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HEADING FOR NEW SHORES: CROWDSOURCING FOR ENTREPRENEURIAL OPPORTUNITY CREATION

Research Paper

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Abstract

In this conceptual paper, we propose crowdsourcing for opportunity creation as a new field of further research in both in the information systems and entrepreneurship domain. Building on previous research on entrepreneurial opportunity creation, we elaborate on the benefits of employing a crowdsourcing approach to reduce uncertainty and iteratively develop an opportunity into a new venture. Based on this assessment we develop a research agenda that highlights the need to adapt previous crowdsourcing mechanisms for the special context of entrepreneurial opportunity creation. In doings so, we expand research of crowdsourcing to the field of entrepreneurship by extending the principles of crowdsourcing for innovation for entrepreneurial opportunity creation. Further, by highlighting the requirements of crowdsourcing for opportunity creation, we point towards potential future research issues. Such research should examine novel participation architectures that enable the iterative co-creation of an opportunity through different maturity stages, thereby overcoming the limitations of previous crowdsourcing efforts that rather focus on the generation of novel ideas than its evolution. Finally, we propose crowdsourcing as a practical way for entrepreneurs to validate their assumptions about their opportunity, thereby achieving fast and early product-market fit.

Keywords: Crowdsourcing, Opportunity Creation, Crowd-based Entrepreneurship, Collective Intelligence

1 Introduction

In the era of digital economy, IT is becoming the enabler of novel products, services, and business models (Yoo et al., 2012). Technological advances such as mobile computing, 3D printing, or cloud computing enable the creation of novel opportunities for entrepreneurs. However, previous studies revealed that around 75 percent of all start-ups fail (Blank, 2013). One main reason for this tremendous failure rate is that entrepreneurs are typically confronted with significant resource constraints and high levels of uncertainty about the viability of their proposed business idea. This fact frequently results in a limited customer focus (Eisenmann et al., 2012).

One prominent perspective from entrepreneurship theory is that opportunities for such novel business ideas cannot be just discovered by entrepreneurs in the market. Rather, they are endogenously created by actions of an entrepreneur who seeks to actively exploit opportunities in a multistage and iterative process of interaction between himself and the environment (Sarasvathy, 2001; Alvarez and Barney, 2007; Alvarez et al., 2013). Following this logic, an entrepreneur's opportunity creation process has two main idiosyncrasies. First, as opportunities do not exist until they are created by the entrepreneur, the context is highly uncertain. Entrepreneurs are therefore not able to predict the outcome of the op-

portunity creation process as opportunities cannot be fully observed a priori. Rather, the initial idea must be enacted with the market to observe reactions (Alvarez and Barney, 2007). Second, the beliefs, actions (at the individual level of an entrepreneur), and the resources and capabilities (at the firm level of a start-up) that are required for opportunity creations are dynamic and steadily evolving. Thus, an entrepreneur must test her assumptions of what is viable against customers' needs. This is usually achieved by interacting with the potential market environment to receive feedback and learn (DiMaggio, 1991). The consensus building among the entrepreneur and stakeholders, for instance potential customers or investors, leads to a common understanding of value of the proposed entrepreneurial venture (Alvarez et al., 2013).

Although uncertainty about market demand in entrepreneurial activities is a popular theme in practically oriented literature (e.g., Blank, 2013; Ries, 2011), research in the field of entrepreneurship provides little evidence on how to deal with such circumstances. Popular approaches to deal with such a kind of uncertainty are gathering feedback from peers, family members, or friends or validating one's idea by consultants (e.g., Tocher et al., 2015). However, these approaches also include certain limitations. For instance, limited social resources or homogeneity of knowledge might reduce an entrepreneur's chances to receive reasonable feedback.

One possible way to reduce these limitations can be found in the literature on collective intelligence and crowdsourcing. Research on crowdsourcing in the context of innovation extensively showed the potential of integrating the "voice of the market" by using collective intelligence for sourcing and evaluating novel ideas and customer co-creation (e.g., Blohm et al., 2016; Howe, 2008; Leimeister et al., 2009; Schlagwein and Bjørn-Andersen, 2014) and provides evidence for the value of integrating the social resources of a heterogeneous crowd into different innovation activities. While previous work on crowdsourcing in IS research has focused on discovering solutions for problems via distant search, and how to design web-based platforms and participation architectures for this context, the creation view on opportunities requires novel perspective on how crowdsourcing should be conducted. Previous research frequently rather focused on the generation and discovery of novel ideas than the evolution of an entrepreneurial opportunity. In this vein, collaboration among participants and feedback-based idea evolution remains minimal. Additionally, participation architectures are rather designed for incentivizing the post of novel ideas than co-creating and refining an existing idea (Majchrzak and Malhotra, 2013). Furthermore, entrepreneurial opportunities do not merely include a single product but rather the development of an entire firm (Ojala, 2016). This contrasts with conventional crowdsourcing efforts that consist of an open call for a modular, self-contained, and rather closed problem (Terwiesch and Xu, 2008).

Given the unique characteristics of opportunity creation as an emergent and uncertain process of iterative development fostered by interaction with the market and the important role of the crowd in the context of innovation, we conjecture that crowdsourcing is suitable to support the entrepreneurial opportunity creation process. We argue that interaction with a heterogeneous crowd allows entrepreneurs to reduce uncertainty about the objective value of an opportunity and thereby promotes the iterative development of an idea and entrepreneurial learning. This is grounded in the general logic of collective intelligence that allows to aggregate knowledge while reducing individual biases (such as overestimation). Thus, we suggest crowdsourcing for entrepreneurial opportunity creation as a noteworthy field for further research to successfully develop participation architectures, i.e. the socio-technological framework that shapes interaction and exchange, that enable an integration of the crowd with the aim of supporting the evolution of an entrepreneurial opportunity.

We seek to make four main contributions to research and practice. First, we extend previous work on theories of entrepreneurial action by showing limitations of previous approaches in the opportunity creation process (Alvarez and Barney, 2007; Venkataraman, 2003). Second, we expand research of crowdsourcing to the field of entrepreneurship by extending the principles of crowdsourcing for innovation for entrepreneurial opportunity creation. Third, we develop a research agenda to start a discourse for enhancing existing literature on the application of the crowd. Finally, we propose

crowdsourcing as a practical way for entrepreneurs to apply user-centric entrepreneurship principles (Blank, 2013; Ries, 2011).

2 Related Work

2.1 Two Alternative Theories of Entrepreneurial Action

The opportunity construct is one of the most pivotal concepts in the field of entrepreneurship (e.g., McMullen and Shepherd, 2006). In general, an opportunity is defined as a desirable situation in the future that is independent of the current resources of the entrepreneur (Stevenson and Jarillo, 1990). Researchers in the academic field of entrepreneurship, however, have different opinions regarding the nature of such opportunities. Literature thereby distinguishes between two perspectives, the discovery view (Venkataraman, 2003) and the creation view (Alvarez et al., 2013; Alvarez and Barney, 2007; Alvarez et al., 2014) on opportunities. The discovery perspective uses a critically realist view to perceive opportunities as objective and formed by exogenous shocks to existing markets and industries (Shane and Venkataraman, 2000; Shane, 2003). Opportunities are therefore discovered by the alert entrepreneur who aims at creating wealth (e.g., Kirzner, 1979). From such a perspective, decision making is risky. This means that both possible outcomes and their probabilities can be derived from information that objectively exists in the environment, for instance by customer surveys (Alvarez et al., 2014). Research on the discovery process identified the role of social interaction with the environment (e.g., market, customers) rather as simple accelerator of opportunity recognition than an active influencer of the development of such opportunities (Wood and McKinley, 2010). For instance, approaches such as idea sourcing (e.g., Leimeister et al., 2009) help the entrepreneur to reveal an opportunity that is "waiting to be recognized" and tools such as customer surveys support the assessment of the probability of an opportunity's success, thus, functioning as a source of novel and creative ideas.

On the other hand, opportunity creation theory (Alvarez and Barney, 2007; Alvarez et al., 2013) applies an evolutionary realism lens and is based on the view that reality is socially constructed. To become meaningful, opportunities must be enacted as part of the social world (Weick, 1979). This perspective implies that opportunities are not existing independently of the entrepreneur but emerge from the iterative actions undertaken to create novel ways to achieve wealth (Sarasvathy, 2001). Market disruptions are therefore not caused by exogenous changes but created endogenously by actions of entrepreneurs (Wood and McKinley, 2010). Entrepreneurs create opportunities based on their individual beliefs and perceptions, imagination, and social interaction with the environment (Alvarez and Barney, 2014). Contrary to the discovery view, the decision-making context is highly uncertain and requires incremental and intuitive decision making as entrepreneurs create context-specific knowledge where none has previously existed (Alvarez et al., 2013). The probability of future success is unknown as neither information on supply nor on demand exists before the opportunity is enacted (Sarasvathy et al., 2003). Thus, opportunities are emerging as entrepreneurial actors wait for a response from their actions (e.g., testing it in the market) and then adjust their beliefs accordingly. The creation process is iterative and the opportunity co-evolves with the surrounding environmental context in which it is embedded (Garud and Karnoe, 2003). The initial idea at the beginning of such a process is agnostic and rather represents the early thoughts of an entrepreneur than an objective discoverable opportunity. Opportunities can only be fully understood when they are enacted in interactions with the market. Initial ideas are therefore frequently reassessed, pivoted, or abandoned before the entrepreneur can finally create wealth (Ojala, 2016). The social environment, for instance potential customers, investors, or the market in general, functions as a feedback provider and helps to further develop the opportunity rather than constituting a source of objective knowledge (Alvarez et al., 2013). Emerging opportunities represent a consensus achieved during social interaction that shows what the actual market needs and other stakeholders, for instance investors, are willing to support. Therefore, entrepreneurs engage in an iterative learning process and try to persuade potential stakeholders of their initially vague ideas (Alvarez and Barney, 2007). The entrepreneur then creates the market for the opportunity by assembling actors who are interested in it (Sarasvathy, 2001). In this context, entrepreneurs create and subsequent-

ly develop their business under conditions of high uncertainty. Following this logic, we focus on opportunity creation theory as our theoretical lens.

2.2 The Opportunity Creation Process and Concepts

The opportunity creation process starts when an entrepreneur conceptualizes a potential future business idea based on her individual social experience and the formation of her cognitive evaluation of the market environment (Wood and McKinley, 2010). After the entrepreneur imagined an opportunity idea, the objectification as an act of sense making starts to set in and helps the entrepreneur to verify her initial beliefs (Weick, 1995). In this early stage of opportunity creation, the entrepreneur is confronted with a high level of uncertainty about the desirability of the opportunity. To reduce such an uncertainty, the entrepreneur aims at validating her assumptions by interacting with her social environment. Typically, entrepreneurial actors rely on like-minded peers such as friends, family members, or other contacts within their direct social network due to their instant availability. However, the value of feedback from peers provided in the process of sense making is highly dependent on their experience in this field, industry, or entrepreneurial practice in general (Dubini and Aldrich, 1991). Through the process of sense making, entrepreneurs attempt to create consensus by validating initial beliefs about the opportunity. This process transforms an idea that was previously formed in the mind of the entrepreneur into an objectified opportunity or results in an idea being abandoned if consensus was not achieved. Thereby, the objectification of an opportunity reduces an entrepreneur's uncertainty about the value of a business idea (Wood and McKinley, 2010).

In the next step, the entrepreneur actively explores and leverages ways to capitalize on the opportunity (Alvarez et al., 2013). To this end, the entrepreneur needs to engage and gain solid traction among stakeholders. In doing so, she expands her scope of interaction beyond the directly related peer group and obtains access to further resources that are critical for the opportunity creation, for instance financial or human capital, which allow him to fully exploit the envisioned opportunity (Wood and McKinley, 2010). Hence, the entrepreneur needs to create a shared view and understanding of the idea among a more peripheral group of stakeholders. In concrete terms, this involves intense and dynamic interactions. This can take on several forms such as negotiations with investors and surveying potential customers or searching for new technologies that might help to fulfill the opportunity. During this process, the entrepreneur needs to convince stakeholders of the value of the opportunity (Alvarez and Barney, 2010). Thus, the value of an opportunity can only be observed and understood after the entrepreneur has gained validation from the market (Alvarez et al., 2013). In doing so, an entrepreneur studies customer response to products and services, which allows him to identify a possible divergence between her assumptions and the actual customer perceptions and needs (Alvarez and Barney, 2007). If an entrepreneur finds a significant divergence, she may change the idea in a process of iterative actions and reactions until she receives a market fit or she might abandon the idea altogether (Wood and McKinley, 2010)

In conclusion, opportunity creation theory comprises four concepts that are central to entrepreneurial action taking: uncertainty, social interaction, iterative development, and learning. First, the underlying core assumption of each creation process is uncertainty. Uncertainty in this context regards the objective value of an idea, the needs of stakeholders, and the outcome of this iterative process (Alvarez et al., 2013). Contrary to the concept of risk, where decision makers can estimate the possible outcomes and the probability of such outcomes associated with a decision, uncertainty neither implies the possible outcomes associated with a decision nor is their probability known (March and Shapira, 1987). For opportunity creation, the concept of uncertainty has a dual role. On the one side, the entrepreneur has only insufficient information about the responses from the market or other stakeholders regarding a novel technology-based value proposition. On the other side, stakeholders, for example potential investors, perceive uncertainty or doubts about the actual value of the idea (McMullen and Shepherd, 2006). For a successful opportunity creation process, entrepreneurs should reduce both their individual uncertainty to objectify an opportunity and the uncertainty of their stakeholders to further develop the initial idea and get potential stakeholders on board (Haynie et al., 2009). Second, entrepreneurs use

social interaction with their peers, customers, and other stakeholders to reduce such an uncertainty by gathering feedback. The uncertainty about their opportunity is reduced until opportunities can be objectified and the enactment can occur (Wood and McKinley, 2010). Third, these social interactions lead to iterative changes in the beliefs and mental models concerning the initial opportunity and finally enable the entrepreneur to create wealth. Therefore, the opportunity emerges and ideas, products, or total business models are continuously reassessed, pivoted, or even abandoned (Ojala, 2016). Fourth, directly related to the iterative development, creation theory assumes that the entrepreneur should rely on experiments, feedback, and learning rather than pre-existing knowledge (Mintzberg, 1994).

2.3 Limitations of Previous Approaches to Support Opportunity Creation

Based on these three concepts, previous research in the context of opportunity creation emphasized the value of an entrepreneur's social resources to reduce uncertainty and foster learning (Wood and McKinley, 2010). Opportunity creation theory implies an evolutionary process from an initially vague idea to a fully enacted entrepreneurial opportunity that is shaped by social interaction (Tocher et al., 2015). The actions of an entrepreneur are therefore heavily influenced by the creativity and the judgment gathered during social interactions (Foss et al., 2008). However, leveraging the entrepreneur's individual social capital to fully exploit the possible value of social interactions runs its limit for several reasons.

Most obviously, if an entrepreneur explains the idea to like-minded peers and asks for feedback on the value of the possible opportunity, she will probably face several traps. For instance, the entrepreneur might encounter a self-selection bias by choosing like-minded peers who are very likely to confirm her thoughts and beliefs. Moreover, due to a halo effect, direct associates might not assess the opportunity itself but might rather assess the qualities of their entrepreneur colleague. These facts could create a misleading sense of security, ultimately leading the entrepreneur to pursue the wrong market opportunity (e.g., Lechner et al., 2006).

Second, during the objectification process, entrepreneurs need to access experienced peers who are also capable of further evaluating and developing the initial ideas (Foss et al., 2008). Thus, an entrepreneur needs contacts to experts that help to determine if a conceptualized idea is viable, thereby providing the entrepreneur the necessary information to decide if an opportunity should be adopted or rejected (Wood and McKinley, 2010). The major constraint that entrepreneurs face here is the fact that they frequently have only limited contacts and social capital. Moreover, the peers within their direct networks might not necessarily be experts in the required field. For instance, they might not have enough business knowledge, technological expertise, or simply not enough entrepreneurial experience. This problem is particularly important if the entrepreneur attempts to converge industry boundaries with her idea and therefore requires experts from various s (Tocher et al., 2015). Without access to such social resources, an entrepreneur has only little chances to reduce uncertainty and finally objectify the idea (Haynie et al., 2009). However, even if access to a small network of social contacts is given, the entrepreneur might face a representativeness bias by relying on and generalizing from small samples rather than consulting a larger number of experts (Fischhoff et al., 1977).

Third, and directly related to this fact is the problem of strong ties in an entrepreneur's network, which might lead to a limited heterogeneity of knowledge (Burt, 2004; Granovetter, 1985). To successfully enact an opportunity, the deep prior experience within one field needs to be balanced with heterogeneous knowledge and insights to enable valuable feedback and foster learning (Alvarez et al., 2013; Weick, 1979). In creating opportunities, closely relying on knowledge and experts from directly related industries or markets may make it difficult to gather valuable feedback. For instance, novel ideas that diminish traditional industry boundaries or disrupt markets require feedback from heterogeneous sources and therefore also social interaction with experts from various fields (DiMaggio, 1991). However, past research provides strong evidence that entrepreneurs tend towards interacting with contacts from closed networks that often provide only little additional information to the entrepreneur's initial assumptions (e.g., Ruef et al., 2003). On the other hand, closely related stakeholders might also face

severe biases in the phase of enactment. Previous studies showed that, for instance, venture capitalists tend to evaluate start-ups with a high level of similarity regarding the industry, educational background, or personal characteristics more favourable (Byrne, 1971; Franke et al., 2006). This similarity bias can potentially lead to disastrous decisions.

Current approaches of supporting entrepreneurs take an intermediary function and thereby aim at connecting the entrepreneur with a larger social environment. For instance, incubator services attempt to leverage the contacts to consultancies, bankers, or investors to enlarge the network of the entrepreneur and provide access to social resources. However, these services are often locally bounded and highly dependent on the social capital of each individual incubator (Mas-Verdú et al., 2015). Therefore, also these current approaches provide only limited support for enhancing an entrepreneur´s social capital. A lack of proper social resources during the opportunity creation process therefore represents the major issue why many entrepreneurial efforts fail (Tocher et al., 2015) (see Table 1).

	Opportunity Objectification	**Opportunity Enactment**
Previous Approaches	▪ Engagement with peers	▪ Engagement with related stakeholders
Limitations of Previous Approaches	▪ Limited social resources ▪ Limited market knowledge ▪ Social influence	▪ Limited social resources ▪ Homogeneity of social resources ▪ Limited expertise
Threats	▪ Self-selection bias ▪ Wrong assumptions ▪ Overestimation	▪ Representativeness bias ▪ Similarity bias ▪ False decision

Table 1. Limitations of Support for Opportunity Creation

We therefore propose that crowdsourcing, which proved to be a valuable concept in the context of innovation, is a valuable approach for entrepreneurs to reduce uncertainty and interact with the market as it provides access to heterogeneous knowledge from diverse sources.

2.4 Previous Work on Crowdsourcing for Innovation

One special instantiation of integrating interaction with a firm's environment into the process of innovation is crowdsourcing. Crowdsourcing has been developing as part of the greater open innovation movement and is thus increasingly used by firms to innovate (e.g., Poetz and Schreier, 2012). It denotes the act of a "[…] participative online activity in which an individual, an institution, a non-profit organization, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task. The undertaking of the task, of variable complexity and modularity, and in which the crowd should participate bringing their work, money, knowledge and/or experience, always entails mutual benefit."(Estellés-Arolas and González-Ladrón-De-Guevara, 2012: 197) (. The underlying rationale suggests that a large diverse crowd of independent strangers performs better on certain types of challenges than a small number of experts (Brabham, 2013; Lakhani et al., 2013). At the heart of the concept are new information systems that allow to leverage networks and therefore innovate with users outside one's association (Doan et al., 2011; Dodgson et al., 2006; Lindic et al., 2011, Trott and Hartmann, 2009).

To argue for the possible application of crowdsourcing for opportunity creation, we extensively reviewed literature on crowdsourcing for innovation to present its current applications, benefits, and organization. For this study, we focus on crowdsourcing in the context of innovation. Although crowdsourcing for innovation is far from being a new concept, it is still a topic of high interest and relevance, especially among innovation scholars (Terwiesch and Xu, 2008, Chesbrough et al., 2006; Dahlander and Gann, 2010; West and Bogers, 2013).

Prominent applications of crowdsourcing in the innovation context include idea generation (e.g., Ebner et al., 2009; Leimeister et al., 2009; Blohm et al., 2011), idea evaluation (Blohm et al., 2016; Magnusson et al., 2016; Riedl et al., 2013), as well as co-creation for new product development (e.g., Giro-

tra et al., 2010; Poetz and Schreier, 2012; Terwiesch and Ulrich, 2006). Previous research in the field shows the crowd's appropriateness as both source of and "rater" for new product and service ideas (Ogawa and Piller, 2006). Firms that apply crowdsourcing for innovation benefit from the heterogeneous and diverse crowd, which can provide the ability to discover creative solutions. Interaction with the crowd enables firms to discover novel customer requirements and user input for ideas, representing a "voice of the customer" (e.g., Dahan and Hauser 2002; Griffin and Hauser, 1993). Therefore, crowdsourcing provides both need-based information (i.e., what is the problem?) as well as solution-based information that guides companies to finding out what a potential new product or service should do (Terwiesch and Ulrich, 2009; Van Hippel, 2005).

Previous research on crowdsourcing for innovation emerged around finding an innovative solution to a certain problem. Prominent examples include idea communities such as Dell Idea storm, MyLego or Foldit where users can brainstorm and provide solutions to new products of the respective companies (Franzoni and Sauerman, 2014; Schlagwein and Bjørn-Andersen, 2014). Therefore, one highly important benefit of crowdsourcing is the crowd's ability to provide both user needs (i.e., demand-side knowledge) and product trends (i.e., supply-side knowledge) (Ozer, 2009). Moreover, the concept of crowdsourcing leverages the cognitive principle of collective intelligence, which aggregates heterogeneous knowledge while reducing errors that arise from human biases (Malone et al. 2009). Although it has been acknowledged that crowdsourcing can also be used to solve more complex tasks, predominant applications still seem to address problems that address the fuzzy front end of innovation (Brabham, 2008). Thus, idea communities providing solutions to complex problems (such as Quirky) still seem to rather be the exception than the rule.

In finding innovative solutions to a certain problem, requestors (i.e., companies) usually call upon the crowd. The crowd is thereby understood as an undefined, heterogeneous mass of people that is expected to differ in their capabilities and knowledge to solve a certain problem. The diversity of the people is believed to increase the likeliness that an innovative and creative solution will be found (Brabham, 2013). Apart from that, relatively little is known about how crowds differ in terms of knowledge and skills across different domains and solution spaces. Although research highlights the role of users, the majority of literature still treats the crowd as an undefined mass of people (Magnusson et al., 2016). Therefore, there still seems to be very little understanding of the adequate composition of crowds and which crowds may be most effective in solving certain types of problems.

In summary, crowdsourcing for innovation uses the creativity, expertise and knowledge of a heterogeneous crowd to generate novel ideas (Leimeister et al., 2009). The sponsoring firm then discovers such solutions as novel opportunities and uses the crowd to filter the most promising ideas through voting (Magnusson et al., 2016). Crowdsourcing is thus a mainly linear process of infusing external knowledge to a firm's innovation management. The development of novel products and services is then based on the ideas of the crowd. However, one limitation of previous applications of crowdsourcing for innovation is that the focus is predominantly on the generation and discovery of novel ideas rather than the evolution and iterative co-creation of such between a firm and the crowd, which is required to turn ideas into novel value propositions and business models (Cullina et al., 2016; Majchrzak and Malhotra, 2013).

2.5 Crowdsourcing for Opportunity Creation

Following the findings of the previous sections, the state of the art in research on OCT demands a higher level of heterogeneity of feedback to understand the value of an opportunity and iteratively develop such. On the other hand, the analysis of literature on crowdsourcing for innovation clarifies that crowdsourcing provides exactly those benefits for entrepreneurs and might be used to digitize the entrepreneurial process of opportunity creation. We therefore focus on crowdsourcing from an opportunity creation perspective which offers a fruitful lens to examine how crowdsourcing can help entrepreneurs to generate value in an iterative and co-creative way. We argue that social interaction with the crowd reduces uncertainty and enables the iterative development of the initial opportunity that ul-

timately triggers entrepreneurial learning. Thus, crowdsourcing could help entrepreneurs to share opportunity ideas with potential customers and stakeholders to iteratively modify and test them over time (Majchrzak and Malhotra, 2013) (see Figure 1).

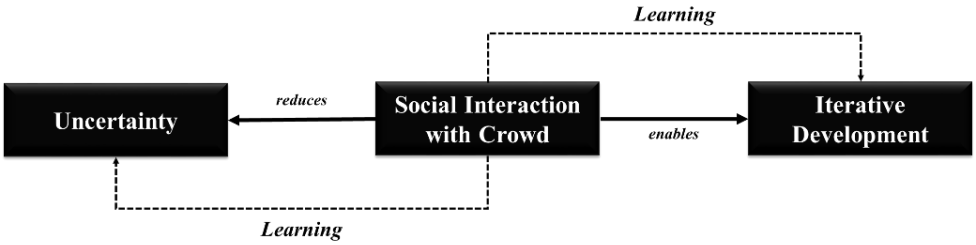

Figure 1. Conceptual Model of Crowdsourcing from an OCT Perspective

Integrating a heterogeneous crowd into the entrepreneurial process therefore provides access to social resources that are characterized by both strong heterogeneity and anonymity. Form a holistic perspective, this enables the entrepreneur to create their opportunity by using tcollective intelligence (Malone et al. 2009) and enabling the entrepreneur to gather data about the "voice of the customer" (e.g., Dahan and Hauser, 2002; Griffin and Hauser, 1993). The feedback of the crowd represents the "voice" of a potential market and therefore results in a higher level of validity meanwhile reducing the threat of overestimating the value of an idea and supporting the further development of an initial opportunity idea into a novel venture. It provides a rapid and cost-efficient way to aggregate data about the reactions of the market, feedback of functionality, or the customers' perception of a solution (e.g., Blank, 2013; Ries, 2011). By challenging her assumptions and beliefs with potential users, the entrepreneur gathers information about the value of the opportunity and the level of its product-market fit and therefore reduces her individual uncertainty by validating her assumptions (Alvarez and Barney, 2007). The feedback of the heterogeneous crowd therefore results in a higher level of validity that reduces the threat of an entrepreneur's overestimation of the value of an idea. As crowdsourcing enables the entrepreneur to use feedback from a huge number of people, the threat that she must generalize and make decisions from small samples is minimized. Vice versa the feedback from the crowd can also function as signalling that the opportunity is desirable for the market (Tocher et al., 2015). Thereby, crowdsourcing helps the entrepreneur to overcome limitations like limited access to or homogeneity of social resources. Furthermore, crowdsourcing provides valuable potential for the iterative development of the opportunity. By providing feedback, the crowd acts as active co-creator and supports the entrepreneur in further developing the opportunity. One major benefit of crowdsourcing is here the access to knowledge from the market. Finally, crowdsourcing for opportunity creation fosters entrepreneurial learning during this process by offering new insights on the market and other stakeholder´s perception of the opportunity. Thus, it enables the entrepreneur to integrate this knowledge in the further opportunity creation process.

In summary, the different concepts from OCT can be addressed by using the crowd to overcome the limitations of previous approaches, making crowdsourcing a central part of the opportunity creation process compared to single creative campaigns of huge firms. We therefore show how the main concepts of OCT and the limitations can be addressed through crowdsourcing (see Table 2).

Main Concepts of OCT	Role of the Crowd	Overcoming Limitations of Previous Approaches
Social Interaction	▪ Access to anonymous and heterogeneous social resources ▪ Access to heterogenous knowledge and error reduction	▪ Limited social resources ▪ Homogeneity of social resources ▪ Social influence ▪ Limited expertise/market knowledge
Uncertainty	▪ Evaluating the opportunity idea ▪ Reducing uncertainty about the value of the idea by signal-	▪ Limited social resources ▪ Homogeneity of social re-

	ling reaction of the market	sources
Iterative Development	▪ Providing feedback ▪ Co-creation of opportunity ▪ Enabling iterative development	▪ Limited social resources ▪ Homogeneity of social resources ▪ Limited knowledge
Learning	▪ Integration of feedback on value of the idea ▪ Learning about stakeholders' perception Integration of novel market knowledge	▪ Limited social resources ▪ Limited market knowledge ▪ Limited expertise

Table 2. The Role of Crowdsourcing from an OCT Perspective

3 What Is Different About Crowdsourcing for Opportunity Creation?

In the previous section, we argued that crowdsourcing provides several benefits for opportunity creation. The actual architectures of crowdsourcing, however, have previously been examined and tailored to the demands of the innovation management in established firm (e.g., Leimeister et al., 2009). However, we argue applying crowdsourcing to entrepreneurial opportunity creation requires an entirely different perspective that can do more than just help companies at the fuzzy front end of innovation by enabling iterative co-creation between the entrepreneur and her environment. Although single parts of crowdsourcing mechanisms and participation architectures are suitable for the iterative creation of opportunities, they do not perfectly fit their requirements due to various reasons.

First, in previous studies on crowdsourcing, the crowd represents a source of creative ideas for problem solving that can be objectively discovered through distant search (e.g., Leimeister et al., 2009). Thus, linear and one-directional social interactions with the crowd rather constitute an accelerator for recognizing ideas than collaboratively co-creating innovative value propositions. Consequently, the crowd is incentivized for posting new ideas rather than refining an existing one (Majchrzak and Malhotra, 2013).

Second, following this argumentation, crowdsourcing in the context of entrepreneurial opportunity creation requires multi-directional interactions with the crowd. From a constructivist's perspective, this is crucial to foster feedback-based idea evolution (Alvarez et al., 2013). Apart from an open call to the crowd, it requires further and intensive exchange between the initiator and the crowd. The crowd is therefore not the source of an initial idea but provides feedback on the correctness of an entrepreneur's assumptions and refines an idea. The initiation of innovation in this process, however, is to the entrepreneur, who starts the interaction with the crowd by showing her beliefs and ideas about an opportunity (Alvarez and Barney, 2007). This is a central limitation of previous IS research on crowdsourcing architectures that led to lots of failures in creating solutions that could be implemented by sponsoring firms (Majchrzak and Malhotra, 2013).

The third difference between traditional crowdsourcing efforts to foster innovation and the context of entrepreneurial opportunity creation is the level of task complexity. Contrary to previous research that focuses rather on using the crowd on the fuzzy front end of innovation (e.g. Poetz and Schreier, 2012), the support of the opportunity creation represents a more complex task. The development of an opportunity goes far beyond the creation of early-stage ideas or product innovation as it includes the complete process including an initial idea of the entrepreneur, prototypes, and finally the development of a business model and an entire start-up (Ojala, 2016). This is in contrast to previous IS research that has focused on participation architectures and platforms for modular and closed problems solving tasks and leveraging the crowd for suggesting ideas while leaving the subsequent steps in the innovation process inside the boundaries of the sponsoring firm (Leimeister et al., 2009).

Fourth, identifying a suitable crowd that represents an entrepreneur's potential stakeholders (e.g., investors, customers) is different from crowdsourcing in existing innovation communities that foster the discovery of novel ideas among existing users (e.g., Poetz and Schreier, 2012). In this context, the selection of crowd members should balance heterogeneity and expertise in the entrepreneur's technolog-

ical and industrial domain. However, required application contexts and markets are frequently not known a priori but rather emerging (Alvarez and Barney, 2007). Therefore, the requirements for crowd members' supply- and demand-side knowledge might also change over time and recruiting the crowd from a firm-specific community might be misleading. This is in contrast to the widespread principles of an open call.

Finally, opportunity creation is an evolutionary and iterative process to develop an initial idea into a new venture. In the context of crowdsourcing for innovation, however, participation architectures and platforms mainly focus on the contribution of creative ideas while they provide only limited support for the evolution of an idea or the generative co-creation to further develop such ideas into novel value propositions and business models (Majchrzak and Malhotra 2013). In general, there is frequently minimal collaboration among the innovating firm and the crowd. Therefore, the current architectures of crowdsourcing platforms for innovation emphasize the generation of novel ideas over the evolution of opportunities that are suggested by either one member of the community or the innovating firm (Madsen et al. 2012). Such participation architectures, however, are required to integrate the crowd to provide feedback and support the opportunity creation of an entrepreneur and point towards directions for developing IS research on crowdsourcing and online communities.

4 Crowdsourcing for Opportunity Creation- A Research Agenda

Based on these holistic differences between crowdsourcing for innovation and crowdsourcing for opportunity creation, we derived a structured description of more detailed requirements for the application of crowdsourcing in this new context. Based on this, we develop a research agenda that motivates and potentially guides future research. To structure our research agenda, the conceptual framework of Pedersen et al. (2013) guided us (see Figure 2). Thereby, we attempt to show how crowdsourcing could be designed to meet the requirements of opportunity creation theory (Alvarez and Barney, 2007; Alvarez et al., 2013) and provide directions for further research, thus, digitizing the entrepreneurial process

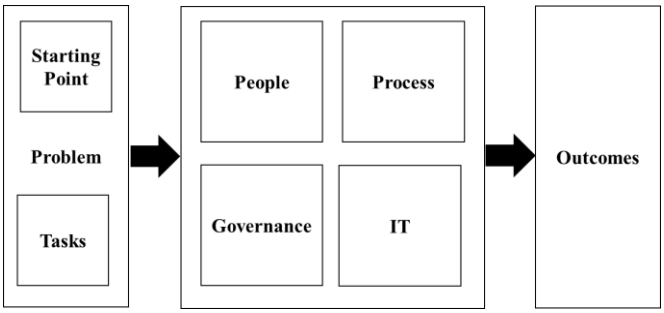

Figure 2. Conceptual Model of Crowdsourcing

The ***starting point*** in crowdsourcing for opportunity creation is an entrepreneur's initial opportunity. Opportunity creation is an iterative process that includes not just an idea or product but rather the development of an entire start-up (Alvarez et al., 2013; Ojala, 2016). Therefore, it is crucial to understand what stage of opportunity is the best starting point to apply crowdsourcing and the path dependence behind that rationale. More practical research could further focus on suitable representations of the opportunity to provide it to the crowd.

The ***problem task*** can start at different stages such as the state of an early idea pitch, a minimally viable product, a prototype, or even a business model. The task of the crowd is providing evaluation and feedback, thus reducing uncertainty (e.g., Mangusson et al. 2014) by gathering information about the "voice of the customer" (Griffin and Hauser, 1993). The focus of the problem task is therefore on the evolution of an entrepreneur's opportunity rather than the generation and discovery of novel opportunities (e.g., Majchrzak and Malhotra, 2013). The role of such opportunity evolution in a co-creative process with the crowd is one central theme for further research to better understand the core of

crowdsourcing for opportunity creation. Furthermore, future work should show how this task can be supported.

The ***people*** in crowdsourcing for opportunity creation include an anonymous and heterogeneous crowd as "solvers" and the individual entrepreneur as requestor. In this context heterogenous covers the aspect of gathering insights from multiple perspectives (e.g. customers, partners, etc.) that are all aligned by a common interest.From a holistic perspective, this enables the entrepreneur to create their opportunity by using the "wisdom of crowds" and benefit from heterogeneous knowledge (Surowiecki, 2004). Although we refer to the crowd as a heterogeneous and anonymous mass of people, the context of entrepreneurial opportunity creation demands several requirements from a "suitable" crowd that has expertise to support the entrepreneur in evolving the opportunity. In this context, we argue that it is particularly important that the crowd represents potential customers and stakeholders (e.g. partners or investors) to assemble people that are interested in the opportunity.. The benefit of crowdsourcing therefore lies in balancing supply- and demand-side knowledge (Lüthje, 2004; Magnusson, 2009). Consequently, further research in this field should focus on how to find a suitable crowd or the role of different expertise in crowdsourcing for opportunity creation. For this purpose, it is central to understand if and what different crowd characteristics are more suitable for different maturity stages of the opportunity creation process and consequently how matching mechanism might support a crowd segmentation process.

The crowdsourcing for opportunity creation ***process*** starts with the initial conceptualization of a potential future business idea by the entrepreneur (Wood and McKinley, 2010). After the entrepreneur has imagined an opportunity, the sense making starts to verify her initial beliefs (Weick, 1995). Therefore, the entrepreneur starts with a call to the crowd. The call should go to a crowd consisting of potential future customers and other stakeholders such as investors or business partners (Alvarez et al., 2013; Tocher et al., 2015). This initiation of the crowdsourcing effort elicits an iterative, dynamic process of evaluation and feedback between the entrepreneur and the crowd to co-create the opportunity. As the entrepreneur uses the interaction with and the feedback from the crowd as sense making, the process is open ended until the entrepreneur has finally objectified and enacted the opportunity (Wood and McKinley, 2010). An entrepreneur therefore individually decides about the numbers of iterations and the end of this process. Thereby, it is particularly important to understand what amount of iterations might be ideal to balance feedback and information overload. Moreover, this process requires research on guidance to support the entrepreneur during opportunity creation.

The ***governance*** of a crowdsourcing for opportunity creation process requires the entrepreneur to select an appropriate crowd (e.g., Magnusson et al., 2016), to deliberately design the task for the crowd by providing suitable feedback mechanisms (e.g., Blohm et al., 2016; Leimeister et al., 2009), and to decide on representations of the opportunity as well as to ensure an effective incentivization (e.g., Malone et al., 2009). Therefore, it is crucial to provide suitable feedback mechanisms to the crowd to ensure high-quality feedback (Riedl et al., 2010) as well as representations of the opportunity that help the crowd to understand the content of the entrepreneurial opportunity (e.g., idea pitches, ontologies, videos). An important issue for IS research is therefore the exploration and design of appropriate evaluation and feedback mechanisms that increase feedback quality. Following previous entrepreneurship research, the interaction between an individual and the crowd might be more important than a sense of community and exchange among the crowd members for opportunity creation. However, we argue that this is an interesting field for further research to explore the role of community engineering in crowdsourcing for opportunity creation. Finally, the entrepreneur should provide incentives to the crowd to ensure that it is not only capable but also willing to provide feedback and help to support the further development of the opportunity. Future work should therefore point towards an understanding of motives in opportunity creation and suitable incentivization mechanisms to attract the crowd.

IT, in this context, is an enabler that provides the technical capabilities to implement crowdsourcing for opportunity creation and guides the interaction between the entrepreneur and the crowd. The iterative co-creation process demands extensive tool support, asynchronous capabilities, and collaboration capabilities to form a crowd and facilitate successful task completion (Pedersen et al., 2013). Thus, an

interesting entry point for further research can be architectures for integrated and automated platforms, which supports the selection of a suitable crowd as well as IT tool support that facilitates co-creation during different stages of the opportunity creation process.

Finally, the ***outcome*** of crowdsourcing for opportunity creation is the feedback from the crowd, the iterative integration of knowledge into the co-creation process, and finally a fully enacted opportunity. The iterative nature of crowdsourcing for opportunity co-creation require also an iterative evolvement of outcomes from simple feedback to fully co-created value propositions. The access to such social resources through crowdsourcing results in evaluations and feedback from potential customers and other stakeholders and reduces an entrepreneur's uncertainty. Thus, crowd feedback signals the response and thoughts of potential customers and reduces uncertainty if the idea is objectively valuable. Furthermore, crowdsourcing for opportunity creation can help the entrepreneur to create an early sense of urgency for her opportunity idea and create awareness as well as commitment among potential customers. To benefit from the outcomes of the process, the entrepreneur should accept and integrate the information acquired in her future actions to facilitate learning (Alvarez et al., 2013). Hence, it is crucial to understand how outcomes should be structured and presented to the crowd and what are integration mechanisms to support entrepreneurial learning.

Based on this discussion, we propose a research agenda for crowdsourcing for opportunity creation that describes how crowdsourcing should be designed to meet the requirements of OCT (see Table 3).

	Crowdsourcing for Opportunity Creation	**Potential Research Issues**	**Exemplary Contributions**
Starting Point	▪ Initial opportunity idea at different stages (e.g., idea pitch, MVP, prototype, business model)	▪ *What are suitable ontologies for representation of the starting point?* ▪ *What stage is the best starting point?* ▪ *Is the process path dependent?*	▪ Business model or prototype ontologies for IT artefacts ▪ Reference Process Models
Tasks	▪ Evaluation and feedback ▪ Idea evolution instead of generation ▪ Should address problems that are highly contextual and require experts	▪ *What is the role of evolution in entrepreneurship?* ▪ *How can the task be supported?*	▪ Platform and task design for complex problem solving
People	▪ Crowd: volunteering potential stakeholders, potential customers, investors, and experts with specific knowledge ▪ Requestor: Individual entrepreneurs seeking to validate and create their opportunity ideas	▪ *What is the role of different expertise?* ▪ *Are different crowd characteristics for different tasks more suitable?*	▪ Expertise requirements in crowdsourcing
Process	▪ Initial opportunity creation by the entrepreneur ▪ Call to "suitable" crowd ▪ Iterative exchange Open-ended process ▪ Evaluation and co-creation between crowd and entrepreneur	▪ *How to support process guidance?* ▪ *What are appropriate feedback mechanisms?* ▪ *What is the best amount of iterations?*	▪ Experimental findings on the effect of collaboration on crowdsourcing outcomes
Governance	▪ Less requirements for community engineering ▪ Immediate incentivization needed ▪ Feedback mechanisms ▪ Quality management	▪ *What is the role of community engineering in crowdsourcing for opportunity creation?* ▪ *What are suitable incentivization mechanisms?*	▪ Activation supporting components and participation architectures for platform design
Role of IT	▪ IT as enabler ▪ Extensive tool support for opportunity creation required ▪ Need for integrated platform	▪ *How can tool support be designed?* ▪ *What are appropriate platform architectures?* ▪ *How can matching mechanisms help to find suitable crowd members?*	▪ Novel platform design principles ▪ Recommender based on crowdsourcing contributions
Outcomes	▪ Broad solution space ▪ Signalling ▪ Feedback and validation ▪ Fully enacted opportunity ▪ Acceptance of external feedback	▪ *How can outcomes be aggregated, structured and presented in IS tools?* ▪ *What are integration mechanisms to support entrepreneurial learning?*	▪ Visualization of decisional guidance ▪ Design and development of decision support systems based on crowdsourcing

Table 3. Research Agenda for Crowdsourcing for Opportunity Creation

5 Discussion and Conclusion

On a broader level, we have proposed crowdsourcing for opportunity creation as a new field of further research in both IS and entrepreneurship. We therefore took an opportunity creation perspective on entrepreneurship and highlighted the limitations of previous approaches in entrepreneurial interaction with the social environment to validate the beliefs and assumptions about an opportunity, thus, reducing uncertainty. We then conceptually developed the idea that crowdsourcing, which was previously applied in the context of innovation management in established firms is a suitable way to overcome these limitations by using the feedback from a heterogeneous crowd to reduce uncertainty and iteratively develop an opportunity into a new venture.

Our further discussion shows that crowdsourcing in its current form is rather tailored for the application in established firms than the opportunity creation context. Thus, we revealed differences between both approaches and based on this developed an agenda for further research to point towards research that explores the adaption of previous crowdsourcing mechanisms in the field of innovation for the special context of entrepreneurial opportunity creation. This is crucial for IS research to design novel IT and platform architectures that enable iterative interaction between entrepreneurs and the crowd. From a methodological perspective, interdisciplinary research on the topic of crowdsourcing for opportunity creation might consider design-oriented research approaches (e.g., Hevner et al., 2004; Peffers et al., 2007). Such possibilities might be, for instance, the development of tools to validate entrepreneurial assumptions and business models (Ries, 2011) or systems to enable online co-creation between entrepreneurs and the crowd. Thus, such research can inform practical orientation while maintaining theoretical rigor (Gregor and Hevner, 2013). Moreover, exploratory research might empirically examine recent innovative platforms such as JumpStartFund (e.g., Dellermann et al. 2017) or Quirky to provide a deeper understanding on how the interplay of openness and IT should function for supporting entrepreneurial opportunity creation.

Our theoretical contribution is therefore three-fold. First, we contribute the opportunity creation theory (Alvarez and Barney, 2007; Alvarez et al., 2014) by revealing limitations of previous approaches that entrepreneurs use to interact with the social environment to reduce uncertainty. Thereby, we showed various reasons why the social interaction with peers is insufficient to gather feedback. Second, we contribute to research on crowdsourcing in IS by extending the theoretical scope to a new field of application. Third, by highlighting the requirements of crowdsourcing for opportunity creation, we point towards potential future research issues. Such research should examine novel participation architectures that enable the iterative co-creation of an opportunity through different maturity stages, thereby overcoming the limitations of previous crowdsourcing efforts that rather focus on the generation of novel ideas than its evolution (Majchrzak and Malhotra, 2013). The crowdsourcing for opportunity creation research agenda proposed here rests on these premises. We therefore aim at making a first step towards this direction. The potential issues for future research outlined here would hopefully not only motivate but also guide future research efforts in the field of entrepreneurship and crowdsourcing in IS.

As a practical contribution of our research we propose crowdsourcing as a practical way for entrepreneurs to validate their assumptions about the objective value of their opportunity. Therefore, crowdsourcing might offer tremendous possibilities to test ideas in the market, achieve fast and early product-market fit and apply customer-centric principles to entrepreneurship (Blank, 2013; Ries, 2011). Entrepreneurs might consider applying such mechanisms for instance during crowdfunding campaigns (e.g. Lipusch et al. 2018) or use existing platforms such as JumpStartFund (Dellermann et al. 2017) or Quirky that became recently popular due to the hyperloop project. This allows entrepreneurs to validate and refine their ideas early and iterative while reducing the risk of missing customer needs.

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