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Participation In On–line Co-Creation: Assessment And Review Of Motivations

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ABSTRACT

The present article provides an overview of the research on motivation for online co-creation. Motivating participants to contribute in online co-creation endeavours is one of the key challenges in online co-creation. Due to this, an array of scholars has faced this question using a variety of research designs. We found that the multitude of motivational factors that the literature provides can be grouped into five distinct classes based on the overview model of motivation by Heckhausen and Heckhausen. We identify several subclasses for each class and provide a detailed overview for each of them. We also find that 'expectancies', a fundamental building block in work motivation has hardly been touched upon by research on motivation for online co-creation.

KEYWORDS

co-creation, participation, review, motivation, crowdsourcing, work motivation

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1. Introduction

Participation in online co-creation is recognized as an important source of ideas for innovation and product development (Gebauer et al. 2012; Tanev et al. 2011; Prandelli et al. 2006; von Hippel 2005). Firms depend on innovation for their competitiveness (Shawney et al. 2005) as well as for economic growth (Spohrer & Maglio 2008). Therefore, a growing number of researchers take interest in the preconditions and antecedents of participation in online co-creation.

The participatory perspective on innovation was discussed much earlier than Chesbrough's (2003) seminal work on *open innovation*. Buur and Matthews (2008) coined the term *participatory innovation* in describing the interconnection between participation and innovation. They trace the concept back to the movement of *participatory design*, which emerged in the 1970s. The inclusion of end-users in the design process, which was hitherto thought to be best run solely by experts, indicates the beginnings of *participatory design* (Ehn & Kyng 1987; Schuler & Namioka 1993). The intense research on *open innovation* increased the significance of this perspective (Enkel et al. 2009; Laursen & Salter 2006).

Frequently firms tend to favour previously used successful solutions and technologies when working on innovations. Lakhani (2006) frames this behaviour as local search bias. From his point of view co-creation can be seen as a tool to overcome the local search bias by making valuable knowledge accessible that lies outside of the organization (Lakhani et al. 2007). Various studies have shown a positive impact of user information on the innovation process (von Hippel 2005). Motivation plays a crucial role when accessing individuals' and organizations' knowledge outside of the searching company (Reichwald & Piller 2009).

Questioning the reasons why participants are motivated to engage in co-creation settings is hence an important research question (Füller 2006; Füller 2010). When engaged in online co-creation users and consumers have expectations about the interaction with the requesting firm (Gebauer et al. 2012; Füller 2006). These expectations have to be managed in order to ensure a

successful co-creation process (Payne et al. 2008) and as such a successful user involvement (Kristensson et al. 2008; Prandelli et al. 2006).

In this paper we aim to review the research landscape on motivation of users in online co-creation settings. The research on the topic shows a surprising degree of non-uniformity. And articles present a wide set of motivational factors that have an influence on the individual person participating. Füller (2010) for instance divides consumers as participants into “four different kinds of consumers engaging in co-creation: reward-oriented, need-driven, curiosity-driven, and intrinsically interested” (Füller, 2010:115) while Muhdi and Boutellier (2011) cluster six motivational groups: *rewards*, *learning*, *sense of efficiency*, *social aspects*, *competition*, and *platform features*. Other authors focus on specific aspects of motivation for online co-creation, e.g. the *increase of social ties of users* and *entertainment aspects* (Antikainen et al. 2010), *time at hand* (Lakhani et al. 2007), or *experience of the users* (Jeppesen & Lakhani 2010).

As of today the literature is missing a comprehensive framework, which provides a structure that incorporates known findings and explains how research can be integrated into an overarching understanding of motivation for participation in online co-creation.

The main contribution of our paper is an overview of the existing literature and a breakdown of the motivational factors for online co-creation into five classes based on *the overview model of motivation* by Heckhausen and Heckhausen (2006). We aim to provide an understanding of these five classes and to indicate the diversity of motivational factors that play a part in online co-creation. Furthermore, we point to the fact that all five classes of motivational factors from Heckhausens’ model are addressed by the literature yet the remainder of his model has been mostly neglected.

Our paper is structured as follows: At the beginning we describe our approach to the review. After that we go through the motivational factors that are discussed in the reviewed papers. We first provide an overview of five major classes of motivational factors: *person*, *situation*, *action*, *outcome*, and *consequences*. Afterwards we present each group in detail. Finally, we discuss the degree to which the reported findings cohere in order to establish an overarching structure of motivational factors to participation in online co-creation, discuss managerial implications, and explain which motivational

factors have not been studied and therefore offer opportunities for further research.

2. Approach to the Review

Co-creation is a research topic that attracts interest from different research streams such as technology and innovation management, marketing, and information systems. In the present review we focus our attention and therefore limit our review by making two selection decisions: Firstly, we include only those studies into our review that explicitly address the issue of motivating the participants in online co-creation challenges. As such we do not address what motivates firms to take part in such challenges, nor do we cover the many articles on motivation in open source software projects. The development of open source software is distinctly different in its design from co-creation challenges. In open source software contributors work more cooperatively as in co-creation challenges, where most of the time a single solution wins. Open source projects are also by design longer lasting than co-creation challenges, which usually end after a couple of weeks. Secondly, we limit the selection of the presented studies to peer-reviewed journal articles, which can be considered a means of quality assurance (Ordanini et al. 2008; Podsakoff et al. 2005). Thus, we omit books, book chapters and articles in journals without a peer-review process from our sample. Given the fact that motivation for online-co-creation is a relatively young research topic and only a small number of published studies exist, we include three studies in our sample, which are not published in peer-reviewed journals. These studies are by Villaroel and Tucci (2010), published as a working paper at MIT-Sloan School of Management, a study by Lakhani et al. (2007) which is also a working paper published at Harvard Business School and the Ph.D. thesis by Dominik Walcher (2007). We select these studies on the basis of their citation counts and the expertise of their authors in the field of co-creation. We strongly feel that all three studies substantially contribute to the topic—citation counts nourish that notion—and that the present review would lack in coherence if we would cut the studies from the sample.

The following table provides an overview of the studies we include in this review. The studies employ a variety of data sources and methodological

approaches in order to contribute to the knowledge pool on motivation for online co-creation.

#	Authors (Year): Title	Method	Data Source	Sample Size	Main Contribution
1	Antikainen et al. (2010): Motivating and Supporting Collaboration in Open Innovation	Exploratory case study, open-ended questionnaire, heuristic interpretation	Three innovation intermediaries: Crowdspirit, FellowForce, Owela (F, NL, FI)	Five community managers, 12 user interviews	Community cooperation, learning, entertainment as motivators, good support, cooperation tools as enablers.
2	Boudreau et al. (2011): Incentives and Problem Uncertainty in Innovation Contests: An Empirical Analysis	Regressions over number of competitors vs. average score	Topcoder.com	9.661 programming contests	Greater rivalry among users in contests reduces the incentives of all competitors but increases likelihood of problem solution.
3	Ebner et al. (2009): Community Engineering for Innovations: The Ideas Competition as a Method to Nurture a Virtual Community for Innovations	Explorative research about "ideas competition" within ERP company: SAP	SAP network SAPIens	60.000 lecturers and students (mainly students) using SAP software at SAP University Competence Center	Trust building as a necessary basis. Organizer needs to balance monetary and non-monetary rewards. Early involvement of stakeholders such as lecturers is very fruitful.
4	Franke, Shah (2003): How Communities Support Innovative Activities: an Exploration of Assistance and Sharing Among End-Users	Qualitative interviews, quantitative survey	External innovators	Four different voluntary special-interest communities	Community membership helps innovators find assistance; many contributions are openly available to community, competition among members decreases assistance and the degree to which innovations are shared
5	Frey et al. (2011a): The Role of Interests, Abilities, and Motivation in Online Idea Contests	Survey data and server log-files, statistical analysis	Atizo.com	Data from 33 different idea contests	Breadth of interest is the strongest predictor of submitted solutions followed by experienced enjoyment.
6	Frey et al. (2011b): Whom Should Firms Attract to Open Innovation Platforms? The Role of Knowledge Diversity and Motivation	Survey and statistical analysis	Atizo.com	104 surveys from frequent posters.	Users' interest in monetary rewards leads to insignificant contributions while experienced enjoyment and broad knowledge each lead to meaningful contributions and interact positively.
7	Füller (2006): Why Consumers Engage in Virtual New Product Developments Initiated by Producers	Survey and statistical analysis	Consumers who have participated in at least one virtual co-creation project	825 complete survey responses, 727 consumers were included in data analysis	Consumers contribute to online product development projects for a range of different reasons. Interest in future participation is predicted by the consumers' intrinsic interest and curiosity and wanting to show their ideas.
8	Füller et al. (2010): Consumer Empowerment Through Internet-Based Co-creation	Empirical study, online survey Questionnaire, 5point- likert scale	Consumers who have participated in at least one virtual co-creation project NPD (new product development) projects	825 complete survey responses, 727 consumers were included in data analysis	Consumers who contribute to online co-creation report different levels of experienced empowerment during the process. The perceived empowerment is explained to a great degree by the experienced tool support.
9	Füller et al. (2011): Why co-creation experience matters? Creative experience and its impact on the quantity and quality of creative contributions	Empirical study, online survey	Participants in an online design-competition	174 complete survey responses, 302 consumers were included in data analysis	The participant's experience during the online participation positively influences the number and quality of contributions.
10	Jeppesen & Lakhani (2010): Marginality and Problem- Solving Effectiveness in Broadcast Search	Survey, probit regression, data base analysis	InnoCentive	320 complete survey responses	Distance between problem field and solver knowledge positively related, female solvers significantly better than male ones.
11	Lakhani et al. (2007): The Value of Openness in Scientific Problem Solving	Data collection and analysis, logit regression models, online survey	InnoCentive	166 scientific problems from 10 different countries; 357 outside scientists	The disclosure of scientific problems to a community of mostly scientists is shown to be an effective means of problem solving. Scientist from the boundary of the problem area are more successful at problem solving

#	Authors (Year): Title	Method	Data Source	Sample Size	Main Contribution
12	Leimeister et al. (2009): Leveraging Crowdsourcing: Activation-Supporting Components for IT-Based Ideas Competition	MIAB model (motive-incentive-activation-behaviour), ERP company SAP	SAP network SAPIens	14 weeks, all students using SAP software were addressed, 127 registered, 39 took part in competition, 61 ideas were submitted, all registered students were able to comment and score the submitted ideas, 10 jury members (SAP experts)	The authors map incentives to each of the following motive to motivate contributions: learning, direct compensation, self-marketing and social motives. Technical and organizations features are shown that the incentives.
13	Muhdi & Boutellier (2011): Motivational Factors Affecting Participation and Contribution of Members in Two Different Swiss Innovation Communities	Case study research and survey	Two Swiss innovation intermediary communities (one firm-internal and one external) Atizo.com and PostFinance	Two projects and 48/ 69 surveys	Large differences in motivation between internal and external communities. Main difference lies in monetary rewards.
14	Villarroel & Tucci (2010): Motivating Firm-sponsored e-collective Work	Survey, statistical analysis	Amazon Mechanical Turk	391 responses to an online survey	Money and fun are found to be strong predictors of performance. Free-time has a negative effect on the duration of participation
15	Walcher (2007): Der Ideenwettbewerb als Methode der aktiven Kundenintegration	Likert questionnaire, confirmatory factor-analysis	Idea contest at Adidas	57 participants and 79 non-participants	Self selection of participants depends on motivations such as identification or appreciation. The creativity of participant's contributions is predicted by motivations like hedonism, identification or appreciation.

Table 1: Overview on the included studies

Motivation for online co-creation is a complex and multi-layered issue. The reviewed studies therefore often identify a multitude of motivational factors and exhibit little coherence in the way the grouping is carried out. On the one hand Muhdi and Boutellier (2011) establish 39 different motivations, which they group into six superordinate clusters based on heuristic interpretation. On the other hand Lakhani et al. (2007) apply factor analysis to a set of indicators. Thereby they obtain for instance the group *intrinsic motivation* which subsumes seemingly distinct motivations like learning about the challenges and enjoyment in solving challenges.

Person	Situation	Action	Outcome	Consequences
Knowledge • Antikainen et al. (2010) • Boudreau et al. (2011) • Frey et al. (2011a) • Frey et al. (2011b) • Jeppesen & Lakhani (2010) • Lakhani et al. (2007) • Villarroel & Tucci (2010) • Walcher (2007)	Features • Füller et al. (2010) • Muhdi & Boutellier (2011)	Fun • Antikainen et al. (2010) • Frey et al. (2011a) • Frey et al. (2011b) • Füller et al. (2010) • Füller et al. (2011) • Lakhani et al. (2007) • Muhdi & Boutellier (2011) • Villarroel & Tucci (2010) • Walcher (2007)	Customize the product for oneself • Franke & Shah (2003) • Füller (2006) • Walcher (2007)	Rewards • Antikainen et al. (2010) • Boudreau et al. (2011) • Ebner et al. (2009) • Franke & Shah (2003) • Frey et al. (2011b) • Füller (2006) • Lakhani et al. (2007) • Muhdi & Boutellier (2011) • Villarroel & Tucci (2010) • Walcher (2007)
Altruism • Villarroel & Tucci (2010) • Walcher (2007)	Competition • Bourdeau et al. (2011) • Franke & Shah (2003)	Feeling during the task • Antikainen et al. (2010) • Füller (2010) • Füller et al. (2011) • Villarroel & Tucci (2010)	Desire to create a better product • Antikainen et al. (2010) • Füller (2006) • Walcher (2007)	Beating others • Antikainen et al. (2010) • Boudreau et al. (2011) • Ebner et al. (2009) • Lakhani et al. (2007) • Muhdi & Boutellier (2011) • Villarroel & Tucci (2010)
Involvement • Füller et al. (2010) • Walcher (2007)		Nature of problem • Boudreau et al. (2011) • Jeppesen & Lakhani (2010)		Learning / Personal enhancement • Antikainen et al. (2010) • Ebner et al. (2009) • Füller (2006) • Muhdi & Boutellier (2011) • Villarroel & Tucci (2010)
Time at hand • Antikainen et al. (2010) • Hoyer et al. (2010) • Lakhani et al. (2007) • Villarroel & Tucci (2010)				Networking / career development • Antikainen et al. (2010) • Ebner et al. (2009) • Lakhani et al. (2007) • Muhdi & Boutellier (2011) • Villarroel & Tucci (2010) • Walcher (2007)
Interest in topic • Frey et al. (2011a) • Füller (2006) • Jeppesen & Lakhani (2010) • Walcher (2007)				Appreciation / status • Antikainen et al. (2010) • Ebner et al. (2009) • Franke & Shah (2003) • Füller (2006) • Muhdi & Boutellier (2011) • Villarroel & Tucci (2010) • Walcher (2007)
Gender & Age • Jeppesen & Lakhani (2010) • Villarroel & Tucci (2010)				

Table 2: The findings were grouped into five classes

In order to establish an overarching framework we extract all reported motivational factors. We use the classes for individual motivation from the overview model of motivational determinants by Heckhausen and Heckhausen (2006) to group the factors. The model is used to describe an individual's motivation and delineates a motivational process by differentiating between a given *situation*, in which a motivated person can perform an *action*. The action in turn leads to a direct *outcome*, which is followed by *consequences*. Using this model as a framework the extensive number of motivational factors is more accessible and understandable. We use the following classes:

- **Situation:** All aspects concerned with the design of the platform and hence with the design of the co-creation contest are subsumed under the class situation.
- **Action:** The nature of the task during the co-creation (what is the person doing) influences in several ways the participants' motivation. All findings regarding this are found under the class action.
- **Outcome:** This class describes how the result influences the motivation (e.g. the product in development being needed by participants).
- **Consequences:** This describes all motivational factors that are consequences of the process but are not the direct result itself. Here, we will discuss such topics as monetary incentives, the solvers' desire to beat others, learning, networking and career incentives, or simple appreciation by others.

Together with these four classes from the Heckhausen and Heckhausen model we found a multitude of motivational factors that study qualities of the acting person. According to *the overview model of motivational determinants* by Heckhausen and Heckhausen (2006) we integrate the class *person* in our view (see fig. 1):

- **Person:** Motivation is not completely determined by the circumstances but also depends on individual disposition. Therefore, many authors have included personal characteristics or traits in their work.

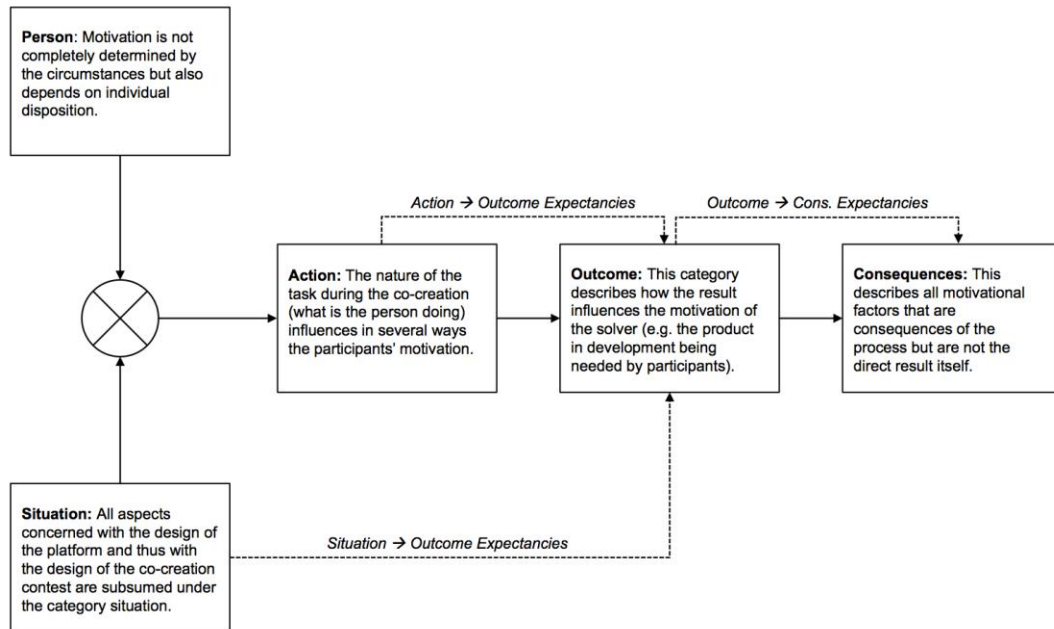


Fig. 1: Framework for motivational classes in co-creation settings

Heckhausens' model depicts three expectancies that are central to motivational processes. The *action-outcome expectancy* describes how much a person expects own actions to lead to an anticipated outcome. For instance, users might have different beliefs about how much their voting behaviour will influence the final ranking of ideas in an online contest. *Situation-outcome expectancy* reflects the degree to which a user expects a situation to lead to a certain outcome even without own action. Finally, *outcome-consequences expectancy* refers to the likelihood of an achieved outcome leading to particular consequences. For example a user might take into account how likely he is to gain more recognition by others after he wins an online design contest. These expectancies are central for the motivational process according to Heckhausen and Heckhausen (2006). Yet, as our review will show they have hardly been touched upon by the research on motivation for online co-creation.

3. Person: Which Motivating Factors Lie within the Individual?

The motivational factors that lie within the participants themselves are grouped in the class *person*. We find these factors in 11 out of the 15 reviewed studies. They fall into the following subclasses: *knowledge*, *altruism*, *involvement*, *time at hand*, *interest in topic*, *gender and age*, and *trust*. The table beneath provides an overview.

Knowledge	Knowledge cont.	Altruism	Involvement	Time at hand	Interest in Topic	Gender and Age	Trust
Antikainen et al. (2010) "Knowledge representation is important for participants to be able to communicate with other participants with different backgrounds and knowledge levels." (p.107) "It also allows people to contribute their knowledge/skills where they can do the most good." CrowdSpirit user, 1 October 2007," (p.110)	Jeppesen & Lakhani (2010) "The provision of a winning solution was positively related to increasing distance between the solver's field of technical expertise and the focal field of the problem." (p. 1016)	Villarroel & Tucci (2010) "H1: Contributors to e-collective initiatives have altruistic values (concern for others and the community) that motivate them to participate [intrinsic]." (p.14) "In this sense, we conclude that in general there is no support for hypotheses H1 thru H6." (p.24)	Füller et al. (2010) "For creative consumers, product involvement has a significant effect on perceived empowerment." (p.92)	Jeppesen & Lakhani (2010) "Examination of the control variables in the second stage reveals that, as is to be expected, the hours of effort invested by the solver is significant and positively correlated with developing a winning solution." (p.1027)	Frey et al. (2011a) "Our findings show that individuals' breadth of interest enables participants to contribute frequently to idea contests. ..." (p.400)	Jeppesen & Lakhani (2010) "It may be that women enter the competition only if they are very confident that they have a winning solution, and therefore we find high-quality contributions from this group." (p.1030) "Talented women scientists are actively using the broadcast search setting as a venue for signaling their ability in problem solving and as a place to obtain recognition of their work that may not be possible elsewhere." (p.1030)	Ebner et al. (2009) "There are two major trust-supporting factors in the development of trust: Interpersonal trust and System trust. Both trust in and support from the organizers of the idea competition are very high. (...) System trust – the perceived reliance on the idea competition system – is very high, too." (p.352) "Although trust in peers is lower than trust in the organizers, it is still positive. There is no significant fear of idea theft." (p. 353)
Boudreau et al. (2011) "Several factors are implicated here, including the shape of the knowledge distribution, number of competitors, skill levels of competitors, degree and scope of uncertainty, and so forth." (p.5) "This is the typical public profile of a TopCoder competitor. It shows the skills ratings, earnings, and placement in various contests." (p.9–10)	Lakhani et al. (2007) "Problem solving success was associated with the ability to attract specialized scientists with diverse scientific interests. Furthermore, successful solvers created solutions to problems that were on the boundary or outside of their fields of expertise, showing that openness in science can trigger the transfer and transformation of knowledge from one scientific field to other." (p.4)	Walcher (2007) "Bei Teilnehmern am Ideenwettbewerb besteht ein signifikant positiver Zusammenhang zwischen dem Kreativscore und dem Motivfaktor Altruismus: nicht bestätigt" (p.241) Walcher assumes that participants in the adidas competition will exhibit higher levels of altruism. Also he assumes that the creativity of the participants' solutions is correlated to their altruism. Both relations are not significant.	Walcher (2007) "High-Involvement-Käufe sind dem Konsumenten wichtig und rufen den Zustand eines hohen kognitiven Engagements und einer hohen inneren Aktivierung hervor." (p.208) Walcher finds that users with higher levels of involvement in the buying process of shoes (!) are more likely to participate in the contest and exhibit solutions with a higher level of creativity. Therefore, involvement seems to be a predictor of motivation to participate.	Lakhani et al. (2007) "Solvers might have been motivated to participate because they had free time/capacity or were simply bored in their current jobs. ... Table 3 also shows that reporting having free time to actually participate in the problem solving effort significantly and positively correlates with being a winning solver." (p.11) Lakhani et al. are not surprised to find that having free time is correlated with posting a winning solution. The authors assume that users are motivated by spare time.	Füller (2006) "Consumers may engage in virtual new product development just because they are curious, or because they want to escape boredom." (p.640)	Villarroel & Tucci (2010) "Females tend to spend more time participating in the AMT initiative." (p.26) "The older the contributors the more time they spend contributing to the AMT initiative." (p.27)	Füller et al. (2010) "Perceived empowerment positively influences consumers' trust in the provider of the virtual co-creation task and enhances their intention to participate in future virtual NPD projects." (p.95)

Frey et al. (2011a) "Using idea contests as an extension of a firm's internal innovation processes promises several advantages: on the one hand, they offer access to a large pool of skilled and motivated contributors, as well as a closer proximity to customers and users." (p.395)	Villarroel & Tucci (2010) "Driven by the availability of new mass interactive information and communication technologies, open source principles are being used as part of a business model, thereby transforming the way knowledge-based work is organized." (p. 30)	Villarroel & Tucci (2010) "Fourth, free time, the construct referring to having free time available as a reason to contribute, is statistically significant. (...) The longer the duration of a contributor's participation, the less he or she finds that free time alone motivates his or her contribution. Those motivated by free time alone may be rapidly satisfied (i.e. they seek a brief time killer), and hence contribute less time (...) the motivation to contribute may consciously shift (...) into some other factors, such as money, career, etc. (i.e. they seek to reach a greater objective)." (p.26)	Jeppesen & Lakhani (2010) "The magnitude of the effect is such that for every increment increase in the self-assessed 'problem-expertise distance' scale, the odds of creating a winning solution increase ..." (p.1028–1029)
Frey et al. (2011b) "We identify the most valuable contributors as those who combine high levels of intrinsic enjoyment in contributing with a cognitive base fed from diverse knowledge domains." (p.387) "Individuals who believe they have the prerequisite knowledge are more likely to choose to engage in fulfilling the task at hand." (p.405)	Walcher (2007) "Wie in der Einführung zu diesem Kapitel beschrieben, wird vermutet, dass sowohl das Wissen bezüglich der Dienstleistung Kaufvorgang als auch das Wissen bezüglich des Produkts Schuh Einfluss auf das Teilnahme- und Leistungsverhalten der Beteiligten am mi adidas- und -ich-Projekt haben könnte." (p.191) Walcher shows that assumption that experience and knowledge about a shopping process is significant for user participation.		Walcher (2007) "Am Ideenwettbewerb nahmen also die neugierigeren Personen teil, die darüber hinaus in ihrem sozialen Netzwerk die Rolle von Meinungsführern haben." (p.240) "Neugier [stellt] zwar einen signifikanten Antrieb zur Beteiligung am Ideenwettbewerb dar[...], [...] die Teilnehmer [unterscheiden sich] jedoch bezüglich dieses Motivs nicht ." (p.246) Participants in the adidas contest are more curious than users that did not participate yet in the contest more curious participants do not contribute more creative solutions.

Table 3: Overview on the motivational class 'person'

3.1 Knowledge

A basic premise of co-creation is that the knowledge of different partakers is aggregated or recombined into a solution, making individual knowledge an important resource of high quality outcomes (Lakhani et al. 2007). Given the general idea of combining knowledge through co-creation the diversity of knowledge is a success factor (Frey et al. 2011b; Lakhani et al. 2007). Jeppesen and Lakhani (2010) find that the distance between the knowledge domain of the problem and the knowledge domains of the participants can be beneficial, when participants apply novel approaches from distant domains to solve a problem.

The interaction of personal skills and the participant's enjoyment of co-creation is an important aspect in the literature (Frey et al. 2011b) for two reasons. Frey et al. (2011b) refer to the theory of planned behaviour by Ajzen (1991) to underline that people are more likely to pursue a goal under the impression of having sufficient resources i.e. knowledge to reach a goal. Also, the process of thinking about a given task becomes more rewarding (more fun) when the participant can apply her knowledge (Novak et al. 2010).

3.2 Altruism

Altruism as a motivational factor is researched in two studies under review; both Walcher (2007) and Villarroel and Tucci (2010) investigate it. Walcher (2007) compares self-reported altruism of participants of an online co-creation project with a group of non-participants and finds no statistically significant difference. Likewise, Villarroel and Tucci (2010) report in their study no significant influence of altruism on the frequency of participation, the duration of participation, and the total number of executed tasks. Hence, the authors cannot support the assumption that altruism is a motivational factor for the participation in online co-creation. To put this into perspective we have to point out that Villarroel and Tucci study the co-creation platform Amazon Mechanical Turk (AMT) where solvers are usually paid small amounts of money for tasks. Thus the particularity in the design of the platform possibly has an influence on the motivational factor altruism.

While altruism plays an important role in other forms of voluntary online contribution (e.g. Nov 2007) it remains unclear under what conditions altruism is a motivational factor in online co-creation.

3.3 Involvement

Involvement of the participants is a motivational factor that refers to different aspects (Walcher 2007; Füller et al. 2010). Füller et al. (2010) divide involvement into *task involvement* and *product involvement*. Walcher (2007) distinguishes between *product involvement* and *customer involvement*. The former describes how much the consumer is involved in a product while the latter refers to the consumer's involvement in the purchasing process.

Walcher (2007) discovers that co-creation participants in his sample are not likely to be more involved in the product than non-participants but reports a positive and significant correlation between participation and customer involvement. Füller et al. (2010) indicate relationships between task and product involvement, experienced tool support, customer creativity, and perceived empowerment in their structural equation model.

3.4 Time at Hand

It is no surprise that winning contributions on the participation platform examined by Lakhani et al. (2007) were made by participants who had spent more than twice as much time as the average participant. Also the study by Jeppesen and Lakhani (2010) shows that the time devoted to developing a solution is positively correlated winning the contest. Consequently, several authors assume that *time at hand* is a predictor of participation (Lakhani et al. 2007; Villarroel & Tucci 2010). Consistently, Lakhani et al. (2007) show that participants with more free time are more likely to win.

Yet, contrary to their expectation Villarroel and Tucci (2010) find that the amount of free time available to the user is negatively related to the duration of their involvement. They try to explain the finding with the following assumption: People with high levels of free time might reach their goal to “kill some time” rather quickly and stop using the platform. Since participants who spend more time on the platform report lower levels of free time, Villarroel and Tucci (2010) conclude that they do not perceive their time spent in the co-

creation process as free time. Also Villarroel and Tucci (2010) identify an interaction between time spent and enjoyment of the participation process: the more participants enjoy the work the longer they participate per week. An interesting observation by Villarroel & Tucci (2010) is that people in their sample spend more time working when they are motivated by monetary incentives (again the sample comes from Amazon Mechanical Turk).

3.5 Interest in Topic

The participants' interest in a topic is discussed by Frey et al. (2011a), Walcher (2007), Füller (2006) and Jeppesen and Lakhani (2010).

Frey et al. (2011a) assume the *breadth of individual interest* to be significant and positively related with the number of submitted ideas and find it to be the strongest predictor of the participation's extent. This can be seen in context of the *breadth of knowledge* discussed above. Also Frey et al. (2011a) suggest that interest in a broad range of topics leads to a broad associative basis as source of creativity, which inspires to explore different alternative solutions.

Walcher (2007) expects interest in a topic not to be a motive in itself but rather an indicator for the participant's involvement. In his sample neither interest in the product of the co-creation nor in the firm hosting the co-creation are correlated to the participants' performance of participation.

We interpret Füller's (2006) indicator *curiosity-exploration-arousal seeking* as a form of interest. Füller's analysis exhibits this indicator as a highly significant predictor for the users' interest in *further participation* but is not significant as a predictor of *participation frequency*.

Jeppesen and Lakhani (2010) address the distance between the knowledge domain of the task at hand and the domain of the participant's scientific interest. They argue that when the two domains overlap it can be beneficial because in this case participants are likely to understand the problem and access prior knowledge. On the other hand Jeppesen and Lakhani (2010) add that distance between knowledge domains can be advantageous when participants utilize experiences from distant domains to solve a problem.

3.6 Gender, Age, and Ethnicity

The studies under review only touch rather briefly on the role of gender and age in participation in online co-creation. Jeppesen and Lakhani (2010) report on gender and Villarroel and Tucci (2010) briefly report on both gender and age.

Villarroel and Tucci (2010) use both age and gender as their control variables. In their sample older age has a positive effect on the frequency of participation. Furthermore, older age has a positive effect on the duration of participation. Finally age, in their study, also correlates positively with the number of total tasks executed. Regarding gender, the scholars only report the observation that females in their sample tend to spend more time participating than their male counterparts.

Jeppesen and Lakhani (2010) cite works that depict how women are marginalized in the natural sciences for instance by lower attainment levels despite equal scientific ability. In studying a platform for scientific problem solving Jeppesen and Lakhani assume the platform they study to reach these marginalized women in an alternative way. And they show that female solvers perform significantly better than men on the platform.

Also, Jeppesen and Lakhani (2010) test the effect of ethnicity and find no relation to the probability of a participant submitting a solution.

Overall it remains to be said that the brief knowledge we have thus far on the factors gender, age, and ethnicity does not suffice to establish a conclusive understanding of their role in motivation for online co-creation.

3.7 Trust

Trust as a motivational factor is examined in two studies in our review. The study by Füller et al. (2010) on new product development shows trust not to be a significant predictor of the users intention of future participation. Ebner et al. (2009) obtain high levels of both interpersonal trust and system trust (concerning the technical setup of the challenge design and the interpersonal relations) in a descriptive study. Trust as a predictor of participation is not examined.

Summarizing, the characteristics of the acting person attracts great attention in the existing research. This reflects its central role well. When designing,

managing or researching online co-creation we have to take into account that different personalities are equipped with different personal resources and motifs and that a user's resources such as *time at hand* might change. Several studies show how central the user's knowledge is to the co-creation process. Studies that omit this factor might put validity at risk.

4. Situation: How Is the Challenge Designed?

Concerning the class *situation* we identify the subclasses *competition* and *features*. Aspects of the platform and thus the situation are addressed by half of the authors: Boudreau et al. (2011), Franke and Shah (2003), Füller et al. (2010), Jeppesen and Lakhani (2010) and Muhdi and Boutellier (2011). The table beneath provides further information.

Features	Competition
Füller et al. (2010) "Experienced tool support has a positive effect on experienced enjoyment and perceived empowerment." (p. 90)	Boudreau et al. (2011) "Greater rivalry reduces the incentives of all competitors in a contest to exert effort and make investments. At the same time, adding competitors increases the likelihood that at least one competitor will find an extreme-value solution." (p. 1)
Muhdi & Boutellier (2011) "Reducing functionalities down to only the necessary, and keeping the platform user-friendly seems to be the rule." (p. 558)	Franke & Shah (2003) "The likelihood of free sharing decreases as the level of competition within the community increases." (p. 170) Franke & Shah proof that the more competition the less free-sharing of information. Muhdi & Boutellier (2011) "Interestingly, the competition factor turned out to be an unimportant motivator to participate and contribute in both of the two Swiss innovation communities." (p. 558)

Table 4: Overview on the motivational class 'person'

4.1 Competition

A high number of participants should lead to a higher number of submitted solutions and probably to more diverse solutions. On the other hand, users are aware of increased competition and might invest more effort in competitions with fewer competitors. Hence, there is a tradeoff between involving more solvers and reducing the participants' incentives.

Boudreau et al. (2011) research that relationship in their study of users in software contests and find that the uncertainty of a problem has to be taken into

account in this relationship. In their view a problem is more uncertain when more knowledge domains are required to solve a problem. On the website TopCoder.com participants of a contest are grouped into virtual rooms with a maximum capacity of 20 participants. Participants are able to see the number of other competitors in the room as well as some information about their progress. Monetary rewards are given to the winners of each room and thereby distributed widely across the platform's participants (all rooms). Boudreau et al. (2011) prove that the average quality of contributions is negatively influenced by the number of competitors in the room. But they also show that the number of solvers per room increases the probability of a very good solution (Boudreau et al. 2011).

Franke and Shah (2003) demonstrate lower levels of assistance as well as a lessened sharing of ideas among users of more competitive innovation communities compared to less competitive communities.

Muhdi and Boutellier (2011) find their motivational factor *competition* not to be related to other measures in their sample.

4.2 Platform Features

This subclass focuses on tools and services provided by the platforms and their impact on motivational aspects. Two of the reviewed papers (Muhdi & Boutellier 2011; Füller et al. 2010) deal with the question whether specific platform features are important for successful co-creation.

Muhdi and Boutellier (2011) report little interest of participants in social network services or chat functions. Platform features are rated least important compared to five other categories such as *rewards*, *learning* or *competition*. Füller et al. (2010:85) point to the importance of the experienced tool support measured by the participants' consent to statements like "The design of the virtual co-creation tool helped me to get an understanding of the functionality and benefit of the new product". In their study the experienced tool support directly influences *experienced enjoyment* of the participants and has a mediated influence on the participants' willingness to take part in future co-creation tasks.

These perspectives might complement each other. While users are not consciously motivated by particular platform features the overall impression of

the platform in regards to supporting the co-creation task does have an impact in the context of motivation.

5. Action: What Is the Individual Doing?

The *action*—what is the person actually doing while co-creating—is touched by the majority of the reviewed papers: Antikainen et al. (2010), Boudreau et al. (2011), Frey et al. (2011a), Frey et al. (2011b), Füller et al. (2010), Jeppesen and Lakhani (2010), Lakhani et al. (2007), Muhdi and Boutellier (2011), Villarroel and Tucci (2010), and Walcher (2007). The findings concerning the action that motivates the co-creator can be grouped into three subclasses being: *nature of the problem*, *fun*, and *feeling during the task*. The following table provides an overview on all studies that link action to the participants' motivation.

Fun	Feeling during the task	Nature of problem
Antikainen et al. (2010) "Interviewee: 'You should really be in this for the fun of being creative and sharing the experience.'" (p.108)	Antikainen et al. (2010) "Feeling of sitting around the same table motivates collaboration." (p. 108)	Boudreau et al. (2011) "We show that for problems drawing on a higher number of knowledge domains, or more uncertain problems, the parallel path effect is amplified, consistent with the higher likelihood of attaining an extreme outcome with higher uncertainty." (p. 3) "Whereas the higher uncertainty of multidomain problems moderates the negative (incentive) response to the average score, the net effect remains negative. By contrast, high uncertainty in the multidomain problems leads to a net positive effect." (p. 17)
Frey et al. (2011a) "The finding that enjoyment is an important predictor of the activity level in idea contests is in alignment with several studies investigating motives to participate in crowdsourcing activities. Individuals who enjoy coming up with new ideas and whose motivation thus lies in performing the task itself are more willing to spend time on the platform and to generate different and elaborated ideas." (p.400)	Antikainen et al. (2010) "Interviewee: 'I have been able to find people that lives, breaths and thinks right the same way'" (p. 108)	Jeppesen & Lakhani (2010) "We note that increasing the size of the award discourages entry, as does the requirement for an RTP solution." (p. 1027)
Frey et al. (2011b) "In sum, we find that intrinsically motivated participants are particularly valuable as contributors to innovation platforms, as they post higher numbers of substantial contributions." (p. 413)	Antikainen et al. (2010) "Interviewee: 'Innovating together is pleasant and efficient.'" (p. 108)	
Füller et al. (2010) "To effectively support virtual co-creation of customers with different IT-related capabilities, Internet tools must make customers experience increased self-determination and efficacy and	Villarroel &Tucci (2010) "H4: Participating in e-collective initiatives offers contributors protection or an escape from their own struggles [intrinsic]." (p. 14)	

Fun	Feeling during the task	Nature of problem
<i>make them enjoy their participation.”</i> (p. 96) Lakhani et al. (2007) <i>“Even though there was a substantial monetary prize for creating the best solution, the effect of intrinsic motivation is stronger and more significant.”</i> (p. 11) Muhdi & Boutellier (2011) <i>“[...] based on the findings showing that ‘Have fun’ is a top motivator for the intermediary community, we suggest that intermediaries try to augment this sensation in their members by further investigating into measures that have the potential to positively stimulate the feeling of enjoyment, amusement or pleasure.”</i> (p. 556) Villarroel & Tucci (2010) <i>“Fun—a typical motivation found in open source communities—is confirmed as offering another strong positive and likely explanation for participation and contribution levels in firm-sponsored e-collective work.”</i> (p.31) Walcher (2007) <i>“Je mehr Spaß eine Person also beim Ideengenerieren verspürt bzw. je mehr sich die Person mit adidas/mi adidas identifiziert und je größer der Wunsch der Person nach Anerkennung durch die anderen Kunden bzw. durch die adidas-Verantwortlichen ist, desto höher fällt der Kreativscore aus.”</i> (p. 242) Walcher reports a link between the motivational factor fun and the creativity of the participating individual. Fun fosters creativity.		

Table 5: Overview on the motivational class ‘action’

5.1 Nature of the Problem

It is not very easy to find comparable measures of task complexity or the different requirements in online co-creation. Two studies found usable empirical data to study *the nature of the problem* that participants work on.

On the platform TopCoder that is studied by Boudreau et al. (2011) problems are attributed to one or more of 16 problem domains by the platform management. Single-domain problems can be approached by participants in a nearly routine fashion while multi-domain problems are more uncertain, require more knowledge and receive less submitted solutions. Boudreau et al. find that the multi-domain problems lessen the effect of users reducing effort when there are higher levels of competition.

In Jeppesen & Lakhani’s study of InnoCentive (2010) the RTP (reduction-to-practice) solution requirement serves as a dichotomous measure of the

problem type. RTP problems require the solver to provide a physical prototype that indicates the viability of their idea and demand better resources from the solver. Not surprisingly, they find RTP problem condition to lessen the probability of a solver submitting a solution.

5.2 Fun

Nine studies deal with the question if individuals participate in co-creation settings because they experience *fun* doing so. Antikainen et al. (2010) quote one of their interviewees “You should really be in this for the fun of being creative and sharing the experience”. The amount of studies which deal with the motivational factor *fun* indicates its importance for the participation in co-creation settings. Frey et al. (2011a) explain: “Individuals who enjoy coming up with new ideas and whose motivation thus lies in performing the task itself are more willing to spend time on the platform and to generate different and elaborated ideas.” Frey et al. (2011b) utilize a similar construct and call it *intrinsic motivation*. They furthermore point out that fun explains the activity level of contributors and the quality level of their contributions and as such that the motivation of those participating is linked to the task itself. People that are motivated by the fun they have while participating post higher numbers of substantial contributions. Lakhani et al. (2007) compare *intrinsic incentives* (enjoyment of the task) to *extrinsic incentives* (monetary rewards). While both types of incentives positively correlate with winning solutions the effect of having fun is stronger and more significant. Füller et al. (2010) explain that “to effectively support virtual co-creation of customers with different IT-related capabilities, Internet tools must make customers experience increased self-determination and efficacy and make them enjoy their participation.” Füller et al. (2011) dedicate a second study mainly to experiential factors and deepen their understanding of the users’ enjoyment and its impact on the number and quality of user contributions. Mudhi and Boutellier (2010) label *having fun* as one of the top motivational factors. Villarroel and Tucci (2010) explain that fun is a strong and positive explanation for participation and contribution levels. Walcher (2007) links fun to creativity and explains that participants that have more fun performing the task generate more creative results.

5.3 Feeling During the Task

Feeling during the task is a subclass that is concerned with the question of “why do you like performing this task?” In this subclass we summarize the findings that go beyond a simple “because I enjoy it”, which is described in the subclass *fun*.

Antikainen et al. (2010) report that individuals are motivated by a sense of cooperation they feel while virtually sitting around a table with others. The authors also explain that a *sense of community* motivates those participating in a co-creation task. They quote one participant saying that an *open and constructive atmosphere* makes especially the ideation easier. The third observation the authors have regarding the task motivation is a *sense of efficacy*. The authors explain that participants can experience the impression that co-creation is more efficient than working alone and this motivates them to perform the task.

Villarroel & Tucci (2010) start with the hypotheses that individuals perform co-creation tasks because it gets them away from everyday troubles. Yet, the authors are not able to confirm this hypothesis.

In sum, especially the more recent studies put an emphasis on the motivational strength of online-co-creation in itself. All of the studies that employ causal research designs find *fun* to be a predictor of the contributions' quality or quantity. Researchers that work exploratory or descriptive support these findings.

6. Outcome: How Does the Outcome itself Trigger Participation?

Under the class *outcome* we subsume motivational stimuli that refer to an individual's interest in the actual outcome of a co-creation. For example, Füller (2006) describes that a community of snowboard enthusiasts contributed to the design of a multifunctional snowboard backpack. Here the backpack itself is what we mean by *outcome* of an online co-creation.

Stimuli of this characteristic can be found in Antikainen et al. (2010), Füller (2006), Franke and Shah (2003) and Walcher (2007). Based on the similarities in the hypotheses and results of the authors in the aforementioned studies we

decided to divide this factor into two subclasses: *desire to make a better product* as well as *customizing the product for oneself*. The next table gives a quick overview.

Desire to make a better product	Customizing the product for oneself
Antikainen et al. (2010) "Influencing and making better products/services " (p. 108)	Franke & Shah (2003) "I wanted to use the product myself." (p. 170)
Füller (2006) "Because I want to support new product innovations." "Because I have ideas that I want to introduce to producers." (p. 643)	Füller (2006) "Sports enthusiasts start to modify or develop their own products because they derive benefit from using their innovation." (p. 641)
Walcher (2007) "Dies kann darauf zurückgeführt werden, dass es sich prinzipiell bei allen mi adidas-Kunden um ambitionierte Läufer handelt, die auf Grund ihres gesteigerten Interesses hinsichtlich der Qualität der Sportschuhe auf das Individualisierungsangebot von adidas zurückgreifen." (p. 212)	Walcher (2007) "Eine Übertragung des Bedürfnis-Motivs auf den mi adidas-Ideenwettbewerb erscheint nahe liegend, da Kunden mit Hilfe der Interaktionsplattform in die Lage versetzt werden, ihre bislang unerfüllten Wünsche zu äußern und direkt an die Verantwortlichen zu senden. Von der Umsetzung der Idee würden sie selber stark profitieren." (p. 153)
The study shows that high product involvement can motivate individuals to contribute to the quality of the product.	The study explains participation in ideas competitions as a possibility for individuals to express unfulfilled wishes.

Table 6: Overview on the motivational class 'outcome'

6.1 Desire to Make a Better Product

The first sub-category regards the individual's desire to improve a product as a motivational factor for partaking in co-creation. Antikainen et. al (2010), in a multiple case study on why users participate in collaborative online innovation communities, for instance, come to the conclusion that influencing and making better products is a motivational factor. It has to be mentioned though that Antikainen et al.'s assessment is based on a qualitative analysis of open questions and telephone interviews with platform maintainers and users. It appears intuitively comprehensible that improving a product is itself a potential reason for understanding individuals' participation in co-creation processes.

Füller (2006) takes the same line of argument as Antikainen et al. when proposing that individuals, among other reasons, enjoy supporting product innovations. This result is based on a quantitative survey among 825 consumers that engaged in online product developments.

Walcher (2007) researches people's motives for participating in an Adidas ideas competition and explains their *desire to make a better product* with high *product involvement*. To put it simply: people that partake in co-creation processes in order to improve a product are quite likely interested in the product they work on. This might not be the most surprising explanation for

people's interest in improving a product; yet it is of importance especially in cases where contribution is not per se monetarily rewarded.

6.2 Customizing the Product for Oneself

The second sub-category, which we call *customizing the product for oneself*, refers to any form of participation in co-creation that is motivated by the aim to find a solution for oneself. It appears that this motivational factor occurs in cases in which needs cannot be satisfied by the market or in which people face a make-or-buy-decision (in which an individual either buys a product or service or makes it herself).

Franke and Shah (2003), for instance, in an exploratory study on individuals who engage voluntarily in special-interest sport communities, found out that sport enthusiasts invest time into developing and modifying own products because they derive benefits from using their own innovations. The authors interview 197 members from 4 online communities, such as a *canyoning community* or an *extreme snowboarding community*. Here, personal (and considering the demand niche) need motivates individuals to virtually engage in new product developments. One indicator in the study by Franke and Shah (2003:170) demonstrates this need as “I want to use the product myself”.

Füller (2006) identifies the motivational item “Because I would highly benefit from a new product” in his study on participation in online product development. He further identifies dissatisfaction with existing products as a related motivational factor for participation—which supports the assumption that the factor *customizing the product for oneself* goes often hand in hand with unmet needs. Walcher (2007) comes to a similar conclusion and explains that a main motivating factor are unfulfilled needs and with them the possibility to realize them. He suggests that *very particular needs* and *markets-of-one* are prompting people to develop their own solutions.

The *outcome* of the co-creation receives comparably little attention in the studies reviewed and is more prominent in the older studies. Only two studies show a significant role of the *outcome*. Yet, from a motivational perspective human action is unthinkable without its outcomes or goals and goal-directed

action is a central building block of motivational research (Heckhausen & Heckhausen 2006).

7. Consequences: Which further Benefits Motivate the Individual?

Consequences classify additional motivational factors, which occur indirectly and as a result of the process of participation. We understand this motivational factor as surplus (monetary and non-monetary) on participation that affects the participating user. Examples are *won money*, an *improved status within the community or company* that comes along with being the winner or the fact that the participating user whose won, feels that she was better than her competitors and more successful than them.

The majority (10 studies out of 15) of studies deal with *consequences*, except the studies by Frey et al. (2011a), Füller et al. (2010), Jeppesen and Lakhani (2010), and Leimeister et al. (2009). We group the findings of this class into five subclasses. These are *rewards*, *beating others*, *learning/personal enhancement*, *networking/career development*, and *appreciation/status*. The following table provides an overview of all studies, which cover consequences as part of the participants' motivation.

Rewards	Rewards cont.	Beating Others	Learning / Personal Enhancement	Networking / Career Development	Status / Appreciation
Antikainen et al. (2010) <i>"The competitive element of the challenges motivates me to post an idea once in a while."</i> (p. 108)	Muhdi & Boutellier (2011) <i>"Members of the intermediary community are, as illustrated above, highly motivated by factors belonging to the category 'Rewards'."</i> (p. 552)	Antikainen et al. (2010) <i>"The entertaining side of collective creativity does not fully fit with the idea of monetary rewards."</i> (p. 113)	Antikainen et al. (2010) <i>"New viewpoints and synergy"</i> (p. 108)	Antikainen et al. (2010) <i>"Reputation is another motivation factor for participation. Reputation can, for example, be helpful in creating a career."</i> (p. 111)	Antikainen et al. (2010) <i>"For example, some user might be very interested the particular challenge at hand and motivated for by the challenge itself where as some might participate to any challenge in hope of getting monetary rewards or fame."</i> (p. 110)
Boudreau et al. (2011) <i>"A chief lever available to elicit participation in the contests is the structure and form of prizes."</i> (p. 8/9)	Villarroel & Tucci (2010) <i>"Money, even in small or otherwise negligible amounts, is the most statistically reliable predictor of participation and contribution levels in firm-sponsored e-collective work, having a strong positive effect on both these community performance measures."</i> (p. 31)	Boudreau et al. (2011) <i>"Our interviews revealed that members, especially those in the higher-performing brackets, took it very personally if they did not come out on top in a competition."</i> (p. 9)	Ebner et al. (2009) <i>"The strongest motivators are the creative challenge of the competition and the opportunity to come in closer contact with SAP and to learn more about the company's products, as shown in Figure 8."</i> (p. 352)	Ebner et al. (2009) <i>"Potential Internships"</i> (p. 352)	Ebner et al. (2009) <i>"Prestige"</i> (p. 352)
Ebner et al. (2009) <i>"Figure 6 shows that monetary incentives are not the strongest motivators. Instead, product-related training offerings had the highest motivational value. Overall, prizes were perceived as positive."</i> (p. 351)	Walcher (2007) Hypothesis: <i>"Teilnehmer am mi adidas-Ideenwettbewerb besitzen eine signifikant höhere Ausprägung des Motivfaktors Vergütung als Nicht-Teilnehmer."</i> (p. 236) Walcher shows that there is no significant difference for rewarding between participants and non-participants.	Ebner et al. (2009) <i>"The strongest motivators are the creative challenge of the competition and the opportunity to come in closer contact with SAP and to learn more about the company's products, as shown in Figure 8."</i> (p. 352)	Füller (2006) <i>"People are motivated to perform an activity because they are striving to improve their skills and gain additional knowledge."</i> (p. 640)	Lakhani et al. (2007) <i>"Social and work-related motivations like career and professional reputation concerns, and peer and work pressure to submit a solution should not be ignored."</i> (p. 10–11)	Franke & Shah (2003) <i>"I was paid well for my assistance"</i> (p. 170)
Frey et al. (2011b) Hypothesis: <i>"The contributors' extrinsic desire for monetary rewards is positively related to the number of non-substantial contributions to open projects."</i> (p. 403)		Lakhani et al. (2007) <i>Being the first to solve a scientific challenge and beat others is also a strong motivational driver for scientists.</i> (p. 11)	Muhdi & Boutellier (2011) <i>"Furthermore, four out of six items belonging to the category 'Learning' were identified as top motivators of the intermediary community and were as follows: 'Interesting and challenging questions' (97.9%), 'Feedback from companies' (79.2%), 'Solve current market challenges' (85.5%), 'Gather new viewpoints and find synergies' (81.3%)."</i> (p. 552–553)	Muhdi & Boutellier (2011) <i>"Build my reputation for carrier enhancement".</i> (p. 554)	Füller (2006) <i>"Consumers may participate in virtual new product development to become visible and get recognition from other participants as well as from the producer."</i> (p. 640)
Füller (2006) <i>"While 'monetary rewards' have a negative impact on further participation interest, they are positively related to participation frequency."</i> (p. 642)		Muhdi & Boutellier (2011) <i>"Competing with other community members."</i> (p. 554)	Villarroel & Tucci (2010) Hypothesis: <i>"Contributors to e-collective initiatives are motivated by the understanding or learning they gain in participating [intrinsic]."</i> (p. 14)	Villarroel & Tucci (2010) Hypothesis: <i>"Contributors to e-collective initiatives are motivated by the prospects of improving their career [extrinsic]."</i> (p. 15)	Muhdi & Boutellier (2011) <i>"Being noticed by the community" and "Becoming famous within the community".</i> (p. 554)
Lakhani et al. (2007) <i>"The literature review suggested that even though winning the</i>		Villarroel & Tucci (2010) Hypothesis: <i>"The more contributors to e-collective</i>		Walcher (2007) Hypothesis: <i>"Teilnehmer am mi adidas-Ideenwettbewerb</i>	Villarroel & Tucci (2010) Hypothesis: <i>"Contributors to e-collective initiatives have social</i>

Rewards	Rewards cont.	Beating Others	Learning / Personal Enhancement	Networking / Career Development	Status / Appreciation
<i>award money was the most obvious reason to participate, social and work-related motivations like career and professional reputation concerns, and peer and work pressure to submit a solution should not be ignored.” (p. 10/11)</i>		<i>initiatives seek to beat others at offering a solution, the more they participate [extrinsic].” (p. 16)</i>		<i>besitzen eine signifikant höhere Ausprägung des Motivfaktors Kontakt als Nicht-Teilnehmer.“ (p. 236)</i> Walcher shows that there is a significant difference for career aspects between participants and non-participants.	<i>ties that motivate them to participate [extrinsic].” (p. 15)</i> Walcher (2007) Hypothesis: “Teilnehmer am mi adidas-Ideenwettbewerb besitzen eine signifikant höhere Ausprägung des Motivfaktors Anerkennung als Nicht-Teilnehmer.“(p. 236) Walcher shows that there is a significant difference for appreciation between participants and non-participants.

Table 7: Overview on the motivational class ‘consequences’

7.1 Rewards

In this subclass we subsume monetary rewards and other forms of tangible prizes like products, which are provided to successful participants in co-creation processes.

The interviews conducted by Antikainen et al. (2010) suggest that individual reward systems of the three investigated platforms increase participation but do not serve as motivation for collaboration. Therefore, Antikainen et al. propose to give rewards to groups. Within an online survey, Villarroel and Tucci (2010) find out that the desire to earn money appears to be the most likely predictor of participation and contribution in co-creation endeavours with a positive effect on the community performance. Boudreau et al. (2011) determine that “winning cash is the most conspicuous motivation”. In the same manner, Franke and Shah (2003:170) name the indicator “I was paid well for my assistance” as a motivational factor for participation. Muhdi and Boutellier (2011) consider two different communities. Rewards are a strong motivational factor for the intermediary innovation community. Füller (2006) also mentions that monetary rewards are important for attracting certain types of consumers to participate. Walcher (2007) as well comes to the conclusion that rewarding for both, customers and employers, can be a motivating incentive for participation. In the case of *SAPiense*, Ebner et al. (2009) identify cash prizes and other forms of material prizes as motivational factors.

In contrast to these studies, Frey et al. (2011b) identify that the desire for monetary prizes significantly increases non-substantial contributions. Also the study of Lakhani et al. (2007) shows a stronger and more significant effect of intrinsic motivation instead of monetary rewards. The review of the aforementioned studies on reward systems shows variety of results. Furthermore, Antikainen et al. (2010) summarize that the rewarding of individuals for their mutual collective work in an appropriate way remains a key challenge.

7.2 Beating Others

Beating others implicates a competitive element of challenges, describes an individual desire and increases participation in co-creation. Antikainen et al. (2010) consider that fostering competition could have a positive impact on the

users' number of contributions. Interviews of Boudreau et al. (2011) describe that some of the participants "take it very personally" if they do reach a top position in a competition. This point implicates an intrinsic desire to beat other participants. Lakhani et al. (2007) come to an analogical conclusion within their study about openness in science: for scientists being the first and beating others in scientific challenges is a strong motivation.

In contrast, Muhdi and Boutellier (2011) find in their study that competition is not important as motivational factor. Also, Villarroel and Tucci (2010) do not find support for beating others as extrinsic motivation for participation.

7.3 Learning / Personal Enhancement

Another consequence is *learning/personal enhancement*. This factor includes the individual understanding or rather the kind of knowledge expansion that participants gain in the co-creation processes. Learning and personal enhancement as motivational factors are mentioned in three studies.

Ebner et al. (2009:352) identify *learning about the company's products* and the *creative challenge of the competition* as strong motivational factors for participation. Antikainen et al. (2010:108) state *new viewpoints and synergy* as identified motivational factor. With an online survey Füller (2006:643) finds two different learning related motives for members: *to experience new and different things* and *to gain new knowledge/expertise*, which he summarizes as personal enhancement. Muhdi and Boutellier (2011:551) also address different motivational factors, which the authors assign to learning: *gather new viewpoints and find synergies, self development, feedback from community, interesting and challenging questions, solve current market challenges, collaboration with professionals from the contracting companies*.

The findings of Villarroel and Tucci's (2010) study come to a different conclusion in the context of the platform Amazon Mechanical Turk. Here the results do not support the hypotheses that contributors are motivated by learning or understanding. Yet, it has to be taken into account that Amazon Mechanical Turk offers rather mechanic routinized tasks.

7.4 Networking / Career Development

The motivation for networking and personal career development is examined within six of the reviewed papers. Lakhani et al. (2007) concentrate on *career/social motivations* as a motivation factor. Antikainen et al. (2010) focus on the factors *reputation* and the *enhancement of the professional status*. They state that reputation can be helpful in creating a career. Profiles in online communities have an influence on the reputation of the participants. Walcher (2007) summarizes different motivation factors for networking within *contact and self marketing*. Ebner et al. (2009) register *potential internships* and *being part of the community for innovations*, which can be categorized as networking or career development. Villarroel and Tucci (2010) come up with the following hypothesis: “contributors ... are motivated by the prospects of improving their career [extrinsic].” The authors conclude that the *quest for career advancement* is a good predictor of length of participation in e-collective work. Participants from their study provide statements like: “The reason I contribute to this initiative is to enhance my career prospects”, “working on this initiative can help me get a job”, “it will look good on my curriculum” or “it allows me to explore different career options”. Also Muhdi and Boutellier (2011) mention the networking factor in their findings. However, this factor is ranked very low in their empirical case study.

7.5 Appreciation / Status

Appreciation or status as a motivational factor is mentioned in five studies. Antikainen et al. (2010) determine *fame and exposure* as reasons why users innovate collectively in innovation communities. Participants of an online survey by Füller (2006:643) mention “to become known as co-inventor” and “to make others aware of my knowledge and ideas” as motivational factors. Ebner et al. (2009:352) identify the motivational item *prestige*, Franke & Shah (2003:170) state “It was nice to receive recognition”, Walcher (2007:284) sees *appreciation*, especially praising feedback as motivation for participation. Villarroel and Tucci (2010) expect *social ties* to people who favor participation as a motive but do not find it to be statistically significant in their sample. And lastly, Muhdi and Boutellier (2011) find social aspects to be more important for

the participants of an internal community of a firm than for the external counterpart.

Concluding, the *consequences* class is researched in the greatest detail of the studies reviewed. Many authors have study the role of monetary incentives in online co-creation. While the majority of these has indeed found a positive impact of monetary incentives contradictory findings in different settings are reported. All the factors *beating others*, *learning*, *networking*, and *appreciation* are likewise reported to influence participation. Yet, especially the dissimilar role of *learning* in the consequences class underlines the importance of the context of co-creation. The application of findings from one study to another is mostly not possible since the studies examine highly different settings.

8. Expectancies

In motivational processes expectancies play an important role. If a user does not expect her behaviour to matter in the given context she will not be motivated by outcomes or consequences because she does not believe to attain them in the first place. *Action-outcome*, *situation-outcome* and *outcome-consequences expectations* are closely related to self-efficacy perception. Self-efficacy beliefs refer to a person's judgement of their own capability to reach a favourable outcome.

Antikainen et al. (2010) cite Bandura's work on the motivating effect of self-efficacy perceptions among Wikipedia users and find qualitative evidence of such perceptions in their sample. Accordingly, Füller et al. (2011) build upon Bandura's work on self-efficacy. They examine the self-reported extent of perceived competence during online co-creation.

Füller et al. (2010) also use self-efficacy as an underlying construct to explain the *empowerment* variable in their study. They argue that generally online co-creation tools may lead to increased levels of perceived empowerment because they enable the user to influence products and firms. The authors remark that a perceived empowerment motivates participants. They explain that it also has a positive impact on the individuals' intention to participate in future projects. Secondly, the same authors point to the concept of task involvement as a driver for motivation. They explain that the perceived empowerment depends on task

involvement and in performing this task involvement can be regarded as a motivational factor. Frey et al. (2011b) mention the importance of self-efficacy but do not include it in their study.

Action-outcome Expectancy
Füller et al. (2010) <i>"The level of experienced empowerment depends on the design of the applied virtual interaction tool, the related enjoyment of the virtual interaction, the participants' task and product involvement, as well as their creativity and lead-user characteristics."</i> (p.72)
Antikainen et al. (2010) <i>"Wikipedia (www.wikipedia.org) is a prime example of an online community that gives contributors a sense of efficacy."</i> (p. 105)
Füller et al. (2011) <i>"Positive outcome of the individual performance compared with relevant standard performance contributes to a perception of self-efficacy (i.e. perceived competence) and feelings of satisfaction."</i> (p. 262)

Table 8: Overview on the motivational class 'expectancies'

9. Discussion

The main goal of our review is to bring together the research results on motivational factors in online co-creation. All of the 15 reviewed articles contribute such motivational factors. Our review suggests that all of these factors can be matched to Heckhausens' (2006) motivational classes. By doing so, we aim to contribute to a common understanding of online participation. Although motivation for online co-creation has been researched by several authors the results lack an overarching understanding. With our review we aim to contribute to that.

While striving for a broad understanding we have to take into consideration that the underlying settings in online co-creation vary drastically. A challenge where users are asked to design a mosquito-net that protects children in poor countries from malaria caters to quite a different set of motivational factors than micro tasks like checking invalid links on a website or translating a text. Given this, the frameworks that are used to explain the motivational patterns behind user-behaviour are often fine-tuned to the specific platform under review. And therefore lack generalizability or even the transfer to another platform. Structuring the totality of motivational factors into five distinctive classes helps to understand in what areas motivational factors lie.

9.1 Managerial Implications

Motivating individuals to participate in an online co-creation task remains one of the main challenges in the design of co-creation projects. Here, the present review can be used as a guide to understand in which areas motivational factors have to be taken into consideration.

Since all of the research works reviewed here indicate significant correlations or even causation it is important to note that practitioners have many starting points to actively encourage motivation for online co-creation.

9.2 Future Research

After reviewing the literature on motivational factors for co-creation in online participation it is evident that more research is needed in order to establish a profound understanding of the matter.

The studies under investigation here did hardly take into consideration the large number of publications stemming from the field of psychology that deal with the question of why workers are motivated to perform a certain task (Pinder 2008, Latham 2011). It is necessary to better link the empirical finding to this field in order to gain a deeper understanding. The discussed authors address numerous motivational factors that fall into all of Heckhausen's classes of incentives. Yet the three expectancies that play a central role in Heckhausen's motivational overview model are only marginally addressed by Antikainen et al. (2010) and Frey et al. (2011). Given the central role of expectancies in the work motivation literature more research is needed to clarify the role of expectancies in online co-creation.

To overcome the limited comparability of results future studies should simultaneously apply the same method to several online co-creation platforms in the way Franke and Shah (2003) or Muhdi and Boutellier (2011) do.

Motivation is anything but a fixed state. Given the dynamic motivation on the individual level and the dynamics of online communities as a whole longitudinal studies are a desirable method to monitor participants' motivation. Yet none of the reviewed studies employs a longitudinal approach.

Moreover other aspects such as feedback (which is mentioned in some works: e.g. Antikainen 2010) or the role of community managers (Cribbett 2011) are not assessed quantitatively at all. Together with the small number of

available studies on the subject this hints at the fact that more exploratory work is needed.

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