the previous chapter) in the following subsection.

We conducted our evaluation in four steps. First, we analyzed the content that users generated during the course of our five-month main test phase. Eighty-one users registered for the system that contributed thirteen unique proposals on various issues. Five proposals came from low-level employees, while only one was posted by a senior manager. Three ideas were submitted anonymously. In total, users contributed 77 likes and 20 comments. None of the proposals or comments included any form of foul language, such as swearwords, insults or defamation. Nonetheless, only one of the six proposals that were voted to get on the agenda of the board meeting was contributed by an anonymous user. While one worker's council representative was an active user in the system, there was no contribution by senior management.

Second, 37 employees followed our invitation to fill-out a survey. However, only 23 participants completed it and only 20 reported that they noticed a feature allowing anonymous posting. For our analysis, we only include the latter part and report results for user acceptance rates (Venkatesh et al. 2003). Although most participants (45%) reported high perceived usefulness for the organization, many others were undecided (40%) and a small portion (15%) reported low usefulness. Results on behavioral usage intention in the coming months were quite similar. Yet, when it comes to exploring the reasons for these results, participants reported a high satisfaction with the ease of use. In more detail, we are able to establish this for the anonymity feature too. We find that the vast majority (80%) thought that the identity of users contributing proposals or comments anonymously was completely untraceable, while only few (10%) did or rather did not agree. Hence, the reasons for the mixed results of perceived usefulness might be non-technical. Participants reported low (10%) or even very low (50%) satisfaction with the number of user-generated contributions. In exploring the organizational culture, we find that 60% of participants were not afraid to post content that is in conflict to senior management's attitude and opinion. Yet, a significant subset (30%) reported that they were indeed afraid or very afraid of posting contrary opinions. For a more detailed description of user acceptance, usage intention and ease of use, please refer to Table 11 in Section 7.

As these survey results can only serve as an indication, we need to gain a deeper understanding of users' perception of our IT artifact. Thus, we conducted two new

individual interviews with the managing director and the head of the worker's council in order to explore the effects the software implementation had on the organization. Both interviews lasted for roughly 45 minutes. Fourth, we conducted a focus group with eight selected key users from seven different teams of the organization. Half of the participants were regular employees, while the other half were team leaders. All of the interviews yielded insights on conditions and reasons for usage and non-usage as well as the impact on the organization as a whole. Participants unilaterally reported that the system's design was suited for its purposes. Moreover, the number of employees attending the strategic board meeting slightly increased. For instance, the managing director said: "*I saw employees participating that I never noticed in such a context before*." Furthermore, interviewees claimed that most of the topics discussed in the system were highly relevant to the entire organization. Both the worker's council as well as the managing director perceived the system to serve as a sort of sentiment analysis. However, users were discouraged by the low perceived up-take and internal structures. We traced this back to a series of reasons. For one, despite the moderate number of user-generated contributions on the platform, proposals were constant topics of the office grapevine. In some teams, employees discussed the proposals offline and had one colleague post their aggregate opinion online. Moreover, although everyone agreed that content posted anonymously was indeed anonymous, there was widespread anxiousness for criticism and feedback by colleagues. Interviewees said employees were most reluctant to use our system because they worried they might be criticized by their colleagues for posting incorrect or irrelevant content. Moreover, interviewees reported that some users were singled out for supposedly having a low workload as they found time to engage on the platform. (This was echoed by two proposals posted in the system asking for workshops on peer feedback and supervision. One of the proposals demanded a more respectful feedback culture as many colleagues spoke about other colleagues' performance behind their back.)

Moreover, with regard to the internal routines, interviewees also reported that the managing director asked the user that contributed the winning proposals to join the board meeting personally. Apparently, this put increased pressure on those users as they would have to spend two hours in the meeting, present their idea and might end up receiving the responsibility for its implementation. Furthermore, some interviewees claimed that the managing director, having joined the organization only two years ago, has implemented a series of new mandatory programs to improve client relations quality. These programs included additional trainings and changing routines, embracing peer feedback and new techniques such as storytelling. Nonetheless, as the software is part of a non-mandatory program, some employees did not want to increase their workload any further. Furthermore, interviewees said that, as of now, many employees would claim that the

system would not bring meaningful change. According to the interviewees, this might be related to the experience with previous directors who followed a less inclusive, non-participative management style.

8.5 Discussion and Conclusion

8.5.1 Discussion

In this study, we designed and implemented a system for internal crowdsourcing at a public organization and evaluated it through a survey and additional in-depth interviews. Our results suggest that the developed system is easy to use and well designed. The system's introduction resulted in a number of new strategic proposals for the organization. However, the organizational culture makes it difficult to sustain a more participatory approach to decision-making. Most notably, there was only a rudimental communal and open feedback culture in place, which arguably created an IT culture conflict (Leidner & Kayworth 2006) with the internal crowdsourcing system, which promotes open information and opinion exchange. Despite an option for anonymous content contribution, users were afraid their colleagues might harshly criticize them. In the survey, the proportion of participants stating that they are afraid to post content that is opposed to the senior management's opinion might even be greater in reality because of social desirability effects. Furthermore, senior management's requirement for users with the winning proposal to join the board meeting complicated the situation ever further as employees perceived this as a heavy workload burden. Interestingly though, employees tended to discuss issues offline, feeding back their opinion to the system through a dedicated team member. Yet, this led others to question the usefulness of the IS because of the perceived low user activity.

Overall, our results question whether the organization was (culturally) ready for a system designed to increase employee participation (Cho et al. 2011). As participatory decision-making entails a bottom-up approach, an implementation driven by the senior management (i.e., top-down), might have been counterproductive. Thus, the relatively low perceived usefulness of the system might be related to an organization that is not used to flat hierarchies, flexible processes and direct decision-making as routines of the organization were otherwise highly hierarchical and fixed (Erickson et al. 2012). A large proportion of the employees also seem to be very skeptical towards change initiatives, a behavior deeply rooted in the organizational structures because of the prior director's management style. Although the new managing director might have put too much pressure on users by requiring them to join the board meeting, the organization's leadership also implemented a series of helpful measures to facilitate the transformation

process (e.g., multipliers, newsletters, etc.). On one hand, in light of the employees' anxiousness for criticism, we consider it a good choice for the senior management to stay out of the online discussion. On the other hand, the managing director's presence could have also functioned as a role model. Furthermore, a fixed period of time to engage on the platform for the employees and more incentives to participate in the system are known tools for increasing user activity (Ke & Wei 2008; Leidner & Kayworth 2006; Nevo & Wade 2010; Erickson et al. 2012) that were omitted in our case. Although employees might still be intrinsically motivated (e.g., recognition by colleagues, gaining control over their work environment), there were little to no extrinsically motivating factors. In terms of our system development, we might incorporate gamification features in the future, such as badges and scores, in order to provide some incentives and increase user motivation (Feldmann, Adam, et al. 2014; Benbya & Leidner 2016).

8.5.2 Conclusion

In conclusion, in order to reap all benefits of the internal crowdsourcing system, we suggest implementing an organizational culture that promotes open information and knowledge sharing, while tolerating conflicts and risks (Ke & Wei 2008). In our case study, though, the system's values currently do not match the organization's cultural norms (Leidner & Kayworth 2006; Nevo & Wade 2010; Davison & Martinsons 2002; Silva & Hirschheim 2007). Therefore our research supports the notion of Davison and Martinsons (2002) that OP is not per se suitable to all organizations. While it might indeed bring several benefits, organizational readiness in terms of culture is key and has a significant impact on user acceptance (Cooper 1994; Ke & Wei 2008; Cha et al. 2015; Leidner & Kayworth 2006). As crowdsourcing transforms organizational structures and processes, an IT culture conflict is inevitable (Erickson et al. 2012; Leidner & Kayworth 2006).

Practitioners need to be aware of this and should engage with employees of various backgrounds in the entire organizations in order to understand the organizational structures and culture before the implementation. Instigating a more friendly, open feedback culture might be a prerequisite to ensure the adoption of crowdsourcing systems (Zuchowski et al. 2016). The organization's executive leadership needs to scrutinize all internal processes and routines in order to determine whether and, if so, where the current structure needs changes. They should also consider expertise and workload of their employees (Wagenknecht, Filpe et al. 2017), as this was one of the obstacles in our case study. For instance, dedicated time slots or the provision of incentives (both monetary as well as non-monetary) could help in this regard.

8.5.3 Limitations

There are some limitations to this study, which are analogous to those in the previous chapter. In addition, this study is limited by its five-month scope. Going forward, we will aim to investigate how the utilization of our software artifact proceeds (Besson & Rowe 2012). With time, the organizational culture might adapt, taking the IS implementation as an activation moment for organizational transformation (Riemer et al. 2015).

9. Conclusion and Outlook

This thesis has explored the conditions, capabilities and components for the design of OOP systems. Following a literature review and expert interviews to identify and validate our relevant research problems, we focused on three main influencing factors for OOP, namely anonymity, rating scales and organizational culture. In this chapter, we will discuss both the contributions of this thesis as well as propositions for future research.

9.1 Contributions

To this end, we want to provide both a *prescriptive* and *descriptive* explanation for our findings – in line with the common understanding of knowledge contribution in DSR (Walls et al. 1992; Gregor & Jones 2007; Baskerville & Pries-Heje 2010; Peffers et al. 2007). That is, DSR includes a prescriptive part on artifact construction – general components – and a descriptive element that functionally explains the artifact's behavior and intended features – general requirements (Baskerville & Pries-Heje 2010). In other words, DSR is able to explain *how* to construct an artifact and *why* it has certain features. Baskerville & Pries-Heje (2010) further distinguish requirements in conditions (i.e., a state or circumstance) and capabilities (i.e., qualities or abilities required). Following their simplistic approach, we outline the subsequent requirements and components derived by this thesis. This enables us to reflect on the contributions of this thesis on both a theoretical as well as managerial level, and sums up our findings. We begin with our problem identification and then refer to the three major parts of this thesis, namely rating scales, anonymity and organizational culture.

9.1.1 Literature Review

We defined the three major parts of this dissertation based on an extensive literature review on open innovation and a subsequent set of expert interviews. First, the structured literature review (Webster & Watson 2002) investigated success factors for idea generation, collaboration, and evaluation in OI processes. Our guiding research question was:

> ***RQ1:*** What are the success factors for idea generation, collaboration and evaluation in OI systems?

Leveraging the D&M IS success model (DeLone & McLean 2003), we identified a number of main success factors along the six dimensions of system quality (e.g., ease of use), information quality (e.g., understandability of goal definitions), and service quality

(e.g., feedback and responsiveness), system use, user satisfaction, and net benefits. We found that extant research analyzed net benefits in terms of increased idea quality, more accurate idea evaluation, and improved user activity. However, this chapter also suggested that significant parts of extant research on OI cannot be captured by the D&M model. Thus, we propose our own OI system success model and extend it by the D&M model by two constructs. First, we introduce *user characteristics*, which refers to users' personality, knowledge, and position within an organization. Research has demonstrated that these factors affect OI system usage as well as user satisfaction. Moreover, we also add *system design*, which includes design choices on an artifact or feature level (e.g., collaboration features, gamification, and algorithms to enhance idea quality or evaluation accuracy). Moreover, we demonstrated that there are three main clusters in the literature. These clusters include one on public or open platforms (e.g., Top Coder), another one on internal crowds and one on a particular feature of OI systems (e.g., rating techniques). Based on our literature review, we criticize the short-term focus we found in many studies. We argue that it hampers a sustainable evaluation of the long-term benefits of OI systems. The literature review also highlighted understudied areas of research along all phases of OI processes – from idea evaluation (rating scales), to collaboration (anonymous contributions), as well as governing factors (organizational culture).

9.1.2 Expert Interviews

Hevner et al. (2004) emphasized that DSR also seeks to solve relevant business problems. Thus, in our next chapter, we validated and extended the success factors derived in our literature review by interviewing 20 senior IT and HR experts from leading German mid- and large-cap enterprise as well as large public organizations and an NGO. Our main research questions were the following:

RQ2: What is the relevance of the success factors in practice?

RQ3: What are objectives for a OOP solution design?

We conducted semi-structured interviews, which lasted about 45 minutes each. Each interview was recorded and transcribed, then coded following an iterative and dynamic approach. Experts reported both positive and negative experiences with participatory processes at their organizations. However, we found that organizations rarely use dedicated software for these engagements. Yet, most of the problems our experts encountered during their participatory projects are also subject to current research in IS. Specifically, experts reflected on problems related to misalignments due to their organizational culture. They also complained about the vast amount of ideas, which made idea evaluation very resource-intensive and therefore costly. Moreover, experts

elaborated to the pros and cons of anonymous user contributions. Based on the interviews, we corroborated our OI system success model, confirming all success factors derived in the literature review. Moreover, the expert interviews allow us to extended the OI system success model further by including factors mentioned by the experts, which we did not find in the literature review. For instance, we found that the organizational structures needs to be adopted to the OOP process too. This includes a timely evaluation and feedback of user-generated ideas as well as a thorough user training, onboarding (particularly for older users) and internal marketing. Furthermore, our expert interviews revealed that the provision of anonymous communication tools is another crucial success factors. Adding to the net benefits, the interviewees reported that both job satisfaction and employee commitment increased in their organizations thanks to OOP engagements.

Our expert interviews yielded three topics that present a problem in business practice. These include the influence of rating scales on the idea evaluation process, the effect of anonymity on communication in OOP engagements as well as organizational culture as an enabler as well barrier for OOP. As these three research subjects also surfaced in our literature review as areas with research gaps, the expert interviews established that a further examination of these topics would be a promising path for DSR. Thus, we decided to analyse them in detail in this thesis.

9.1.3 Rating Techniques

Internal crowdsourcing and similar forms of user engagements often result in vast amounts of ideas in varying quality (Di Gangi & Wasko 2009; Blohm et al. 2010; Poetz & Schreier 2012; Riedl et al. 2013). In order to lower the effort required by facilitators and moderators, OOP systems need to account for an abundance of user-generated content. While IS research has hitherto considered complex evaluation approaches, such as prediction markets and automated approaches (Blohm et al. 2016; Teschner & Rothschild 2013), many popular websites use simpler rating techniques, such as up-voting (e.g., Facebook and Yammer) or Likert scale-like rating techniques (e.g., Amazon and Airbnb). However, these methods face inherent shortcomings, including biased distributions (Teubner et al. 2016), limited accuracy due to oversimplification, a possible disconnect between the goals of process organizers and rating users, as well as reduced user satisfaction (Ebner et al. 2009; Riedl et al. 2010). The BOL approach aims to address some of these shortcomings, outperforming Likert scales in terms of time for task completion and accuracy in an initial study (Klein & Garcia 2015). In order to evaluate these early results and scrutinize them in comparison with another simple rating technique – up- and down-voting – we asked the following research questions:

RQ4: How does the BOL rating technique affect user activity and frustration in a crowd-based evaluation task?

RQ5: Which role do perceived novelty and information overload play in mediating these effects?

We addressed our research questions in an online field experiment, accompanied by an online survey. We engaged the employees of a private-public research center in Germany to join a two-stage OOP process. We collected 42 unique user-generated proposals, which 141 participants then evaluated using one of three rating techniques. Following our research questions, we analyzed how the three different rating techniques fared in terms of users' activity (measured on the number of votes per treatment), frustration (modeled according to Riedl et al. 2013) as well as information overload (building on the items by Schultz & Vandenbosch 1998) and perceived novelty (following Riedl et al. 2013). In order to ensure a realistic scenario, participants did not have to rate all ideas, which meaningfully differentiates our study from prior research (Riedl et al. 2013; Klein & Garcia 2015).

Evaluating both click data as well as the post-evaluation survey data in a SEM-PLS analysis, we demonstrated that participants perceived BOL as significantly more novel, but also markedly more frustrating than the two other rating techniques. We partly traced this result to the mediating factor of information overload. Moreover, BOL users were not necessarily quicker in their idea evaluation than participants in the other treatments. Although users were more active using the BOL technique, the high levels of frustration and information overload eventually question whether OOP facilitators should use this novel technique. Instead, they could resort to more common techniques, such as Likert scales and up- and down-voting. In these treatment, users were almost as quick as BOL participants were, yet less frustrated – hinting at positive user acceptance.

In effect, our results markedly differed from those by Klein & Garcia (2015). Furthermore, we support findings by Riedl et al. (2013) that suggested that users form attitudes towards rating techniques. The findings on varying user perception on the different scales, contribute to research on rating techniques in general (Bao et al. 2011; Riedl et al. 2010; Riedl et al. 2013; Klein & Garcia 2015; Blohm et al. 2016). Moreover, by integrating the opposing factors of user activity and frustration within a joint research model, we enhance the understanding of collaborative evaluation processes (Adamczyk et al. 2012; Leimeister 2010; Straub et al. 2015).

Summarizing our results, we propose the following general requirements and components for rating techniques in the idea evaluation process of an OOP system in Table 12.

Table 12 Requirements and Components for Rating Techniques

General Requirement	Condition	Capability
	• There are (too) many ideas or user proposals	• Users can evaluate their peers' ideas and proposals
General Component	Design features for idea evaluation, including rating techniques that (a) activate users and (b) avoid frustration by reducing information overload	

9.1.4 Anonymity

Another major part of this thesis examined anonymity in OOP processes. Early on, we noticed that legal requirements might make it necessary to let employees at least register and communicate anonymously in order to protect their privacy. Subsequently, this was confirmed in our expert interviews. IS literature has explored effects of anonymity in the context of computer-mediated discussions. On one hand, researchers found that anonymity can increase user participation (Connolly et al. 1990; Haines et al. 2014). However, anonymity also poses several challenges as anonymous discussions were found to be more polarizing (Charness & Gneezy 2008; Sia et al. 2002) or exhibiting more hoax and foul language (Jane Siegel et al. 1986; Sæbø et al. 2010; Cho et al. 2012; Silva & Panahi 2017; Postmes & Lea 2000; Haines et al. 2014). We examined these relations in two studies – one experimental and one in the field.

Our first study examined the role of user anonymity in persuasion. Anonymity in online discussions – including those in OOP systems – is usually subject to the users' decisions, where they can typically provide profile images, names, or other personal references about themselves (Jessup & Tansik 1991; Teubner et al. 2014; Benbya & Leidner 2016; Hernández-Ortega 2018). While the IS literature has mainly considered the effects of anonymity on user behavior in discussions (Wilson et al. 2012; Valacich, Jessup, et al. 1992), credibility, and communication persuasiveness separately (Jiang et al. 2013; Walther et al. 2001; Postmes & Lea 2000), only few studies have jointly approached these aspects. Our study sought to close this gap by investigating whether and how (a sender's) anonymity affects (his or her message's) persuasiveness in online discussions. Building on the ELM (Petty & Cacioppo 1979) and signaling theory (Spence 2002), we suggest

that perceived social presence affects user involvement and user credibility, which in turn influence persuasiveness. Involvement refers to how personally relevant a topic is to an individual (Petty et al. 1981), while credibility is related to the perceived trustworthiness and expertise of a user (Schlosser 2011). We asked the following research questions:

RQ6: How does anonymity (as compared to identifiability) affect communication persuasiveness in a corporate discussion environment?

RQ7: Which role does social presence play in this context?

RQ8: How is the effect on communication persuasiveness mediated by perceived user credibility and personal involvement?

In order to answer our research questions, we followed a rigorous study design that aimed to assess actual opinion change as an indicator of persuasiveness. We simulated a corporate discussion forum – as a major part of idea evaluation and collaboration in OOP systems – and conducted a two-staged online experimental survey with 377 participants. First, we asked participants to state their opinion on a set of controversial topics. After several weeks, we re-invited the same participants and exposed them to different versions of a semi-fictional online discussion about one selected topic (executive pay) with comments from fictive colleagues. In these discussions, the discussants (1) were either represented by profile image and name or remain anonymous, and (2) either argued in favor or against a certain opinion. We evaluated our structural equation research model using PLS.

Our findings showed that anonymity is a double-edged sword. When limited on the overall impact of user anonymity, there appears to be no significant effect. When differentiated by pro and contra arguments, however, we found that identifiable users were significantly more persuasive than anonymous users in the pro conditions, whereas this effect is also observable, yet insignificant, for contra arguments. Moreover, we were able to demonstrate that perceived social presence significantly affects persuasiveness through user credibility and involvement. Anonymity significantly and negatively affected perceived social presence, which in turn affected both user involvement and user credibility. However, while higher levels of involvement lowered persuasiveness, user credibility increased it. When we controlled for the argument direction (i.e., pro or contra), our study found that identified users provoked stronger opinion changes than anonymous users, though insignificantly. Still, both user representation as well as the argument direction influence user perceptions.

Our research contributes to the sparse literature on anonymity's effect on persuasiveness (Haines et al. 2014; Rains 2007) and to research on persuasive technologies (Stibe 2015; Oinas-Kukkonen & Harjumaa 2009). While prior studies have either complimented anonymity for its positive effects on empowering users (Connolly et al. 1990; Acquisti et al. 2015) or criticized the polarization (Cho et al. 2012), our study provides a more unique, balanced view. Moreover, we are the first to illustrate the intricate relations between anonymity, perceived social presence, user credibility, and involvement. We also highlight an inherent contradiction in the ELM. Furthermore, based on our findings, practitioners might want to consider whether the potential advantages of user privacy protection outweigh the negative effects of anonymity on social presence.

In our second study on anonymity, we wanted to transfer some of the insights from the first study into a practical application. Acknowledging that anonymity can act as a double-edged sword, we conducted a study in which we aimed to leverage the potential benefits of anonymity (e.g., increased participation), while mitigating the downsides (i.e., foul language). More specifically, we posed the following research question:

> ***RQ9:*** How does a feature for optional anonymity affect participation and the choice of language in a OOP engagement?

Applying a DSR approach (Peffers et al. 2007), we designed an internal crowdsourcing system (Zuchowski et al. 2016) and implemented it at a German public organization with approximately 110 staff members, where it was used to enable employees to participate in the strategic planning of their organization. Users were able to propose, develop and vote on ideas. Our core artifact was a feature called "Opt-in anonymity," which allowed users of the website to post content anonymously when deemed necessary. Yet, by default content was posted identified by the employees' real names. After jointly gathering the system requirements with the organization's management and employee representatives, we implemented and tested the system during the course of five months. Up until the end of our test phase, 81 employees registered for the system and contributed 13 idea proposals, 20 comments and 77 likes. Our analysis was guided by the conceptual framework of anonymity in group support system by Valacich, Jessup et al. (1992), which focuses on group size, proximity and history in order to understand anonymous group communication.

Conducting a qualitative content analysis, we found not one proposal or comment that included any form of disinhibited language, such as swearwords, insults or defamation. Moreover, our survey among all employees of the organization revealed that our "opt-in anonymity" feature was overwhelmingly perceived as being effective as the vast majority

of respondents confirmed that the identity of users posting anonymously was not traceable. Nonetheless, 90% of respondents agreed that content posted anonymously was still credible. Moreover, we interviewed the managing director and the head of the worker's council of the public organization and conducted a focus group in order to gain a deeper understanding. Both revealed that our artifact was well perceived and that users contributed ideas who would not have done so previously. Thus, we argued that our artifact successfully mitigated the negative effects of anonymity, while ensuring a trusted environment for the employees of the public organization. Moreover, we were also able to solicit at least a modest rate of overall participation. However, we explored the antecedents for user acceptance of our internal crowdsourcing platform in more detail in our chapter on organizational culture and transformation.

Theoretically, our study on "opt-in anonymity" contributes to the IS literature streams on anonymity (Valacich, Jessup, et al. 1992; Wilson et al. 2012; Haines et al. 2014), trust (Teubner et al. 2014) as well as internal crowdsourcing (Zuchowski et al. 2016; Erickson et al. 2012). In particular, we were able to apply and confirm the framework of group support system anonymity by Valacich, Jessup et al. (1992) in practice. Moreover, we shed new light on the processes that guarantee social norms in organizations. That is, we suggested that the long-standing social norms and group history in the organization also contributed to the prevention of foul language (Jessup et al., 1990). In contrast to earlier studies (Diehl & Stroebe 1987; Jablin et al. 1977; Nunamaker et al. 1987), we found that the option for anonymity did not decrease peer critique. From a managerial point of view, our study provides guidance on why and how a feature for optional anonymous content contribution can be implemented. Overall, and in line with prior research (Hurley & Hult 1998; Erickson et al. 2012), our study suggests that OOP can enhance the innovativeness of an organization. In particular, our artifact at hand – "Opt-in anonymity" – activated otherwise reticent members of staff to participate in the decision-making processes of their organization.

Concluding the chapters on anonymity, we propose the following general requirements and components to enable anonymous communication in the idea generation, collaboration and evaluation phases of an OOP system in Table 13.

Table 13 Requirements and Components for Anonymity

General Requirement	Condition	Capability
	• Employees are reticent to participate in a process because they are afraid of repression from senior management or peers • Data protection laws demand anonymization	• Employees are protected against repression from senior management and colleagues • Employees' privacy is protected
General Component	• Anonymous user contributions • "Opt-in anonymity" feature for optional anonymous contributions	

9.1.5 Organizational Culture

The final part of this thesis analyzed the case of the internal crowdsourcing system for the public organization from an organizational culture and organizational transformation perspective. Organizational culture and the accompanying leadership decisions during the implementation of a system can significantly affect its adoption and use (Besson & Rowe 2012; Nevo & Wade 2010). If organizational values are in a mismatch with the values represented by the new system, users will be reluctant to or even actively resist the adoption (Cooper 1994). The implementation might result in an IT culture conflict (Leidner and Keyworth 2006). As prior research suggests that internal crowdsourcing requires a shift from hierarchical structures and fixed processes to flat hierarchies and flexible processes, there might be a mismatch with the prevailing organizational culture at the public organization (Erickson et al. 2012; Zuchowski et al. 2016; Riemer et al. 2015). Thus, we wanted to explore whether and how organizational culture affected the adoption of our internal crowdsourcing system. Specifically, we posed the following research question:

> ***RQ10:*** How does organizational culture affect the usage and acceptance of an internal crowdsourcing system?

As in the previous chapters, we apply a DSR approach by evaluating the implementation and usage of the internal crowdsourcing system at the public organization (Hevner et al.

2004; Peffers et al. 2007). We use the data from the survey, which we conducted among all employees of the public organization in order to assess user acceptance, following Venkatesh et al. (2003). We found that participants report high or very high ease of use. However, perceived usefulness and intention to use the system in the near future are at the lower end of the rate of agreement spectrum. In order to gain a better understanding how this result came about, we extended the analysis of the individual interviews (with the managing director as well as the head of the worker's council) and the focus group with senior and regular personnel of the public organization. Although users contributed 13 proposals, we found that the prevailing organizational culture inhibits a more participatory approach to decision-making transposed by our internal crowdsourcing system. The public organization only had a rudimental communal and open feedback culture in place, which – we proposed – caused an IT culture conflict (Leidner & Kayworth 2006) with the internal crowdsourcing system that promotes open information sharing and opinion exchange. Despite the aforementioned feature for anonymous content contribution, users reported that they were still afraid their own colleagues (not senior managers) might criticize them. Moreover, many employees of the organization seemed to be less tech-savvy. Despite training and support measures, this led them to discuss topics offline, which in turn resulted in a low user activity overall. We discussed a number of suggestions for improvements going forward. These included increased attention and participation by senior management, as well as more incentives for proposal contribution (Ke & Wei 2008; Leidner & Kayworth 2006; Nevo & Wade 2010; Erickson et al. 2012) and elements of gamification (Feldmann, Adam, et al. 2014; Benbya & Leidner 2016).

Our study contributes to the literature on internal crowdsourcing (Zuchowski et al. 2016) and organizational transformation (Nevo & Wade 2010). We are able to apply the theory on IT culture conflict (Erickson et al. 2012; Leidner & Kayworth 2006) in practice, proposing that such a conflict was the result of the introduction of the internal crowdsourcing system. Practitioners should be aware of the requirement to instigate a friendly and open feedback culture before implementing such systems. Our study questions whether the public organization at hand was "ready" for an OOP system as their organizational culture was in stark contrast to the approach of flat hierarchies, flexible processes and open knowledge sharing usually associated with internal crowdsourcing (Zuchowski et al. 2016). In particular, we suggest that a successful OOP implementation is somewhat of a *tightrope walk* for managers. On one hand, they should engage on the OOP system in order to act as promoters and positive examples. On the other hand, participation is a bottom approach. Thus, an OOP implementation should also be driven by lower-level employees. Still, managers could increase intrinsic (e.g., recognition and praise) as well as extrinsic motivation (e.g., monetary rewards) for their employees.

Organizational culture can be affected by the design, implementation and use of IT artifacts (Luna-Reyes et al. 2005). Thus, we conclude with requirements and components for an OOP system built to transform organizational culture in Table 14.

Table 14 Requirements and Components for Organizational Online Participation

General Requirement	**Condition**	**Capability**
	• Employees are open for feedback and share knowledge and information freely with their colleagues • Employees have new, valuable and feasible ideas to improve their organization	• Employees can propose ideas and comment on their peers' suggestions • Employees can receive rewards for their engagement
General Component	• Training, onboarding, and support for users • Reward system to provide intrinsic and extrinsic motivation to users (e.g., elements of gamification, awards, premiums or other forms of recognition) • Regular updates on the progress of the OOP process (e.g., through newsletters, etc.) • Engagement by senior management (e.g., visible through special OOP profile as well as offline)	

Note that we provide both prescriptive and descriptive information on the broader design considerations for an OOP system in the form of our success factors in Section 3 and 4, particularly in Table 4.

9.2 Propositions for Future Research

After having reviewed the contributions of this thesis, we are able to identify areas for future research along our main topics of this thesis as well as on other issues in OOP studies.

9.2.1 Rating Techniques

First, research on rating scales often built on expert committees, who set something of a "gold standard" on which crowd-based ratings were later measured against (Bao et al. 2011; Klein & Garcia 2015). However, this makes the replication of these studies very difficult. Thus, future research may establish a common idea corpus or refer to publicly available data (e.g. Amazon product reviews) in order to better enable cumulative knowledge building. This echoes calls by other researchers, who claimed that the contextual features that drive crowdsourcing are not well understood (Pedersen et al. 2013; Zuchowski et al. 2016). Moreover, we suggest that future research could investigate the impact of information cascades on the idea evaluation process (Wagenknecht, Teubner, et al. 2017). That is, we asked participants in our study on rating techniques to rate ideas in the absence of any indication on whether and how other users already rated proposals. Although other studies on rating techniques did the same (Bao et al. 2011; Riedl et al. 2010; Riedl et al. 2013; Klein & Garcia 2015; Blohm et al. 2016), another stream of research recognized that the sequence of information significantly influences evaluation results (Bikhchandani et al. 1992; Duan et al. 2009). In this sense, it could also be interesting to control for and systematically vary the level of expertise of raters in order to understand what qualifies accurate evaluators (Zuchowski et al. 2016).

9.2.2 Anonymity

Second, future research could investigate the effect of anonymity on persuasiveness in a real organizational setting. Although this would require a greater effort into understanding how employees know and like each other, the difference between anonymous and identified user representation may be even more important. Furthermore, we suggest that research could also test for different types of topics. For instance, we asked participants in our study to state their opinion on the pay ratio between executives and lower-level employees. Arguably, this is a controversial issue without an undisputable correct answer. However, on the topics of health or environment, where scientific research and public opinion agree (e.g., eat fruits, do not litter), results of our study might unfold differently (see Fogg & Tseng 1999). Especially in the pro and contra settings, there might be significant differences when an argument opposes common public and scientific opinions. Moreover, as we conducted our experimental study with a set of mainly German students, future research could also investigate cultural differences in the perception of anonymity. For instance, collectivist cultures could react differently. Moreover, elements from gamification, such as badges indicating the level of expertise, might be valuable to establish credibility, even in the absence of profile pictures (Bhattacharya & Dugar 2014; Riemer et al. 2015).

9.2.3 Organizational Culture

Third, organizational cultures vary significantly and are difficult to capture in explicit form (Jackson 2011; Leidner & Kayworth 2006). Furthermore, not all parts of an organizational culture are equally shared by all teams or members to the same amount (Jackson 2011). Although there are conceptual frameworks like the one proposed by Hurley and Hult (1998), they do not relate to IS research. Thus, one large area for future research could be the design of a more IS-related framework, which describes organizational cultures in their extent to which they are open for new systems and, more specifically, to OOP systems. Our findings in Section 8 already lend some starting points to this, such as the hierarchical structures and processes. Moreover, future research could also investigate the differences of user acceptance of OOP systems between public and private organizations. Schraeder et al. (2005) propose that decision-making in public organizations is rather autocratic, whereas private firms are more participatory and team-oriented, and policies are driven by structures and rules in public organizations, while the private sector is results-driven. Thus, public organizations in general might be less suited for internal crowdsourcing systems as they emphasize open information and opinion exchange (Erickson et al. 2012). This thesis does not provide conclusive results on this front as some OOP engagements worked in the public sphere (see the research center in Section 5), while others were arguably less successful (Section 7 and 8). Furthermore, our study in Section 8 briefly examined the effect of leadership involvement on the acceptance of OOP systems. As previous research as well as our expert interviews suggested that top management support would increase user motivation (Ke & Wei 2008; Cho et al. 2011; Leidner & Kayworth 2006; Erickson et al. 2012), future research could investigate the level and way this needs to be ensured. Up until now, it is not known how much interaction by senior managers is necessary. After all, OOP is an inclusive approach. Yet, as the managing director in the public organization examined in Section 7 and 8 only promoted the internal crowdsourcing system, but never posted any content, this might not be enough. Nonetheless, if top managers are too active, this could discourage employees to come up with original, own ideas.

9.2.4 IS Research

Fourth, on a meta-level, we also highlighted that there is only scarce research on productivity improvements, profits or sales triggered by OOP system. Although many studies highlight that organizational participation would be beneficial for both employers and employees, there is little to no IS research on such quantitative, business-related factors. Studies often only trace a time frame of less than two years. It might be too costly for researchers to go beyond such a period and, quite possibly, some OOP facilitators

could merge or discontinue their OOP efforts. Moreover, on such a long period, several external influencing factors are difficult to control for (e.g., macroeconomic fluctuations, workforce changes, etc.). Yet, in order to understand the potentials of OOP processes better, such a long-term perspective is crucial.

Furthermore, we criticized the bulk of different systems implemented by various researchers as they make the replicability for other studies very difficult. This critique is in line with Gregor & Jones (2007), who also disparaged the constant re-invention of artifacts and methods under new labels. Arguably, this is due to the high specificity of contexts in which OI processes are used in, impeding a swift generalization of models and the associated findings. Yet, as far as possible, for our studies, we built on a systems (mainly Adhocracy by Liquid Democracy) published under an open source license in order to make replication and adoption, as well as further development, by other scholars and practitioners easier.

9.3 Summary

In this thesis, we studied conditions, capabilities and components for the design of OOP systems based on the literature on OP, OI and internal crowdsourcing applying a DSR approach. Following an extensive literature review on idea generation, collaboration and evaluation in organizational open innovation processes, we outlined success factors for system quality, information quality, service quality, system use, user satisfaction and net benefits. In order to reflect the findings from research on open innovation better, we extended the D&M IS Success Model by the two constructs of user characteristics (e.g., personality, knowledge and network position) as well as system design (e.g. features for collaboration and evaluation). Thereafter, we validated our success factors in practice by conducting semi-structured interviews with 20 senior experts from mid- and large-cap private and public organizations in Germany. In effect, we were able to corroborate and extend our success factors. Moreover, based on both the literature review as well as the expert interviews, we derived three key challenges for research and practice in OOP – improving rating techniques, handling anonymous user communication as well as understanding the effect of organizational culture.

First, we investigate the BOL approach, a novel rating technique, and compare it to the standard techniques Likert scales and up- and down-voting. Our study with 141 participants in a strategic employee participation process at a public-private research organization found that BOL is perceived as more frustrating than the other two rating techniques. This effect was mediated by the significantly increased levels of perceived information overload. Yet, BOL neither significantly increased evaluation time nor participation. Second, we turned to anonymity in two studies. We began by analyzing the effect of anonymity, as compared to identifiability of user profiles, on communication persuasiveness – operationalized as actual opinion change – in a two-staged online experimental survey with 377 participants. We found anonymity to be a double-edged sword as it decreases perceived social presence, which in turn affects both user involvement as well as perceived user credibility. Thereafter, we turned to the practical side by investigating how a feature for optional anonymous contributions affects participation and the choice of language in an internal crowdsourcing platform. Our analysis of an implementation and five-month test at a public organization with 81 registered employees showed the effectiveness of our IT artifact, “opt-in anonymity,” as we elicited moderate participation and no disinhibited language. Third, we analyzed the internal crowdsourcing system at the public organization in more detail, focusing on the influence of its organizational culture on usage and acceptance. We found an IT culture conflict as the organizational values did not match the open and communal approach transposed by the internal crowdsourcing system.

In conclusion, this thesis will contribute to research on OI and internal crowdsourcing as it identified hurdles, proposed and tested solutions for idea generation, collaboration and evaluation. We suggested that information systems could enhance employee participation, which in turn drives innovations and organizational culture transformation. Nevertheless, there are many remaining open questions for future research, which should investigate the benefits and tradeoffs of OOP over time.

Appendix

Appendix A

Table 15 Literature Review

	. Publications by context, source, DS IT artifact (FS = Full System, ME = Method, PR = Principle, MO = Model), open innovation task, target variable, and methodology																			
		Context			**Sources**				**OI task**			**Target var.**			**Methodology**					
		Academic	Corporate	Public	Experts	Internal	External	DS IT artifact	Generation	Collaboration	Evaluation	Idea Quality	Efficiency	Motivation	Framework	Review	Empirical	Survey	Math. Model	Interview
1	Adamczyk et al. 2012	◐	◐	◐	◐	◐	◐		●	●	●					●				
2	Bailey and Horvitz 2010		●		●	●		FS	●	●	●	●		●			●			●
3	Bao et al. 2011	●					●	ME			●	●		◐			●			
4	Bayus 2013		●				●	FS	●	◐		●		◐			●			
5	Björk and Magnusson 2009		●				●		◐	●	◐	●					●			●
6	Blohm et al. 2010		●		◐		●	ME	●	●		◐		●			●			
7	Blohm et al. 2011	●			◐		●	ME			●	●		●			●	●		
8	Boudreau et al. 2011		●	●			●		●	◐				●			●			
9	Bullinger et al. 2010			●			●		●	●		●		●			●	●		●
10	Ciriello et al. 2016		●			●		ME			●	◐	◐		●					●
11	Dean et al. 2006	●			◐		◐	PR			●	●			●					
12	Feldmann et al. 2014	●	●			◐	●			●	●	●		●			●			
13	Görs et al. 2012	●					●	ME			●	●	●	●			●		●	
14	Horton et al. 2016	●	◐				●	PR			●	●					◐	◐	●	
15	Hrastinski et al. 2010		●	●		●	●		●	●	●	◐	◐	◐	◐	●				
16	Hutter et al. 2011		●				●		●	●	◐	●		◐			●	●		
17	Jung et al. 2010	●					●	ME	●	●		◐		●			●			
18	Kathan et al. 2015		●				●	FS	●	●		●		◐			●			
19	Klein and Garcia 2015	●	●		◐	●		ME			●	●	●				●			
20	Kornish and Ulrich 2011	●					●		●			●	●				●			
21	Kristensson et al. 2004		●		●	●	●		●			●					●			
22	Lauto and Valentin 2016		●			●					●	●					●			
23	Lee and Seo 2013		●				●			◐	●	●		●			●			
24	Leimeister et al. 2009		●		◐		●	FS	●	●	●	●		●	◐		●	●		
25	Luo and Toubia 2015	●					●	PR	●		◐	●		●			●	◐		
26	Magnusson et al. 2014	●			●						●	●					●			
27	Muller et al. 2013		●			●		FS	●	●	●	◐		●			●			

28	Natalicchio et al. 2014	●	●	●	●	●	●		●	●	●	●		●		●				
29	Pashkina and Indulska 2011		●				●	MO	●			◐	◐	◐	●					
30	Pedersen et al. 2013	◐	◐	◐	◐	◐	◐		◐	◐	◐	◐	◐	◐		●				
31	Piller and Walcher 2006		●		◐		●	FS	◐		●	●					●			◐
32	Poetz and Schreier 2012		◐	◐					●		◐	●					◐			
33	Riedl et al. 2013	●	◐		◐		●	ME			●	●	●				●			
34	Riedl et al. 2010	●	●		◐		●	ME			●	●		●			●	◐		
35	Sawhney et al. 2005		●			●			●	●	◐	◐		◐			●			
36	Scheiner 2015			●			●	FS	●	●	●			●			●	●		●
37	Siemon et al. 2016	●					●	FS	●		◐	●		●			●	●		
38	Soukhoroukova et al. 2012		●		◐	●		FS	●	●	●	●	●	◐			●			
39	Stieglitz and Hassannia 2016		●			●	●		◐		●	●		●			●			
40	Terwiesch and Xu 2008	●					●	PR	◐		◐	●		●					●	
41	Toubia 2006	●					●	MO	●					●			●			
42	Toubia and Flores 2007	●	◐				●	ME			●	●	◐				◐		●	
43	Walter and Back 2013	●		●	●		●	ME			●	●	◐		◐		●			
44	Walter and Back 2011		●	●			●			●	●	●		●	●		●			
45	West and Bogers 2013	●	●	●			●		●	●	●	●		●		●				
46	Wu and Fang 2010		●				●		●	●				●			●	●		
47	Xu and Bailey 2012		●				●	MO			●	●					◐		◐	
48	Yu and Nickerson 2011	●					●	ME	●	◐	◐	●					●			
49	Yücesan 2013	●					●	MO			●		●						●	
50	Zimmerling et al. 2016		●		◐	●		FS	◐	◐	●			●				●		●

Appendix B

Stimulus material (Survey)

This is the translated version of the texts presented to our participants. The first three comments belong to the pro arguments, the last three to the contra side.

Introduction

Imagine you are an employee in an international company with multiple locations and businesses in different industries. Your company has decided to invite all its employees to a participatory engagement to better integrate them in the decision-making process. For this, a company-wide discussion forum has been set up, in which everyone can express themselves freely on certain issues. You will see various questions that the company that the company is asking the employees to discuss. Please read everything carefully! We care for your personal opinion. Please take the time and fill out the questionnaire conscientiously. If you wish to participate in the lottery, please provide your e-mail address at the end of this questionnaire. The address is only used for notification for the lottery. Your data will be kept strictly confidential and will not be shared with third parties.

Topic Description

The US Securities and Exchange Commission (SEC) will require listed companies to disclose their so-called “Pay Ratio” (i.e., the ratio between the pay of the CEO and the average employee). Salary differences should be visible in the financial reports. A study in 2013 found that large corporations payed their CEOs, on average, 296 times as much as their ordinary workforce. So far, only the salaries of the board members are public. Most companies did not disclose how much an ordinary employee earned.

⟶ Should our company disclose the salary differences between management and the regular workforce?

Comment 1 (pro)

If salaries are openly discussed, the pressure to justify the high salary of the management will rise. As can be seen in Sweden, where almost complete payroll and tax transparency prevails, information alone can already serve as a huge corrective function. Therefore, our company should disclose the pay differences too.

Comment 2 (pro)

The countries with the happiest people are those with the highest (social) redistribution. The SEC's move is a first important step towards more justice and curbed unbridling greed. An extension of the information towards a "Pay Ratio" would be desirable which is why our company should publish salary differences too.

Comment 3 (pro)

Whoever makes money with honest performance, does not need to be afraid of publication. A publication of salary differences could even help to unravel tax secrecy and avoid tax fraud. Thus, such a policy can only help to increase transparency and openness.

Comment 4 (contra)

In Germany, as well as in the US, executive salaries are published anyway. Since in any large enterprise somebody will receive only the minimum wage, the informative value added by the pay ratio is rather limited. It's just about symbolism. To me, € 20 million salary p.a. seems to be more startling than the fact that the boss earns 296 times more than anyone else in the company. For me, the additional disclosure of the pay ratio is not necessary.

Comment 5 (contra)

It is true that fiscal-political redistribution in developed economies correlates with the average life satisfaction (implicit redistribution through the provision of public goods!). But it is also true that the Gini coefficient of income also correlates with the average life satisfaction if taken as a control variable into an international panel regression. Therefore, balance is crucial. Our company should refrain from publication because the salary differences do not explain the true inequalities.

Comment 6 (contra)

After disclosure, many workers would be upset even more than they are right now. And what does it change about the most fundamental problem of inequality? Nothing.

Appendix C

Figure 20 User Images

Appendix D

Measurement Items

Construct	Item	Adapted from
Perceived Anonymity (PA)	I can't identify the discussion participants.	Sosik et al. 1998
	The discussion participants appear anonymous.	
	The identity of the discussion participants is hidden.	
Perceived Social Presence (PSP)	With regard to this discussion, I have a sense of sociability.	Gefen and Straub 2004
	With regard to this discussion, I have a feeling of human sensitivity.	
	I have the feeling that the participants in this discussion are human.	
Perceived User Credibility (PUC)	The discussion participants are credible.	Schlosser 2011
	The discussion participants are knowledgeable.	
	The discussion participants are reliable.	
Personal Involvement (PI)	The topic of the discussion interests me personally.	Petty et al. 1981
	The subject of the discussion concerns me personally.	
	The topic in the discussion is personally relevant to me.	
Communication Persuasiveness (PI)	*This construct represents the main dependent variable and is operationalized as the absolute difference between stated agreement in t=1 and t=2 (both measured on 11-point Likert scales).*	—

Note: The constructs PA, PSP, PUC, and PI are reflective and are measured on 7-point Likert scales.

All but the dependent variable (communication persuasiveness, operationalized by "opinion change," i.e., the difference between stated agreement in t=1 and t=2) are measured as reflective variables (perceived social presence, perceived user credibility, personal involvement, perceived anonymity). We discern that indicators do not represent the defining characteristics of the construct but rather some (of many more possible) manifestations. Changes in the constructs are hence expected to affect the indicators. Indicators share a common theme and are conceptualized in a purposeful redundant manner. Eliminating an indicator is hence not expected to alter the conceptual domain of the construct. For all used constructs the following properties hold: i) causality flows from the construct to the indicators and not vice versa (e.g., "With regard to this discussion, I have a sense of sociability." Hence, the discussion does not convey a high degree of social presence because a participant perceives a sense of sociability (social presence can in fact have other roots) but rather: If the discussion in fact conveys social presence, this will affect the participant's perception of sociality. The same reasoning holds for the other constructs alike); ii) The indicators are in fact interchangeable (please refer to Table A1 in the Appendix. The items of all constructs vary semantically only in terms of few verbs or adjective, which have synonymous meaning: e.g., "sociability/ human sensitivity/ human"; "can't identify/ appear anonymous/ identity is hidden"); iii) Based on the argument on interchangeability, we can expect that the items will covary with each other. In fact, the reliability measures suggest that there occur high levels of correlation between the items.

References

Acquisti, A., Brandimarte, L. & Loewenstein, G., 2015. Privacy and Human Behaviour in the age of Information. *Science*, 347(6221), pp.509–514.

Adamczyk, S., Bullinger, A.C. & Möslein, K.M., 2012. Innovation Contests: A Review, Classification and Outlook. *Creativity and Innovation Management*, 21(4), pp.335–360.

van Aken, J.E., 2004. Management research on the basis of the design paradigm: The quest for field-tested and grounded technological rules. *Journal of Management Studies*, 41(2), pp.219–246.

Andrews, J.C. & Shimp, T.A., 1990. Effects of involvement, argument strength, and source characteristics on central and peripheral processing of advertising. *Psychology & Marketing*, 7(3), pp.195–214.

Argyle, M. & Dean, J., 1965. Eye-contact, distance and affiliation. *Sociometry*, 28(3), pp.289–304.

Arnold, K.A. et al., 2007. Transformational leadership and psychological well-being: The mediating role of meaningful work. *Journal of Occupational Health Psychology*, 12(3), pp.193–203.

Australian Council of Professors and Heads of Information Systems (ACPHIS), 2013. *Recommended IS Conferences*, Accessed January 4th, 2018: http://www.acphis.org.au/v2wp/recommended-is-conferences/.

Bagozzi, R.P. & Yi, Y., 1988. On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, 16(1), pp.74–94.

Bailey, B.P. & Horvitz, E., 2010. What's your idea? A case study of a grassroots innovation pipeline within a large software company. In *Proceedings of the 28th Annual Conference on Human Factors in Computing Systems (CHI 2010)*. Atlanta, USA pp. 2065–2074.

Baltes, B.B. et al., 2002. Computer-Mediated Communication and Group Decision Making: A Meta-Analysis. *Organizational Behavior and Human Decision Processes*, 87(1), pp.156–179.

Bao, J., Sakamoto, Y. & Nickerson, J. V., 2011. Evaluating Design Solutions Using Crowds. In *Proceedings of the 17th Americas Conference on Information Systems (AMCIS 2011)*. Detroit, USA, Paper 446.

Baskerville, R. & Pries-Heje, J., 2010. Explanatory Design Theory. *Business & Information Systems Engineering*, 2(5), pp.271–282.

Bayus, B.L., 2013. Crowdsourcing New Product Ideas over Time: An Analysis of the Dell IdeaStorm Community. *Management Science*, 59(1), pp.226–244.

Beaudry, A. & Pinsonneault, A., 2005. Understanding user responses to information technology: a coping model of user adaptation. *MIS Quarterly*, 29(3), pp.493–524.

Behrendt, S., Richter, A. & Trier, M., 2014. Mixed methods analysis of enterprise social networks. *Computer Networks*, 75(B), pp.560–577.

Benbya, H. & Leidner, D., 2016. Harnessing Employee Innovation in Internal Crowdsourcing Platforms : Lessons from Allianz UK. In *Proceedings of the 37th International Conference on Information Systems (ICIS 2016)*. Dublin, Ireland, pp.1–19.

Besson, P. & Rowe, F., 2012. Strategizing information systems-enabled organizational transformation: A transdisciplinary review and new directions. *Journal of Strategic Information Systems*, 21(2), pp.103–124.

Bhattacharya, H. & Dugar, S., 2014. Partnership formation: The role of social status. *Management Science*, 60(5), pp.1130–1147.

Bhattacherjee, A. & Sanford, C., 2006. Influence Processes for Information Technology Acceptance: An Elaboration Likelihood Model. *MIS Quarterly*, 30(4), pp.805–825.

Bikhchandani, S., Hirshleifer, D. & Welch, I., 1992. A Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascades. *Journal of Political Economy*, 100(5), pp.992–1026.

Bjelland, O.M. & Wood, R.C., 2008. An Inside View of IBM's "Innovation Jam." *MIT Sloan Management Review*, 50(50101), pp.32–40.

Björk, J. & Magnusson, M., 2009. Where do good innovation ideas come from? Exploring the influence of network connectivity on innovation idea quality. *Journal of Product Innovation Management*, 26(6), pp.662–670.

Blasio, P. Di & Milani, L., 2008. Computer-mediated communication and persuasion : Peripheral vs . central route to opinion shift. *Computers in Human Behavior*, 24, pp.798–815.

Blohm, I. et al., 2010. Does Collaboration among Participants Lead to Better Ideas in IT-based Idea Competitions? An Empirical Investigation. In *Proceedings of the 43rd Hawaii International Conference on System Sciences (HICSS 2010)*. Koloa, USA, pp. 1–10.

Blohm, I. et al., 2011. Idea Evaluation Mechanisms for Collective Intelligence in Open Innovation Communities: Do Traders Outperform Raters? In *Proceedings of the 32nd International Conference on Information Systems (ICIS 2011)*. Shanghai, China, pp. 1–24.

Blohm, I. et al., 2016. Rate or Trade? Identifying Winning Ideas in Open Idea Sourcing. *Information Systems Research*, 27(1), pp.27–48.

Bock, L., 2016. *Work Rules!: Insights from Inside Google That Will Transform How You Live and Lead*, Hachette: Hodder and Stoughton.

Bonin, H., Gregory, T. & Zierahn, U., 2015. Übertragung der Studie von Frey / Osborne (2013) auf Deutschland. *Working Paper*. Mannheim: Zentrum für Europäische Wirtschaftsforschung.

Boudreau, K.J., Lacetera, N. & Lakhani, K.R., 2011. Incentives and Problem Uncertainty in Innovation Contests: An Empirical Analysis. *Management Science*, 57(5), pp.843–863.

Brinol, P., McCaslin, M.J. & Petty, R.E., 2012. Self-generated persuasion: Effects of the target and direction of arguments. *Journal of Personality and Social Psychology*, 102(5), pp.925–940.

Brynjolfsson, E. & McAfee, A., 2017. *Machine, Platform, Crowd: Harnessing the Digital Revolution*, New York: Norton & Company.

Bullinger, A.C. et al., 2010. Community-based innovation contests: Where competition meets cooperation. *Creativity and Innovation Management*, 19(3), pp.290–303.

Bundesagentur für Arbeit, 2017. *Fachkräfteengpassanalyse*, Nürnberg: Bundesagentur für Arbeit.

Cappelli, P., 2014. *Skills Gaps, Skill Shortages and Skill Mismateches: Evidence from the US*. Cambrigde, MA: National Bureau of Economic Research. Accessed January 4th, 2018: http://www.nber.org/papers/w20382.

Carnall, C.A., 1982. Semi-autonomous work groups and the social structure of the organization. *Journal of Management Studies*, 19(3), pp.277–294.

Cha, K.J., Hwang, T. & Gregor, S., 2015. An integrative model of IT-enabled organizational transformation. *Management Decision*, 53(8), pp.1755–1770.

Chaiken, S., 1980. Heuristic Versus Systematic Information Processing and the Use of Source Versus Message Cues in Persuasion. *Journal of Personality and Social Psychology*, 39(5), pp.752–766.

Charness, G. & Gneezy, U., 2008. What's in a name? Anonymity and social distance in dictator and ultimatum games. *Journal of Economic Behavior & Organization*, 68(1), pp.29–35.

Chesbrough, H.W., 2006. Open Innovation: A New Paradigm for Understanding Industrial Innovation. In H. W. Chesbrough, W. Vanhaverbeke, & J. West, eds. *Open Innovation: Researching a New Paradigm*. Oxford: Oxford University Press, pp. 1–14.

Chesbrough, H.W., 2003. *Open Innovation: The New Imperative for Creating and Profiting from Technology.* Cambridge, MA: Harvard Business School Press.

Cheung, C.M.-Y., Sia, C.-L. & Kuan, K.K.Y., 2012. Is This Review Believable? A Study of Factors Affecting the Credibility of Online Consumer Reviews from an ELM Perspective. *Journal of the Association for Information Systems*, 13(8), pp.618–635.

Chin, W.W., 1998. The partial least squares approach to structural equation modeling. *Modern Methods for Business Research*, 295(2), pp.295–336.

Cho, D. & Kim, S., 2012. Empirical analysis of online anonymity and user behaviors: The impact of real name policy. In *Proceedings of the 45th Hawaii International Conference on System Science (HICSS 2012)*. Maui, USA, pp. 3041–3050.

Cho, J., Park, I. & Michel, J.W., 2011. How Does Leadership Affect Information Systems Success? The Role of Transformational Leadership. *Information & Management*, 48(7), pp.270–277.

Cialdini, R.B. et al., 1999. Compliance With a Request in Two Cultures : The Differential Influence of Social Proof and Commitment / Consistency on Collectivists and Individualists. *Personality and Social Psychology Bulletin*, 25(10), pp.1242–1253.

Cialdini, R.B., 2001. Harnessing the Science of Persuasion. *Harvard Business Review*, 79(9), pp.72–81.

Cialdini, R.B., 1993. *Influence: The Psychology of Persuasion*, New York: Morrow.

Cialdini, R.B., 1984. *The Psychology of Persuasion*, New York: Morrow.

Ciriello, R.F., Richter, A. & Schwabe, G., 2016. Designing an Idea Screening Framework for Employee-driven Innovation. In *Proceedings of the 49th Hawaii International Conference on System Sciences (HICSS 2016)*. Kauai, USA, pp. 4262–4271.

Clark, R.C. & Mayer, R.E., 2011. *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning*, New York: John Wiley & Sons.

Clauset, A., Newman, M.E.J. & Moore, C., 2004. Finding community structure in very large networks. *Working Paper*. Accessed January 4th, 2018: https://arxiv.org/abs/cond-mat/0408187.

Connolly, T., Jessup, L.M. & Valacich, J.S., 1990. Effects of Anonymity and Evaluative Tone on Idea Generation in Computer-mediated Groups. *Management Science*, 36(6), pp.689–703.

Cooper, B., 1994. The inertial impact of culture on IT implementation. *Information & Management*, 27, pp.17–31.

Corbin, J. & Strauss, A., 2008. *Basics of qualitative research: techniques and procedures*

for developing grounded theory. 2008, New York: Sage Publications.

Cremer, R.D. et al., 2015. *Academic Journal Guide*, Accessed January 4th 2018: https://charteredabs.org/academic-journal-guide-2015/.

Csikszentmihalyi, M., 1977. *Beyond Boredom and Anxiety*, San Francisco: Jossey-Bass.

Cyr, D. et al., 2009. Exploring Human Images in Website Design: A Multi-Method Approach. *MIS Quarterly*, 33(3), pp.539–566.

Cyr, D. et al., 2007. The role of social presence in establishing loyalty in e-service environments. *Interacting with Computers*, 19(1), pp.43–56.

Dachler, H.P. & Wilpert, B., 1978. Conceptual dimensions and boundaries of participation in organizations: A critical evaluation. *Administrative Science Quarterly*, 23(1), pp.1–39.

Davison, R. & Martinsons, M.G., 2002. Empowerment or enslavement ? A case of process-based organisational change in Hong Kong. *Information Technology & People*, 15(1), pp.42–59.

Dean, D.L. et al., 2006. Identifying Quality, Novel, and Creative Ideas: Constructs and Scales for Idea Evaluation. *Journal of the Association for Information Systems*, 7(10), pp.646–699.

Deci, E.L. & Ryan, R.M., 2003. Intrinsic Motivation Inventory. Accessed January 4th 2018: http://www.psych.rochester.edu/SDT/ measures/intrins.html.

Delone, W.H. & McLean, E.R., 2003. The DeLone and McLean Model of Information Systems Success : A Ten-Year Update. *Journal of Management Information Systems*, 19(4), pp.9–30.

DeLone, W.H. & McLean, E.R., 1992. Information Systems Success: The Quest for the Dependent Variable. *Information Systems Research,*, 3(1), pp.60–95.

Dennis, A.R., 1996. Information Exchange and Use in Small Group Decision Making. *Small Group Research*, 27(4), pp.532–550.

Dennis, A.R., Valacich, J.S. & Nunamaker, J.F., 1990. An experimental investigation of the effects of group size in an electronic meeting environment. *IEEE Transactions on Systems, Man, and Cybernetics*, 20(5), pp.1049–1057.

Deshpande, R. & Webster, F.E., 1989. Organizational Culture and Marketing : Defining the Research Agenda. *Journal of Marketing*, 53(1), pp.3–15.

Diehl, M. & Stroebe, W., 1987. Productivity loss in brainstorming groups: Toward the solution of a riddle. *Journal of Personality and Social Psychology*, 53(3), pp.497–509.

Druckman, J.N., 2001. Using credible advice to overcome framing effects. *Journal of Law, Economics, and Organization*, 17(1), pp.62–82.

Duan, W., Gu, B. & Whinston, A.B., 2009. Informational Cascades and Software Adoption on the Internet: An Empirical Investigation. *MIS Quarterly*, 33(1), pp.23–48.

Duarte, J., Siegel, S. & Young, L., 2012. Trust and credit: The role of appearance in peer-to-peer lending. *Review of Financial Studies*, 25(8), pp.2455–2483.

Dunham, B., 2011. The role for signaling theory and receiver psychology in marketing. In G. Saad, ed. *Evolutionary Psychology in the Business Sciences*. Springer: Heidelberg, pp. 225–256.

Eagly, A.H. & Chaiken, S., 1993. *The Psychology of Attitudes*, Harcourt: New York.

Ebner, W., Leimeister, J.M. & Krcmar, H., 2009. Community engineering for innovations: the ideas competition as a method to nurture a virtual community for innovations. *R&D Management*, 39(4), pp.342–356.

Eckhardt, A., Maier, C. & Buettner, R., 2012. The Influence of Pressure to Perform and Experience on Changing Perceptions and User Performance: A Multi-Method Experimental Analysis. *Proceedings of the 33rd International Conference on Information Systems (ICIS 2012)*. Orlando, USA, pp.1–12.

Eden, C. & Ackermann, F., 2014. "Joined-Up" Policy-Making: Group Decision and Negotiation Practice. *Group Decision and Negotiation*, 23(6), pp.1385–1401.

Erickson, L.B., Trauth, E.M. & Petrick, I., 2012. Getting Inside Your Employees' Heads: Navigating Barriers To Internal- Crowdsourcing for Product and Service Innovation. In *Proceedings of the 33rd International Conference on Information Systems (ICIS 2012)*. Orlando, USA, pp. 1–11.

Feldmann, N., Gimpel, H., et al., 2014. Idea Assessment via Enterprise Crowdfunding: An empirical analysis of decision-making styles. In *Proceedings of the 22nd European Conference on Information Systems (ECIS 2014)*. Tel Aviv, Israel, pp. 1–10.

Feldmann, N. et al., 2013. Using crowd funding for idea assessment inside organizations: Lessons learned from a market engineering perspective. In *Proceedings of the 3rd IEEE International Conference on Social Computing and Its Applications (SCA 2013)*. Karlsruhe, Germany, pp. 525–530.

Feldmann, N., Adam, M. & Bauer, M., 2014. Using serious games for idea assessment in service innovation. In *Proceedings of the 22nd European Conference on Information Systems (ECIS 2014)*. Tel Aviv, Israel, pp. 1–17.

Ferguson, C.J., 2009. An effect size primer: A guide for clinicians and researchers. *Professional Psychology: Research and Practice*, 40(5), pp.532–538.

Festinger, A. & Metzger, M.J., 1952. Some consequences of de-individuation in a group. *Journal of Abnormal and Social Psychology*, 47(2), pp.382–389.

Fisher, R. & Ury, W.L., 1983. *Getting to yes: Negotiating agreement without giving in*, New York: Penguin.

Flanagin, A.J. & Metzger, M.J., 2000. Perceptions of Internet information credibility. *Journalism & Mass Communication*, 77(3), pp.515–540.

Flanagin, A.J. & Metzger, M.J., 2007. The role of site features, user attributes, and information verification behaviors on the perceived credibility of web-based information. *New Media & Society*, 9(2), pp.319–342.

Fogg, B.J. et al., 2001. What makes Web sites credible? A report on a large quantitative study. In *Proceedings of the International Conference on Human Factors in Computing Systems (CHI 2001)*. Seattle, Washington pp. 61–68.

Fogg, B.J. & Tseng, H., 1999. The Elements of Computer Credibility. *Proceedings of the International Conference on Human Factors in Computing Systems (CHI 99)*, Pittsburgh, USA, pp.80–87.

Fornell, C. & Larcker, D.F., 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), pp.39–50.

Fortin, D. & Dholakia, R., 2005. Interactivity and vividness effects on social presence and involvement with a Web-based advertisement. *Journal of Business Research*, 58(3), pp.387–396.

Franke, N. & Piller, F.T., 2004. Value Creation by Toolkits for User Innovation and Design: The Case of the Watch Market. *Journal of Product Innovation Management*, 21(6), pp.401–415.

Frey, C.B. & Osborne, M.A., 2013. The Future of Unemployment: How susceptible are jobs to computerisation?, *Working Paper*. Accessed January 5th 2018: https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf

Fuchs, C. & Schreier, M., 2011. Customer empowerment in new product development. *Journal of Product Innovation Management*, 28(1), pp.17–32.

Galletta, D.F. et al., 2004. Web site delays: How tolerant are users? *Journal of the Association for Information Systems*, 5(1), pp.1–28.

Di Gangi, P.M. & Wasko, M., 2009. Steal my idea! Organizational adoption of user innovations from a user innovation community: A case study of Dell IdeaStorm. *Decision Support Systems*, 48(1), pp.303–312.

Gassmann, O., Enkel, E. & Chesbrough, H., 2010. The future of open innovation. *R&D*

Management, 40(3), pp.213–221.

Gefen, D., 2000. E-commerce: The role of familiarity and trust. *Omega*, 28(6), pp.725–737.

Gefen, D. & Straub, D.W., 2004. Consumer trust in B2C e-Commerce and the importance of social presence: Experiments in e-Products and e-Services. *Omega*, 32(6), pp.407–424.

Gefen, D., Straub, D.W. & Boudreau, M.-C., 2000. Structural equation modeling and regression: Guidelines for research practice. *Communications of the Association for Information Systems*, 4(1), pp.1–77.

Gordon, S. et al., 2008. Improving the Front End of Innovation with Information Technology. *Research Technology Management*, 53(1), pp.50–58.

Görs, J., Horton, G. & Kempe, N., 2012. A Collaborative Algorithm for Computer-Supported Idea Selection in the Front End of Innovation. In *Proceedings of the 45th Hawaii International Conference on System Sciences (HICSS 2012)*. Maui, USA, pp. 217–226.

Graham, J.R., Harvey, C.R. & Puri, M., 2016. A corporate beauty contest. *Management Science*, in press.

Gregor, S. et al., 2006. The transformational dimension in the realization of business value from information technology. *Journal of Strategic Information Systems*, 15(3), pp.249–270.

Gregor, S. & Hevner, A.R., 2013. Positioning and Presenting Design Science Research for Maximum Impact. *MIS Quarterly*, 37(2), pp.337–355.

Gregor, S. & Jones, D., 2007. The anatomy of a design theory. *Journal of the Association for Information Systems*, 8(5), pp.312–335.

Gressgård, L.J. et al., 2014. Use of information and communication technology to support employee-driven innovation in organizations: A knowledge management perspective. *Journal of Knowledge Management*, 18(4), pp.633–650.

Haas, M., 2012. Direkte Partizipation abhängig Beschäftigter. Konzept, organisatorische Realisierung und die Wirkung auf Arbeitszufriedenheit und Gesundheitsressourcen, *Working Paper*. WZB Discussion Paper SP, 2012-302.

Haines, R. et al., 2014. Anonymity in Computer-Mediated Communication: More Contrarian Ideas with Less Influence. *Group Decision Making and Negotiations*, 23(4), pp.765–786.

Haines, R. & Mann, J.E.C., 2011. A new perspective on de-individuation via computer-mediated communication. *European Journal of Information Systems*, 20(2), pp.156–167.

Hassanein, K. & Head, M., 2007. Manipulating perceived social presence through the web interface and its impact on attitude towards online shopping. *International Journal of Human-Computer Studies*, 65(8), pp.689–708.

Hawlitschek, F., Teubner, T. & Weinhardt, C., 2016. Trust in the Sharing Economy. *Die Unternehmung*, 70(1), pp.26–44.

Hernández-Ortega, B., 2018. Don't believe strangers: Online consumer reviews and the role of social psychological distance. *Information & Management*, 55(1), pp. 31-50.

Hess, T., Fuller, M. & Campbell, D., 2009. Designing Interfaces with Social Presence : Using Vividness and Extraversion to Create Social Recommendation Agents. *Journal of the Association for Information Systems*, 10(12), pp.889–919.

Hevner, A.R. et al., 2004. Design Science in Information Systems Research. *MIS Quarterly*, 28(1), pp.75–105.

Hiltz, S.R., Turoff, M. & Johnson, K., 1989. Experiments in group decision making, 3: disinhibition, deindividuation, and group process in pen name and real name computer conferences. *Decision Support Systems*, 5(2), pp.217–232.

Von Hippel, E., 2005. *Democratizing Innovation*, Cambridge, MA: MIT Press.

Von Hippel, E., 1986. Lead Users: A Source of Novel Product Concepts. *Management Science*, 32(7), pp.791–805.

Ho, S.Y. & Bodoff, D., 2014. The Effects of Web Personalization on User Attitude and Behavior: an Integration of the Elaboration Likelihood Model and Consumer Search Theory. *MIS Quarterly*, 38(2), pp.497–520.

Hofstede, G., 1980. Motivation, leadership, and organization: Do American theories apply abroad? *Organizational Dynamics*, 9(1), pp.42–63.

Horton, G., Goers, J. & Knoll, S.W., 2016. How Not to Select Ideas for Innovations: A Critique of the Scoring Method. In *Proceedings of the 49th Hawaii International Conference on System Sciences (HICSS 2016)*. Kauai, USA, pp. 237–246.

Hossain, M. & Islam, K.M.Z., 2015. Ideation through Online Open Innovation Platform: Dell IdeaStorm. *Journal of the Knowledge Economy*, 6(3), pp.611–624.

Hovland, C.I., Janis, I.L. & Kelley, H.H., 1953. *Communication and Persuasion—Psychological Studies of Opinion Change*, New Haven: Yale University Press.

Hrastinski, S. et al., 2010. A review of technologies for open innovation: Characteristics and future trends. In *Proceedings of the 43rd Hawaii International Conference on System Sciences (HICSS 2010)*. Koloa, USA, pp. 1–10.

Hurley, R.F. & Hult, G.T.M., 1998. Innovation , Market Orientation , and Organizational Learning : An Integration and Empirical Examination. *Journal of Marketing*, 62(3),

pp.42–54.

Hutter, K. et al., 2011. Communitition: The Tension between Competition and Collaboration in Community-Based Design Contests. *Creativity and Innovation Management*, 20(1), pp.3–21.

Hwang, Y. & Yi, M.Y., 2002. Predicting the Use of Web-Based Information Systems: Intrinsic Motivation and Self-Efficacy. In *Proceedings of the 8th Americas Conference onf Information Systems (AMCIS 2002)*. Dallas, USA, pp. 1076–1081.

Iivari, N., 2005. The Role of Organizational Culture in Organizational Change - Identifying a Realistic Position for Prospective IS Research. In *Proceedings of the 13th European Conference on Information Systems (ECIS 2005)*. Regensburg, Germany, Paper 46.

Jablin, F.M., Seibold, D.R. & Sorenson, R.L., 1977. Potential inhibitory effects of group participation on brainstorming performance. *Communication Studies*, 28(2), pp.113–121.

Jackson, S., 2011. Organizational culture and information systems adoption: A three-perspective approach. *Information and Organization*, 21(2), pp.57–83.

Jessup, L.M., Connolly, T. & Galegher, J., 1990. The Effects of Anonymity on GDSS Group Process With an Idea-Generating Task. *MIS Quarterly*, 14(3), pp.313–321.

Jessup, L.M. & Tansik, D.A., 1991. Group Problem Solving in an Automated Environment: The Effects of Anonymity and Proximity on Group Process and Outcome with a Group Decision Support System. *Decision Sciences*, 22(2), pp.266–279.

Jiang, Z.J., Heng, C.S. & Choi, B.C.F., 2013. Privacy Concerns and Privacy-Protective Behavior in Synchronous Online Social Interactions. *Information Systems Research*, 24(3), pp.579–595.

Jones, K. & Leonard, L.N.K., 2008. Trust in consumer-to-consumer electronic commerce. *Information & Management*, 45(2), pp.88–95.

Jørgensen, H.-H., Bruehl, O. & Franke, N., 2014. *Making Change Work*, IBM Institute for Business Value. Accessed January 4th 2018: https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?subtype=XB&infotype=PM&appname=GBSE_GB_TI_USEN&htmlfid=GBE03618USEN.

Jung, J.H., Schneider, C. & Valacich, J., 2010. Enhancing the Motivational Affordance of Information Systems: The Effects of Real-Time Performance Feedback and Goal Setting in Group Collaboration Environments. *Management Science*, 56(4), pp.724–742.

Kahneman, D. & Tversky, A., 1979. Prospect Theory: An analysis of decisions under

risk. *Econometrica*, 47(2), pp.263–291.

Kamis, A., Koufaris, M. & Stern, T., 2008. Management Information Systems Research Center, University of Minnesota. *MIS Quarterly*, 32(1), pp.159–177.

Karmarkar, U.R. & Tormala, Z.L., 2010. Believe me, I have no idea what I'm talking about: The effects of source certainty on consumer involvement and persuasion. *Journal of Consumer Research*, 36(6), pp.1033–1049.

Kathan, W. et al., 2015. Reciprocity vs. Free-Riding in Innovation Contest Communities. *Creativity and Innovation Management*, 24(3), pp.537–549.

Ke, W. & Wei, K.-K., 2008. Organizational Culture and Leadership in ERP Implementation. *Decision Support Systems*, 45(2), pp.208–218.

Kee, K. et al., 2016. The 10 attributes that drive adoption and diffusion of computational tools in e-science. In *Proceedings of the XSEDE16 Conference on Diversity, Big Data, and Science at Scale*. Miami, USA, Article 50.

Kilner, P.G. & Hoadley, C.M., 2005. Anonymity Options and Professional Participation in an Online Community of Practice. In *Proceedings of the 2005 Conference on Computer Support for Collaborative Learning*. Taipei, Taiwan, pp. 272–280.

Klein, M. & Garcia, A.C.B., 2015. High-speed idea filtering with the bag of lemons. *Decision Support Systems*, 78, pp.39–50.

Koch, S. et al., 2005. Constructing gender in chat groups. *Sex Roles*, 53(2), pp.29–41.

Kornish, L.J. & Ulrich, K.T., 2011. Opportunity Spaces in Innovation: Empirical Analysis of Large Samples of Ideas. *Management Science*, 57(1), pp.107–128.

Koroleva, K., Krasnova, H. & Günther, O., 2010. "STOP SPAMMING ME!" - Exploring Information Overload on Facebook. In *Proceedings of the 16th Americas Conference on Information Systems (AMCIS 2010)*. Lima, Peru, Paper 447.

Koufaris, M., 2002. Applying the technology acceptance model and flow theory to online consumer behavior. *Information Systems Research*, 13(2), pp.205–223.

Kristensson, P., Gustafsson, A. & Archer, T., 2004. Harnessing the creative potential among users. *Journal of Product Innovation Management*, 21(1), pp.4–14.

Kuan, K.K.Y. et al., 2015. What Makes a Review Voted? An Empirical Investigation of Review Voting in Online Review Systems. *Journal of the Association for Information Systems*, 16(1), pp.48–71.

Kuegler, M., Smolnik, S. & Kane, G., 2015. What's in IT for employees? Understanding the relationship between use and performance in enterprise social software. *Journal of Strategic Information Systems*, 24(2), pp.90–112.

Kwon, W. & Lennon, S., 2009. What induces online loyalty? Online versus offline brand images. *Journal of Business Research*, 62(5), pp.557–564.

Lakhani, K.R. & Jeppesen, L.B., 2007. Getting unusual suspects to solve R&D puzzles. *Harvard Business Review*, 85(5), pp.30–32.

Landers, R.N. & Callan, R.C., 2014. An experiment on anonymity and multi-user virtual environments: Manipulating identity to increase learning from online collaborative discussion. *International Journal of Gaming and Computer-Mediated Simulations*, 6(2), pp.53–64.

Lauto, G. & Valentin, F., 2016. How preference markets assist new product idea screening. *Industrial Management & Data Systems*, 116(3), pp.603–619.

Lee, H. & Seo, S., 2013. What Determines an Agreeable and Adoptable Idea? : A Study of User Ideas on MyStarbucksIdea.com. In *Proceedings of the 46th Hawaii International Conference on System Sciences (HICSS 2013)*. Wailea, USA, pp. 3207–3217

Leidner, D. & Kayworth, T., 2006. A Review of Culture in Information Systems Research: Toward a Theory of Information Technology Culture Conflict. *MIS Quarterly*, 30(2), pp.357–399.

Leimeister, J.M., 2010. Collective Intelligence. *Business & Information Systems Engineering*, 4(2), pp.245–248.

Leimeister, J.M. et al., 2009. Leveraging Crowdsourcing: Activation-Supporting Components for IT-Based Ideas Competition. *Journal of Management Information Systems*, 26(1), pp.197–224.

Leonardi, P.M. & Barley, S.R., 2013. Enterprise social media. Definition, history, and prospects for the study of social technologies in organizations. *Journal of Computer-mediated Communication*, 19(1), pp.1–19.

Leonardi, P.M. & Barley, S.R., 2010. What's Under Construction Here? Social Action, Materiality, and Power in Constructivist Studies of Technology and Organizing. *The Academy of Management Annals*, 4(1), pp.1–51.

Leung, A.K.-Y. & Cohen, D., 2011. Within- and between-culture variation: Individual differences and the cultural logics of honor, face, and dignity cultures. *Journal of Personality and Social Psychology*, 100(3), pp.507–526.

Likert, R., 1932. A Technique for the Measurement of Attitudes. *Archives of Psychology*, 22, pp.1401–1455.

Liu, Z. et al., 2016. Self-Disclosure in Chinese Micro-Blogging: A Social Exchange Theory Perspective. *Information & Management*, 53(1), pp.53–63.

Luna-Reyes, L.F. et al., 2005. Information systems development as emergent socio-

technical change: a practice approach. *European Journal of Information Systems*, 14(1), pp.93–105.

Luo, L. & Toubia, O., 2015. Platforms and Customizing the Task Knowledge. *Journal of Marketing*, 79, pp.100–114.

Magnusson, P.R., Netz, J. & Wästlund, E., 2014. Exploring holistic intuitive idea screening in the light of formal criteria. *Technovation*, 34(5–6), pp.315–326.

Maier, C. et al., 2012. Online Social Networks As a Source and Symbol of Stress: an Empirical Analysis. In *Proceedings of the 33rd International Conference on Information Systems (ICIS 2012)*. Orlando, USA, pp. 1–19.

Malouff, J.M., Emmerton, a. J. & Schutte, N.S., 2013. The Risk of a Halo Bias as a Reason to Keep Students Anonymous During Grading. *Teaching of Psychology*, 40(3), pp.233–237.

Markus, M.L., 2004. Technochange management: using IT to drive organizational change. *Journal of Information Technology*, 19(1), pp.4–20.

Markus, M.L., Majchrzak, A. & Gasser, L., 2002. A Design Theory for Systems That Support Emergent Knowledge Processes. *MIS Quarterly*, 26(3), pp.179–212.

Martinez-Torres, M.R., 2015. Content analysis of open innovation communities using latent semantic indexing. *Technology Analysis & Strategic Management*, 27(7), pp.859–875.

Marx, G.T., 1999. What's in a Name? Some Reflections on the Sociology of Anonymity. *The Information Society*, 15(2), pp.99–112.

Mavlanova, T., Benbunan-Fich, R. & Koufaris, M., 2012. Signaling Theory and information asymmetry in online commerce. *Information & Management*, 49(5), pp.240–247.

Mondak, J.J., 1990. Perceived legitimacy of supreme court decisions: Three functions of source credibility. *Political Behavior*, 12(4), pp.363–384.

Muller, M. et al., 2013. Crowdfunding inside the Enterprise: Employee-Initiatives for Innovation and Collaboration. *Proceedings of the 31st Conference on Human Factors in Computing Systems (CHI 2013)*, Paris, France, pp.503–512.

Natalicchio, A., Messeni Petruzzelli, A. & Garavelli, A.C., 2014. A literature review on markets for ideas: Emerging characteristics and unanswered questions. *Technovation*, 34(2), pp.65–76.

Nerdinger, F.W. & Wilke, P., 2008. *Erfolgsfaktor Beteiligungskultur: Ergebnisse aus dem Projekt Transfer innovativer Unternehmensmilieus*, Augsburg: Rainer Hampp Verlag.

Nevo, S. & Wade, M., 2011. Firm-level benefits of IT-enabled resources: A conceptual extension and an empirical assessment. *Journal of Strategic Information Systems*, 20(4), pp.403–418.

Nevo, S. & Wade, M.R., 2010. The Formation and Value of IT-Enabled Resources: Antecedents and Consequences of Synergistic Relationships. *MIS Quarterly*, 34(1), pp.163–183.

Niederman, F. & March, S.T., 2012. Design Science and the Accumulation of Knowledge in the Information Systems Discipline. *ACM Transactions on Management Information System.*, 3(1), p.1:1–1:15.

Niemeyer, C. et al., 2016. Participatory Crowdfunding: An approach towards engaging employees and citizens in institutional budgeting decisions. In *Proceedings of the 49th Hawaii International Conference on System Sciences (HICSS 2016)*. Kauai, USA, pp. 2800–2808.

Nisbett, R.E. & Wilson, T.D., 1977. The Halo Effect: Evidence for Unconscious Alteration of Judgments. *Journal of Personality and Social Psychology*, 35(4), pp.250–256.

Nunamaker, J.F. et al., 1991. Electronic meeting systems. *Communications of the ACM*, 34(7), pp.40–61.

Nunamaker, J.F., Applegate, L.M. & Konsynski, B.R., 1988. Computer-Aided Deliberation : Model Management and Group Decision Support. *Operations Research*, 36(6), pp. 826–848.

Nunamaker, J.F., Applegate, L.M. & Konsynski, B.R., 1987. Facilitating Group Creativity : Experience with a Group Decision Support System. *Journal of Management Information Systems*, 3(4), pp.5–19.

Nunamaker, J.F., Chen, M. & Purdin, T.D.M., 1990. Systems development in information systems research. *Journal of Management Information Systems*, 7(3), pp.89–106.

Nunnally, J.C. & Bernstein, I.H., 1994. The assessment of reliability. *Psychometric Theory*, 3, pp. 248–292.

Offermann, P. et al., 2009. Outline of a Design Science Research Process. In *Proceedings of the 4th International Conference on Design Science Research in Information Systems and Technology (DESRIST 2009)*. New York, USA, p. 7:1–7:11.

Oinas-Kukkonen, H. & Harjumaa, M., 2009. Persuasive Systems Design: Key Issues, Process Model, and System Features. *Communications of the Association for Information Systems*, 24(1), pp.485–500.

Oldroyd, J. & Morris, S., 2012. Catching Falling Stars: A Human Resource Response to Social Capital's Detrimental Effect of Information Overload on Valuable and Visible Employees. *Academy of Management Review*, 37(3), pp.396–418.

Omernick, E. & Sood, S.O., 2013. The Impact of Anonymity in Online Communities. In *Proceedings of the International Conference on Social Computing (SocialCom 2013)*. Washington, USA, pp. 526–535.

Palvia, P. et al., 2004. Research Methodologies in MIS: An Update. *Communications of the Association for Information Systems*, 14(1), pp.526–542.

Pashkina, E. & Indulska, M., 2011. Where are the Ideas?: External Idea Acquisition. In *Proceedings of the 22nd Australasian Conference on Information Systems (ACIS 2011)*. Sydney, Australia, Paper 85.

Pedersen, J. et al., 2013. Conceptual foundations of crowdsourcing: A review of IS research. In *Proceedings of the 46th Hawaii International Conference on System Sciences (HICSS 2013)*. Wailea, USA, pp.579–588.

Peffers, K. et al., 2007. A design science research methodology for information systems research. *Journal of Management Information Systems*, 24(3), pp.45–78.

Petter, S., Delone, W. & McLean, E., 2008. Measuring information systems success: models, dimensions, measures, and interrelationships. *European Journal of Information Systems*, 17(3), pp.236–263.

Petty, R.E. & Cacioppo, J.T., 1986. *Communication and Persuasion – Central and Peripheral Routes to Attitude Change*, New York: Springer.

Petty, R.E. & Cacioppo, J.T., 1979. Issue Involvement Can Increase or Decrease Persuasion by Enhancing Message-Relevant Cognitive Responses. *Journal of Personality and Social Psychology*, 37(10), pp.1915–1926.

Petty, R.E., Cacioppo, J.T. & Goldman, R., 1981. Personal Involvement as a Determinant of Argument-Based Persuasion. *Journal of Personality and Social Psychology*, 41(5), pp.847–855.

Petty, R.E., Cacioppo, J.T. & Schumann, D., 1983. Central and Peripheral Routes to Advertising Effectiveness: The Moderating Role of Involvement. *Journal of Consumer Research*, 10(2), pp.135–146.

Piller, F.T. & Walcher, D., 2006. Toolkits for idea competitions: A novel method to integrate users in new product development. *R&D Management*, 36(3), pp.307–318.

Poetz, M.K. & Schreier, M., 2012. The value of crowdsourcing: can users really compete with professionals in generating new product ideas? *Journal of Product Innovation Management*, 29(2), pp.245–256.

Polites, G.L. & Karahanna, E., 2012. Shackled to the Status Quo: The Inhibiting Effects of Incumbent System Habit, Switching Costs, and Inertia on New System Acceptance. *MIS Quarterly*, 36(1), pp.21–42.

Pornpitakpan, C., 2004. The Persuasiveness of Source Credibility: A Critical Review of

Five Decades Evidence. *Journal of Applied Social Psychology*, 32(2), pp.243–281.

Postmes, T. et al., 2001. Social Influence in Computer-Mediated Communication: The Effects of Anonymity on Group Behavior. *Personality and Social Psychology Bulletin*, 27(10), pp.1243–1254.

Postmes, T. & Lea, M., 2000. Social processes and group decision making: anonymity in group decision support systems. *Ergonomics*, 43(8), pp.1252–1274.

Postmes, T., Spears, R. & Lea, M., 2000. The formation of group norms in computer-mediated communication. *Human Communication Research*, 26(3), pp.341–371.

Qiu, L. & Benbasat, I., 2010. A study of demographic embodiments of product recommendation agents in electronic commerce. *International Journal of Human-Computer Studies*, 68(10), pp.669–688.

Racherla, P. & Friske, W., 2012. Perceived usefulness of online consumer reviews: An exploratory investigation across three services categories. *Electronic Commerce Reserach and Applications*, 11(6), pp.548–559.

Rains, S.A., 2007. The Impact of Anonymity on Perceptions of Source Credibility and Influence in Computer-mediated Communication - A Test of Two Competing Hypotheses. *Communication Research*, 34(1), pp.100–125.

Rao, H., Greve, H.R. & Davis, G.F., 2001. Fool's Gold : Social Proof in the Initiation and Abandonment of Coverage by Wall Street Analysts. *Administrative Science Quarterly*, 46(3), pp.502–526.

Reicher, S.D., Spears, R. & Postmes, T., 1995. A Social Identity Model of Deindividuation Phenomena. *European Review of Social Psychology*, 6(1), pp. 161-198.

Reingen, P.H., 1982. Test of a list procedure for inducing compliance with a request to donate money. *Journal of Applied Psychology*, 67(1), pp.110–118.

Rhee, J.W.J. & Kim, E., 2009. Deliberation on the net: Lessons from a field experiment. In Davies, T. & Gangadahran, S.P., eds. *Online Deliberation: Design, Research, and Practice*. Chicago: CSLI Publications, pp. 223–232.

Richter, A. et al., 2016. Enterprise Social Networks from a Manager's Perspective. In *Proceedings of the 49th Hawaii International Conference on System Science (HICSS 2016)*. Kauai, USA, pp. 4242–4251.

Riedl, C. et al., 2010. Rating Scales for Collective Intelligence in Innovation Communities: Why Quick and Easy Decision Making Does Not Get it Right. In *Proceedings of the 31st International Conference on Information Systems (ICIS 2010)*, St. Louis, USA, Paper 52.

Riedl, C. et al., 2013. The Effect of Rating Scales on Decision Quality and User Attitudes

in Online Innovation Communities. *International Journal of Electronic Commerce*, 17(3), pp.7–36.

Riemer, K., Stieglitz, S. & Meske, C., 2015. From Top to Bottom: Investigating the Changing Role of Hierarchy in Enterprise Social Networks. *Business and Information Systems Engineering*, 57(3), pp.197–212.

Ringle, C.M., Wende, S. & Becker, J.-M., 2015. *SmartPLS 3*, Bönningstedt.

Robinson, A.G. & Schroeder, D.M., 2004. *Ideas are free: How the idea revolution is liberating people and transforming organizations*, San Francisco: Berrett-Koehler Publishers.

Sæbø, Ø., Rose, J. & Molka-Danielsen, J., 2010. eParticipation: Designing and Managing Political Discussion Forums. *Social Science Computer Review*, 28(4), pp.403–426.

Sassenberg, K. & Postmes, T., 2002. Cognitive and social processes in small groups : Effects of anonymity of the self and anonymity of the group on social influence. *British Journal of Social Psychology*, 41, pp.463–480.

Sawhney, M., Verona, G. & Prandelli, E., 2005. Collaborating To Create The Internet as a Platform for Customer Engagement in Product Innovation. *Journal of Interactive Marketing*, 19(4), pp.4–17.

Schaschl, T., 2000. *Stock Options - Mitarbeiterbeteiligung über Aktienoptionen*, Wien: Manz.

Schein, E.H., 1985. *Organizational culture and leadership*, San Francisco: Jossey-Bass.

Scheiner, C.W., 2015. The motivational fabric of gamified idea competitions: The evaluation of game mechanics from a longitudinal perspective. *Creativity and Innovation Management*, 24(2), pp.341–352.

Schlosser, A.E., 2011. Can including pros and cons increase the helpfulness and persuasiveness of online reviews ? The interactive effects of ratings and arguments. *Journal of Consumer Psychology*, 21(3), pp.226–239.

Schraeder, M., Tears, R.S. & Jordan, M.H., 2005. Organizational culture in public sector organizations by example. *Leadership & Organization*, 26(6), pp.492–502.

Schultz, U. & Vandenbosch, B., 1998. Information Overload in a Groupware Environment : Now You See It, Now You Don't. *Journal of Organizational Computing and Electronic Commerce*, 8(2), pp.127–148.

Schwarz, N., 1996. *Cognition and Communication: Judgmental Biases, Research Methods, and the Logic of Conversation*, Hillsdale: Lawrence Erlbaum.

Sherif, C.W., Sherif, M. & Nebergall, R.E., 1965. *Attitude and attitude change: The social judgment-involvement approach*, Philadelphia: Saunders.

Shiller, R.J., 1995. Conversation, information, and herd behaviour. *The American Economic Review*, 85(2), pp.181–185.

Short, J., Williams, E. & Christie, B., 1976. *The Social Psychology of Telecommunications*, New York: Wiley.

Sia, C.-L., Tan, B.C.Y. & Wei, K.-K., 2002. Group Polarization and Computer-Mediated Communication: Effects of Communication Cues, Social Presence, and Anonymity. *Information Systems Research*, 13(1), pp.70–90.

Siegel, J. et al., 1986. Group processes in computer-mediated communication. *Organizational Behavior and Human Decision Processes*, 37(2), pp.157–187.

Siemon, D., Rarog, T. & Robra-Bissantz, S., 2016. Semi-Automated Questions as a Cognitive Stimulus in Idea Generation. In *Proceedings of the 49th Hawaii International Conference on System Sciences (HICSS 2016)*. Kauai, USA, pp. 257–266.

Silva, L. & Hirschheim, R., 2007. Fighting Against Windmills: Strategic Information Systems And Organizational Deep Structures. *MIS Quarterly*, 31(2), pp.327–354.

Silva, L. & Panahi, H., 2017. Catch me if you can: Online protests on sites powered by user-generated content. *Information & Management*, 54(1), pp.103–114.

Sloman, S.A., 1996. The empirical case for two systems of reasoning. *Psychological Bulletin*, 119(1), pp.3–22.

Solomon, M. et al., 2006. *Consumer Behaviour: A European Perspective* 3rd ed., Harlow: Pearson FT Prentice Hall.

Sosik, J. et al., 1998. Computer-supported work group potency and effectiveness: the role of transformational leadership, anonymity, and task interdependence. *Computers in Human Behavior*, 14(3), pp.491–511.

Soukhoroukova, A., Spann, M. & Skiera, B., 2012. Sourcing, filtering, and evaluating new product ideas: An empirical exploration of the performance of idea markets. *Journal of Product Innovation Management*, 29(1), pp.100–112.

Spence, M., 2002. Signaling in retrospect and the informational structure of markets. *American Economic Review*, 92(3), pp.434–459.

Spiegel, O. et al., 2016. Business model development, founders' social capital and the success of early stage internet start-ups: a mixed-method study. *Information Systems Journal*, 26(5), pp.421–449.

Stibe, A., 2015. Advancing Typology of Computer-Supported Influence: Moderation Effects in Socially Influencing Systems. In *Proceedings of the 9th International Conference on Persuasive Technology (PERSUASIVE 2015)*. Chicago, USA, pp. 253–264.

Stieglitz, S. & Hassannia, S., 2016. Idea Generation by Employees and External Participants in Innovation Competitions. In *Proceedings of the 49th Hawaii International Conference on System Sciences (HICSS 2016)*. Kauai, USA, pp. 4272–4281.

Stiff, J.B., 1993. *Persuasive Communication*, New York: Guilford Press.

Stoltenberg, C.D. & Davis, C.S., 1988. Career and study skills information: Who says what can alter message processing. *Journal of Social and Clinical Psychology*, 6(1), pp.38–52.

Straub, T. et al., 2015. How (not) to Incent Crowd Workers: Payment Schemes and Feedback in Crowdsourcing. *Business and Information Systems Engineering*, 57(3), pp.167–179.

Surowiecki, J., 2005. *The Wisdom of Crowds*, New York: Anchor.

Van Swol, L.M., Savadori, L. & Sniezek, J.A., 2003. Factors that may affect the difficulty of uncovering hidden profiles. *Group Processes & Intergroup Relations*, 6(3), pp.285–304.

Tegarden, D. et al., 2016. De-Fusing Organizational Power Using Anonymity and Cognitive Factions in a Participative Strategic Planning Setting. *Group Decision and Negotiation*, 25(1), pp.1–29.

Terwiesch, C. & Xu, Y., 2008. Innovation Contests, Open Innovation, and Multiagent Problem Solving. *Management Science*, 54(9), pp.1529–1543.

Teschner, F. & Rothschild, D., 2013. Simplifying market access: A new confidence-based interface. *The Journal of Prediction Markets*, 6(3), pp.27–41.

Teubner, T. et al., 2016. It's only pixels, badges, and stars: On the economic value of reputation on Airbnb. In *Proceedings of the 27th Australasian Conference on Information Systems (ACIS 2016)*. Wollongong, Australia, Paper 56.

Teubner, T. et al., 2014. Understanding Resource Sharing in C2C Platforms : The Role of Picture Humanization. In *Proceedings of the 25th Australasian Conference on Information Systems (ACIS 2014)*. Auckland, New Zealand, Paper 179.

Thom, N., 1996. *Betriebliches Vorschlagswesen: ein Instrument der Betriebsführung und des Verbesserungsmanagements*, Berlin: Lang.

Toubia, O., 2006. Idea Generation, Creativity, and Incentives. *Marketing Science*, 25(5), pp.411–425.

Toubia, O. & Flores, L., 2007. Adaptive idea screening using consumers. *Marketing Science*, 26(3), pp.342–360.

Tu, C.-H. & McIsaac, M., 2002. The Relationship of Social Presence and Interaction in

Online Classes. *The American Journal of Distance Education*, 16(3), pp.131–150.

Tumasjan, A., Strobel, M. & Welpe, I., 2011. Employer brand building for start-ups. which job attributes do employees value most. *Journal of Business Economics*, 81(6), pp.111–136.

Tyworth, M., 2014. Organizational identity and information systems: how organizational ICT reflect who an organization is. *European Journal of Information Systems*, 23(1), pp.69–83.

Ulbrich, F., 2010. Adopting shared services in a public-sector organization. *Transforming Government: People, Process and Policy*, 4(3), pp.249–265.

Urbach, N., Smolnik, S. & Riempp, G., 2011. Determining the improvement potentials of employee portals using a performance-based analysis. *Business Process Management Journal*, 17(5), pp.829–845.

Valacich, J.S., Jessup, L.M., et al., 1992. A Conceptual Framework of Anonymity in Group Support Systems. *Group Decision and Negotiation*, 1(3), pp.219–241.

Valacich, J.S., Dennis, A.R. & Nunamaker, J.F., 1992. Group size and anonymity effects on computer-mediated idea generation. *Small Group Research*, 23(1), pp.49–73.

Venable, J.R., Pries-Heje, J. & Baskerville, R., 2012. A Comprehensive Framework for Evaluation in Design Science Research. In *Proceedings of the 7th International Conference on Design Science Research in Information Systems (DESRIST 2012)*. Las Vegas, USA, pp. 423–438.

Venkatesh, V., 1999. Creation of Favorable User Perceptions: Exploring the Role of Intrinsic Motivation. *MIS Quarterly*, 23(2), pp.239–260.

Venkatesh, V. et al., 2003. User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, 27(3), pp.425–478.

Wagenknecht, T., Crommelinck, J., Teubner, T., & Weinhardt, C. 2017a. Ideate. Collaborate. Repeat. A Research Agenda for Idea Generation, Collaboration and Evaluation in Open Innovation. In *Proceedings of the 13th International Conference on Wirtschaftsinformatik (WI 2017)*, St. Gallen, Switzerland, pp. 942-956.

Wagenknecht, T. Crommelinck, J., Teubner, T., & Weinhardt, C. 2017b. When Life Gives You Lemons: How rating scales affect user activity and frustration in collaborative evaluation processes. In *Proceedings of the 13th International Conference on Wirtschaftsinformatik (WI 2017)*. St. Gallen, Switzerland, pp. 380-394.

Wagenknecht, T., Filpe, R. & Weinhardt, C., 2017. Towards a Design Theory of Computer-supported Organizational Participation. *Journal of Enterprise Information Management*, 30(1), pp.188–202.

Wagenknecht, T., Filpe, R. & Weinhardt, C., 2016. Towards a Research Framework of Computer-Supported Organizational Participation. In *Proceedings of the 8th IFIP WG 8.5 International Conference on Electronic Participation (ePart 2016)*. Guimarães, Portugal, pp. 17–28.

Wagenknecht, T., Levina, O. & Weinhardt, C., 2017a. Crowdsourcing in a Public Organization: Transformation and Culture. In *Proceedings of the 23rd Americas Conference on Information Systems (AMCIS 2017)*. Boston, USA, pp. 1–10.

Wagenknecht, T., Levina, O. & Weinhardt, C., 2017b. Designing Anonymous Collaboration in Computer- supported Organizational Participation. In *Proceedings of the 12th International Conference on Design Science Research in Information Systems and Technology (DESRIST 2017)*. Karlsruhe, Germany, pp. 90–103.

Wagenknecht, T., Teubner, T. & Weinhardt, 2017. Peer Rating and Assessment Quality in Crowd-based Innovation Processes. In *Proceedings of the 25th European Conference on Information Systems (ECIS 2017)*. Guimarães, Portugal, pp. 3144–3154.

Wagenknecht, T., Teubner, T. & Weinhardt, C., 2016a. The Impact of Anonymity on Persuasiveness in Online Participation. In *Proceedings of the Multikonferenz Wirtschaftsinformatik (MKWI 2016)*. Ilmenau, Germany, pp. 225–231.

Wagenknecht, T., Teubner, T. & Weinhardt, C., 2016b. The Impact of Anonymity on Communication Persuasiveness in Online Participation. In *Proceedings of the Thirty Seventh International Conference on Information Systems (ICIS 2016)*. Dublin, Ireland, pp. 1–11.

Walls, J.G. et al., 1992. Building an information system design theory for vigilant EIS. *Information Systems Research*, 3(1), pp.36–59.

Walter, T. & Back, A., 2013. A text mining approach to evaluate submissions to crowdsourcing contests. In *Proceedings of the 46th Hawaii International Conference on System Sciences (HICSS 2013)*. Wailea, USA, pp. 3109–3118.

Walter, T. & Back, A., 2011. Towards Measuring Crowdsourcing Success: An Empirical Study on Effects of External Factors in Online Idea Contest. In *Proceedings of the 7th Mediterranean Conference on Informtion Systems (MCIS 2011)*. Guimarães, Portugal, Paper 63.

Walther, J.B., Slovacek, C.L. & Tidwell, L.C., 2001. Is a picture worth a thousand words? Photographic images in long-term and short-term computer-mediated communication. *Communication Research*, 28(1), pp.105–134.

Weber, C., Dunaway, J. & Johnson, T., 2012. It's All in the Name: Source Cue Ambiguity and the Persuasive Appeal of Campaign Ads. *Journal of Political Behavior*, 34(3), pp.561–584.

Webster, J. & Watson, R.T., 2002. Analyzing the Past to Prepare for the Future: Writing

a Literature Review. *MIS Quarterly*, 26(2), pp.xiii–xxiii.

Wegge, J. et al., 2010. Promoting Work Motivation in Organizations. *Journal of Personnel Psychology*, 9(4), pp.154–171.

Weisband, S. & Kiesler, S., 1996. Self disclosure on computer forms: Meta-analysis and implications. In *Proceedings of the International Conference on Human Factors in Computing Systems (CHI 96)*. Vancouver, Canada, pp. 3–10.

West, J. & Bogers, M., 2014. Leveraging External Sources of Innovation: A Review of Research on Open Innovation. *Journal of Product Innovation Management*, 31(4), pp.814–831.

Weston, C. et al., 2001. Analyzing interview data: The development and evolution of a coding system. *Qualitative Sociology*, 24(3), pp.381–400.

Wilkinson, A., 1998. Empowerment: Theory and Practice. *Personel Review*, 27(1), pp.40–56.

Wilkinson, A. et al. eds., 2010. *The Oxford Handbook of Participation in Organizations*, Oxford: Oxford University Press.

Wilpert, B., 1984. Participation in Organziations - Evidence from International Comparative Research. *International Social Science Journal*, 36(2), pp.355–366.

Wilson, J.L., Griffin, T.E. & Jessup, L.M., 2012. GSS Anonymity Effects on Small Group Behavior. *Academy of Information and Management Sciences Journal*, 13(2), pp.41–57.

Wu, P.F., van der Heijden, H. & Korfiatis, N.T., 2011. The influences of negativity and review quality on the helpfulness of online reviews. In In *Proceedings of the 32nd International Conference on Information Systems (ICIS 2011)*. Shanghai, China, pp. 1–10.

Wu, S.C. & Fang, W., 2010. The effect of consumer-to-consumer interactions on idea generation in virtual brand community relationships. *Technovation*, 30(11), pp.570–581.

Wu, Y.C.J., Chang, W.H. & Yuan, C.H., 2015. Do Facebook profile pictures reflect user's personality? *Computers in Human Behavior*, 51(1), pp.880–889.

Xu, A. & Bailey, B.P., 2012. A Reference-Based Scoring Model for Increasing the Findability of Promising Ideas in Innovation Pipelines. In *Proceedings of the ACM 2012 Conference on Computer Supported Cooperative Work (CSCW 2012)*. Seattle, USA, pp. 1183–1186.

Yoon, C. & Rolland, E., 2012. Knowledge-sharing in virtual communities: familiarity, anonymity and self-determination theory. *Behaviour & Information Technology*, 31(11), pp.1133–1143.

YouTube, 2009. Five Stars Dominate Ratings. *YouTube Official Blog*. Accessed January 4th 2018: https://youtube.googleblog.com/2009/09/five-stars-dominate-ratings.html.

Yu, L. & Nickerson, J. V., 2011. Generating creative ideas through crowds: An experimental study of combination. In In *Proceedings of the 32nd International Conference on Information Systems (ICIS 2011)*. Shanghai, China, pp. 1–16.

Yücesan, E., 2013. An efficient ranking and selection approach to boost the effectiveness of innovation contests. *IIE Transactions*, 45(7), pp.751–762.

Zhang, K.Z.K. et al., 2018. Can consumers be persuaded on brand microblogs? An empirical study. *Information & Management*, 55(1), 1–15.

Zhao, K., Stylianoua, A.C. & Zheng, Y., 2018. Sources and impacts of social influence from online anonymous user reviews. *Information & Management*, 55(1), pp. 16–30.

Zimmerling, E. et al., 2016. Increasing the Creative Output at the Fuzzy Front End of Innovation – A Concept for a Gamified Internal Enterprise Ideation Platform. In *Proceedings of the 49th Hawaii International Conference on System Sciences (HICSS 2016)*. Kauai, USA, pp. 837–846.

Zuchowski, O. et al., 2016. Internal crowdsourcing: Conceptual framework, structured review, and research agenda. *Journal of Information Technology*, 31(2), pp.166–184.