
Let's generate ideas – a review of web-based crowd sourcing tools for the basis of entrepreneurship

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Abstract: The main aim of this paper is to review web-based tools designed for generating and documenting business ideas. The paper first reviews related literature and then discusses useful instruments relevant for creative entrepreneurial tasks. These tools can be helpful in the initial phase of entrepreneurial activities. While several factors are crucial for successful ideas and their implementation, the discussed web-based idea generation tools might assist in creating, evaluating and selecting entrepreneurial ideas. The aim of this manuscript is to provide an overview of such tools so that scholars and practitioners can select a tool that is appropriate for their purpose. As future work we plan an in-depth empirical investigation of these tools.

Keywords: web-based tool; idea generation; crowd sourcing tool; entrepreneurial ideas.

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1 Introduction

Creativity, also known as divergent thinking, refers to people's ability to create unique and beneficial solutions to tackle complex problems (Torrance, 1988; Mumford et al., 1991; Sternberg and Lubart, 1995; Feist, 1999; Weisberg and Hass, 2007). Creativity can be modified, taught and even improved by practising skills to increase the capability to develop unique ideas for addressing various problems (Çubukcu and Dündar, 2007; George, 2007). Evidently, creative skills are necessary for solving issues in the modern world (Runco, 2004; Ardaiz-Villanueva et al., 2011).

While the creative potential of an individual is limited, crowdsourcing represents an option for obtaining more ideas, thus maximising creative capacity. According to Howe (2006, p.99), crowdsourcing can be described as "the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call". Crowdsourcing consists of various types of tools, approaches and concepts that represent the procedure of outsourcing work (e.g., the search for ideas) to many individuals outside an organisation. This group of individuals comprise the 'crowd' in crowdsourcing. The term also has several definitions and variations. Estellés-Arolas and González-Ladrón-de-Guevara (2012) claim there are 40 definitions of crowdsourcing and offered their own definition of the term. Their conception of crowdsourcing includes eight characteristics, among which is the utilisation of a crowd for solving problems (Chiu et al., 2014; Hossain and Islam, 2015).

Despite its various definitions, crowdsourcing is essentially a methodology of work distribution among many workers in an organisation or external to an organisation to improve decision-making and performing tasks as well as to promote co-creation of projects (Chiu et al., 2014). There are many types of crowdsourcing applications; nevertheless, the one analysed here involves how crowdsourcing can be used to support the stages of idea generation for innovative-driven entrepreneurs. A framework was developed to identify tools for the process of entrepreneurial idea generation. This context helps to organise already available literature and discusses web-based tools for future empirical evaluation. This framework offers guidance regarding entrepreneurial opportunities to increase practitioner knowledge so they can apply crowdsourcing more effectively (Chiu et al., 2014).

Because crowdsourcing is a business practice involving outsourcing activities to a crowd (Howe, 2006; Chiu et al., 2014), organisations in the private, public and government sectors use crowdsourcing for various reasons. However, crowdsourcing is mostly used to attain solutions for persistent and difficult problems. Moreover, some reasons for using crowdsourcing are linked to the limited resources and capabilities of the organisation and the strategic tendency to focus on core competencies (Schenk and Guittard, 2009; Chiu et al., 2014). In this framework, companies of multiple sizes increasingly use web-based tools to cooperate with crowds to generate ideas (Sawhney and Prandelli, 2000; Sawhney et al., 2005). Thus, web-based crowdsourcing via idea generation tools represents more and more an efficient way to produce ideas (Chesbrough, 2003; Dahlander and Wallin, 2006; Hossain and Islam, 2015).

Web-based crowdsourcing for idea generation has been receiving continuous momentum from a diverse set of stakeholders. In particular, scholars must enhance research examining idea crowdsourcing and its evaluation (Schulze and Hoegl, 2008;

Poetz and Schreier, 2012; Hossain and Kauranen, 2015). It is crucial to find the best ideas in a large pool of submitted ideas throughout the pursuit of entrepreneurial opportunities (Jouret, 2009). Also, it is not known which web-based tools show the most potential regarding how to find and support individuals who are engaged in the idea generation process to transform ideas into successful outcomes (Kristensson and Magnusson, 2010). Hargadon and Bechky (2006) claim that cooperative actions in communities can generate new ideas that a firm or customer cannot develop on their own (Chan et al., 2015). However, the question remains of whether and how online interactions of users influence the generation of ideas positively with respect to its long-term success within idea crowdsourcing communities (Bayus, 2013; Di Gangi et al., 2010). Thus, as a basis for future empirical research, it is crucial to first review existing tools designed for idea generation.

Despite open research gaps, many different technological instruments have been utilised to boost creativity for supporting the idea generation process (Lazzeretti et al., 2008; Ardaiz-Villanueva et al., 2011). Several researchers are working on improving the performance of novel applications in this regard (e.g., Fleming et al., 2007; Johnson et al., 2002; McLoughlin and Lee, 2009; Ardaiz-Villanueva et al., 2011). Although web-based potential is stressed in various ways (Becker, 2000; Cooper and Brna, 2002), researchers' reviews and influence on boosting creativity skills need more in-depth investigations (Florida, 2002, 2005; Cennamo and Vernon, 2008; Jang, 2009). Shneiderman (2007) claims that although there has already been a wide range of research regarding creative skills in various categories, the matter of web-based instruments for entrepreneurial idea generation is quite novel. It is necessary to investigate which web-based applications regarding creative thinking are available to clarify how using these tools can enable entrepreneurial idea creation and successful implementation (Ardaiz-Villanueva et al., 2011). Consequently, this paper will contribute to this literature stream and will also provide a vital fundament for further empirical research.

This paper is organised as follows. In the next section, the theoretical background is explained, specifically the link between innovation and creativity, the influencing factors, open innovation and co-creation. Subsequently, the applied methods for the review of web-based idea generation tools are described. Next, an organising review framework is mapped. Additionally, the different tools are discussed and suggestions for future research are proposed. The paper closes with a conclusion section.

2 Theoretical background

With the increasing attention toward information and communication technologies (ICTs), computer-assisted creativity tools (Bao et al., 2010) have become well-known instruments to communicate and work cooperatively. Organisations increasingly use both computer-based and web-based tools to support business procedures and to identify creative ideas for the organisation. The creative performance of individuals inside and outside the company can support the firm's success. The impact on and results attained by firms through ICT-based collaboration has been examined in the literature. Nevertheless, little attention has been paid to mechanisms that can improve creativity with a focus on entrepreneurial idea generation.

Wang et al. (2015) attempt to present the impact of two essential motivational aspects – performance feedback and targets – on perceived creative skills and competence

regarding computer-based cooperation. By utilising computer-based idea generation as a collaboration systems' instantiation, they conducted a controlled, laboratory experiment to test the impact of performance targets and various types of feedback on perceived competence and creativity. The outcome displays the struggle of performance targets and the kind of performance feedback being communicated and the impact on people's perceived competence, which impacts creativity (Wang et al., 2015). Furthermore, studies on information systems (IS) evaluated how ICTs impact group collaboration and help people create ideas in various contexts (e.g., Diehl and Stroebe, 1987; Connolly et al., 1990; Michinov and Primois, 2005; Valacich et al., 2006; Jung et al., 2010). The studies assessed different factors related to groups and the environment that could impact performance (Jung et al., 2010). Nevertheless, further research on entrepreneurial idea generation with a particular focus on web-based environments is required (Jung et al., 2010; Wang et al., 2015).

Although research related to web-based instruments for entrepreneurial idea generation still calls for further efforts, colleagues stress that motivation represents a key ingredient for idea generation (Venkatesh and Speier, 1999; Steers et al., 2004; Wasko and Faraj, 2005; Wang and Clay, 2012) owing to the positive impacts of motivation on individuals' levels of dynamism and determination (Ryan and Deci, 2000). For instance, "managers see motivation as an integral part of the performance equation at all levels, while organizational researchers see it as a fundamental building block in the development of useful theories of effective management practice" [Steers et al., (2004), p.379; Wang et al., 2015]. In this framework, the self-determination theory is used to understand how to satisfy people's needs and boost creativity (Deci and Ryan, 1985; Ryan and Deci, 2000). This theory highlights that people are growth- and action-oriented as well as determined for personality development and behavioural self-regulation (Ryan et al., 1997). The theory also clarifies peoples' "inherent growth tendencies and innate psychological needs that are the basis for their self-motivation as well as for the conditions that foster those positive processes" [Ryan and Deci, (2000), p.68]. The self-determination theory suggests three mental necessities to assist an individual's development and self-motivation, including the need for competence (White, 1963; Harter, 1978), autonomy (DeCharms, 1968; Deci, 1975) and relatedness (Reis, 1994; Baumeister and Leary, 1995). In detail, autonomy is described as the necessity to experience choice and control (DeCharms, 1968); the need for relatedness refers to an individual's wish to create and uphold common respect and care for others (Baumeister and Leary, 1995; Harlow, 1958); finally, the aspect of competence concerns the desire to perform well when it comes to challenges and reach the wanted results (Skinner, 1995; White, 1959). Based on these fundamental environments, Wang et al.'s (2015) objective is to understand how to boost creativity of co-working individuals in their idea generation in a web-based setting. This central requirement represents the framework for review of the web-based tools' in this paper.

Overall, the first process theorisation of creativity is defined by Helmholtz-Poincaré-Getzels (Lubart, 2003) or Wallas (Ogot and Okudan, 2007). The incubation and insight concepts are introduced and build on "individuality, insight and outstanding ability". An additional mental creativity aspect might be the links between analogies and ideas (Boden, 1994; Gero and Kannengiesser, 2004; Gabriel et al., 2016). The concentration of idea generation is on assisting an individual in the swap of their knowledge and expertise regarding the creativity's collective level. The thought of

generating ideas is preferred to insight and incubation. The creative problem-solving method and the brainstorming method are common procedures (Osborn, 1963; Gabriel et al., 2016). These present further requirements for the web-based idea generation tool for connecting innovation of entrepreneurship and unique creativity.

2.1 Innovation and creativity

The definition of innovation is the acceptance and the common application of a novel product, process or service. Innovation expresses the idea of beneficial value from an economic perspective (Tidd and Bessant, 2009). If innovation is viewed as a process, creativity is often seen as a component of innovation (Boly, 2008; Tidd and Bessant, 2009; Damanpour and Aravind, 2012; Gabriel et al., 2016). Thus, the terms ‘innovation’ and ‘creativity’ are often utilised synonymously; however, the notion of creativity is much wider in scope than innovation. Innovation concerns making money with ideas, while creativity refers to the creation of new ideas (Rosenfeld and Servo, 1991; Whiting, 1989). Therefore, innovation’s starting point is creativity in entrepreneurship. In other words, creativity is the heart of innovative entrepreneurship. Via creativity, the innovative system begins and keeps ‘beating’.

After successful idea creation, innovation becomes alive and mostly includes the work of many people with various skills. Innovation’s challenge is to convert ideas into successful products or services that will advance organisational productivity (Rosenfeld and Servo, 1991; Klein and Dologite, 2000). Some researchers (e.g., Frame, 1989; Couger et al., 1990, 1993) made the distinction between innovation and creativity clear by applying the metaphor of a link between invention and discovery. Innovation is focused on the implementation of ideas, and invention concentrates on implementing a discovery. Specifically, the process of innovation is to put new, creative ideas into practice (Rickards, 1988; Klein and Dologite, 2000).

Generally speaking, creativity – like innovation – is seen differently from different perspectives, because some authors explain it as a mindset, some as a procedure and some as an outcome. The literature regarding creativity is characterised by a diverse pool of definitions. In the context of solving a problem, the most frequently used definition of creativity refers to the ability to attain updated concepts (Lubart, 2003) or the ability to create something new for a context (Howard et al., 2008). Creativity balances novelty and appropriate usefulness (Puccio and Cabra, 2012; Zeng et al., 2011; Howard et al., 2008), which is accomplished by utilising already available information (Ogot and Okudan, 2007; Gabriel et al., 2016).

As already highlighted, the definition of creativity is characterised by mixed discussions (e.g., Bruner, 1968; Keil, 1987; Miller, 1987; Parnes, 1967, 1992). For instance, Rhodes (1961) conceptualised four elements to utilise as a framework for examining creativity (Fellers and Bostrom, 1993; Woodman et al., 1993) as well as measuring it (MacKinnon, 1978; Mooney, 1963; Isaksen et al., 1993; Klein and Dologite, 2000). Both creativity and innovation represent vital ingredients to boost entrepreneurship through web-based information technology. Innovation has an direct and strong influence on leveraging technology to generate positive outcomes regarding the organisation’s overall profitability, whereas improvement causes business processes to be quicker and more effective (McClean and Smits, 1993; Klein and Dologite, 2000).

As the heart of innovative entrepreneurship, creativity represents a vital dimension for organisations that want to increase competitiveness via innovation. Procedures should be

created and implemented to foster the potential of creativity in organisations so that way every stakeholder can participate in a cooperative and timely manner, even with the many levels of dispersion that could separate them. Open innovation strategies and related web-based platforms support the emerging trend related to open innovation and (co-)collaboration. In this context, Gabriel et al. (2016) address digital schemes, which support creativity via innovative initiatives and approaches of innovation. Overall, creating a web-based system or platform to help integrate creativity in the innovation process is vital for the firm's long-term performance with respect to innovation (Ardaiz-Villanueva et al., 2011; Gabriel et al., 2016).

Despite the flourishing open innovation approach, the results of the investigation regarding the effectiveness of web-based creative group activity are inconsistent. While Campbell (1968) claims that 'best members' perform better than the whole working group, Laughlin and Barth (1981) provide support that the performance of a group is better than an individual. Several studies followed which discussed the effectiveness of web-based tools (e.g., Thompson and Randall, 2001; Hungwei et al., 2009; Yu-Chu and Chun Fu, 2015; Diliello et al., 2011; Abdulrahman and Al, 2015). Regarding generating ideas, Douglas (1983) states that teams create better and more solutions together. Thus, the potential to develop a creative and new solution increases (Klein and Dologite, 2000). Several researchers explored the small work groups' effectiveness (Douglas, 1983; McGrath, 1984) to suggest methods to optimise team work as well as decision-making within teams (DeSanctis and Gallupe, 1987). Furthermore, studies have been conducted to examine how structured group management methods and techniques can improve idea generation (e.g., Ulschak et al., 1981; VanGundy, 1984; Klein and Dologite, 2000). However, research regarding the web-based environment with a focus on idea generation for innovative entrepreneurship is still in its infancy.

3 Method

Gabriel et al. (2016) explores how existing digital instruments related to creativity are supporting the idea generation processes. Examining these tools requires consideration of the cognitive and social creativity process, social interaction by the mode of collaboration and the environmental aspects as the technological means and the creative methods used (Gabriel et al., 2016). Overall, there are several ways to assist idea generation (Clapham, 1997; Smith, 1998; Shah et al., 2002). Krippendorff's (2005) design discourses and Alexander's et al. (1977) pattern language for architecture claim that common patterns in fruitful solutions are recognised at different levels, connecting the designer with a wide array of useful information from former projects in a precise format (Alexander et al., 1977). The merged information regarding design can be seen as heuristic knowledge (Fu et al., 2015). Heuristics are defined as universal 'mental shortcuts' that can lead to solutions (Nisbett and Ross, 1980) (Goldstein et al., 2001). Vital features are captured by heuristics (Clancey, 1985). The process includes the implementation of the eight stages of the thinking actively in a social context method presented by Wallace and Adams (1993). The stages are gathering, goals, idea generation, idea evaluation, project development, assessment, presentation and reflection (Ardaiz-Villanueva et al., 2011). These stages have been considered within this review of web-based tools. Open source idea generation tools have been collected from the web, and strengths and weaknesses are noted while

fulfilling the fundamental discussed requirements for boosting idea generation and innovation support.

The overview of some tools in Section 4 establishes the basis for future research to perform the following stages based on previous contributions (Ardaiz-Villanueva et al., 2011).

- 1 *Gathering and organising*: The moderator introduces the different tools. After this, the participants use the different tools so that the individual gets familiar with each one.
- 2 *Setting goals*: With assistance from the moderator, the goals for the idea generation workshop via diverse tools are defined. The criteria of the evaluation are accessible via an online questionnaire. The questionnaire should provide scales related to usability, perceived level of satisfaction and ease of use (Lund, 2001; Davis, 1989), perceived expectations connected to the used tool (Ardaiz-Villanueva et al., 2011) as well as the entrepreneurial discovery process (Tang et al., 2012).
- 3 *Generating ideas*: The individuals suggest ideas via the different portals, taking the different objectives for each tool into account. This phase should take several weeks. The individuals explain their own ideas to all the other individuals anonymously and evaluate others' ideas in the web-based environment.
- 4 *Assessment*: In this phase of the experiment, the results of the online assessment questionnaire are inspected via structural equation modelling.

Although a large amount of instruments exist already, a gap is still existent between the evaluation of these tools and their potential to boost the processes of creativity to enhance the benefits and changes of innovative entrepreneurship. This review presents a systematic study of the literature and web-based offers of already-available digital instruments that focus on the idea generation phase within the crowd. Via search engines, 17 open source tools were found that fulfil the discussed requirements of the existing literature. By examining these digital tools, co-creation during creative processes is supported (Gabriel et al., 2016). However, this study does not claim to provide a full list of such tools. It should serve as first coarse-grained review for future research.

4 Instrument overview of some tools of idea generation tools for open innovation and co-creation

The reviewed tools are created to increase creativity by offering information and assistance. The tools counteract the brainstorming processes with 'pen and paper' (Puccio and Cabra, 2012; Gutwein, 2013). Although well-known and widely studied, brainstorming is not the only method addressed by assistance tools. For example, TRIZ, an inventive problem-solving tool, includes the accessible TRIZ 406 or the expert-oriented TRIZAcquisition (Zanni-Merk et al., 2009; Gabriel et al., 2016). Overall, the open innovation concept builds on the notion that firms combine ideas from the outside with internal ideas to boost innovation and competitiveness (Chesbrough, 2006,

2011). There are many methodologies to import ideas from outside of an organisation. For example, consultants, focus groups or other cooperation methodologies are used to assist open innovation. Recently, many novel methods and instruments were created, for instance, co-creation, user innovation (von Hippel and Euchner, 2013), collective intelligence and crowdsourcing. Sloane (2011) and Loren (2011) provide a wide-ranging overview and typology in their work (Chiu et al., 2014).

Co-creation refers to a collaborative effort of consumers and producers to create innovations (Prahalad and Ramaswamy, 2000; Zwass, 2010). Co-creation could be seen as a facilitator of open innovation. Co-creation is different to crowdsourcing. Crowdsourcing deals with outsourcing tasks or projects to the public to gather many ideas from the people offering various types of support (Chiu et al., 2014). The participants of co-creation can share their experiences, ask questions, comment, vote on ideas and answer questions from other users on these platforms. As a result, they create the ideas as a community inside and outside of an organisation (Rowley et al., 2007; Hossain and Islam, 2015). Overall, the people's motivation to take part on a platform is a vital factor regarding the platform's success (Hossain and Islam, 2015). Table 1 maps a selection of web-based tools and outlines each tool's strengths and weaknesses.

Table 1 List of idea generation tools (non-exclusive list)

<i>Name URL:</i>	<i>Description</i>	<i>Strengths</i>	<i>Weaknesses</i>
Pengloo http://pengloo.com	Pengloo is a tool for fleshing out ideas. Specifically, the tool helps with writing down ideas, structuring them, sharing them, improving them over time and breaking them down into smaller portions (Pengloo, 2016).	Provides support for collecting ideas and revising them after time. The ideas can be made public. It is free to use for everyone.	Anyone who has the link can alter the idea. There is no undo button. An account is necessary to access the tool.
Evernote http://www.evernote.com	One can create a list of tasks, note reminders or take a picture of a scribble. A note can be anything and can be edited and viewed anywhere (Evernote, 2016).	Can be used on every platform (web, application, smartphone, etc.). It is free (subscriptions are also available). One can share ideas with other people. This tool is not only for remembering, it can also be used for project management. Pictures and other items can be uploaded to the notes.	Evernote is not in sync with Microsoft Office or Google Docs (for instance, like OneNote or Google Keep). An account to access the content of Evernote is necessary.

Table 1 List of idea generation tools (non-exclusive list) (continued)

<i>Name URL:</i>	<i>Description</i>	<i>Strengths</i>	<i>Weaknesses</i>
Tricider http://www.tricider.com	Tricider is a tool where someone can ask a question and invite friends and colleagues to join. Here, one can collect ideas and also vote on them (tricider, 2016).	Questions can be asked to gain ideas on a specific topic. Questions can be shared on various social media platforms. People can add ideas, add pros and cons to each idea and vote on every idea. Logging in is not necessary to use the tool.	This tool has a rather broad spectrum of topics which can be seen as both advantage or disadvantage depending on one's needs.
Tumblr http://www.tumblr.com	On Tumblr, one can create a blog with various content, such as, stories, pictures, GIF's, TV shows, links, etc. In these blogs, one can find support, which may lead to ideas for his/her own project (Tumblr, 2016).	Ideas can be found on this site and can be shared with other people. One can follow people who post interesting and potentially beneficial ideas. People can comment on each post to gain more information regarding the idea.	One can only post the idea to the public so anyone can see the post/idea (it could be therefore copied by someone else). It is a form of social media, which means one has to have a Tumblr account to be able to post and view posts from other people.
Pinterest http://www.pinterest.com	Pinterest is a catalogue full of ideas. One can search and collect various ideas regarding many different kinds of topics (Pinterest, 2016).	This platform is an easy way of getting ideas for a wide range of topics. One can save these topics as 'pins'. One can follow specific words or people to be updated with new pins.	To use the site, an account is necessary. Ideas can only be pinned.
Listly http://list.ly	Lastly is a tool where the user can discover and create lists. There, the user's interests can be shared. Additionally, one can collaborate with friends and involve his/ her audience (Listly, 2016).	Information can be collected in one place. Videos and other items can be posted, and others can add information. People can add other videos or can comment underneath it and also post the whole list on other platforms, blogs, etc.	To view a public list, one does not need an account; however, to create a list one needs to log in with an account. The free user is allowed to create three free lists. Anyone can see this list. Private lists are only available when a subscription is bought.

Table 1 List of idea generation tools (non-exclusive list) (continued)

<i>Name URL:</i>	<i>Description</i>	<i>Strengths</i>	<i>Weaknesses</i>
Scoop.it http://www.scoop.it	Scoop.it is a platform where one can build an online presence by providing content. Here, one can rapidly find content regarding certain keywords. On this platform, one can organise ideas, add a perspective and publish information on one's own page. In addition, this data can be shared on social media platforms and embedded on a website (Scoop.it, 2016).	This tool is supportive for finding new content on a specific topic. Suggestions can be received from Scoop.it and can be posted on various social media sites, blogs, etc., to get the word of various topics 'out there'.	To use this as a business, a business account is necessary (a fee must be paid); however, one has more options by having a business account (e.g., view analytics, and other useful tools).
Padlet http://padlet.com	Padlet is a tool that lets one share his/her thoughts concerning a common topic. The concept works like a sheet of paper online where one can post any content on this page with anyone and on any device (Padlet, 2016).	All information can be collected in one place. Can add 'friends' to a 'padlet' and can give friends a role (e.g., can only read, etc.). Supports almost every document format. Very simple to use.	For businesses, one must pay an annual or a monthly fee. However, with a business account, more features are available.
Elevatr http://www.elevatr.com	Elevatr is a platform to capture, organise and share ideas (Elevatr, 2016).	This tool focuses on business ideas. Sharing and exploiting these ideas play key roles in this tool.	It is free, but only for the iPhone.
Kiunei http://www.kiunei.com	Kiunei represents a question and answer tool for events (Kiunei, 2016).	Supportive to gain data from presentations, events, etc. Can connect it to a Google account. People in the audience can ask questions, and people can also vote on these questions to determine which questions are the most pressing.	An account is necessary to access the features and program.

Table 1 List of idea generation tools (non-exclusive list) (continued)

<i>Name URL:</i>	<i>Description</i>	<i>Strengths</i>	<i>Weaknesses</i>
Wridea http://wridea.com	Wridea is an online idea management and cooperative platform. It is used for organising ideas with friends (Wridea, 2016).	Ideas can be written down, shared and organised.	An account is necessary to access the application.
Germ http://germ.io	Germ allows a team to capture ideas, brainstorm and turn ideas into project plans (germ.io, 2016).	One can brainstorm ideas, and one can capture the idea in a realistic way – no idea gets lost. These ideas can be turned into project plans.	An account is necessary to use this tool properly.
OpenIdeaL http://openidealapp.com	This tool is an idea management system for companies and organisations that are interested in sharing decisions and future planning of services and products with their costumers (OpenideaL, 2016).	It can be altered to one's wishes. It is adequate for people who want to gain ideas from the public and also from clients.	A person has to maintain the site. Someone also has to filter the ideas which could be time consuming.
Eideabox http://eideabox.com	This tool tries to close the gap between the management floor and the shop floor. This tool lets people share their ideas (Eideabox, 2016).	Supportive for gaining ideas from inside a company. The employees have the chance to have a voice regarding various topics. Employees will feel valued.	Someone has to filter out the ideas. This could be time consuming. A free version can be only used for up to 50 users.
Conflux http://cnflx.io	This tool allows one to have all feedback in one place. Here, ideas can be presented. The users of a product can be involved regarding the product's features and changes (Conflux, 2016).	Supportive to get people more involved while developing a product. The admins can ask questions, and the users (potential customers) can add ideas and comments that could be considered for the upcoming product. Additional features exist.	It is not yet finished. Someone has to go through all of the ideas to identify the valuable ideas that can be considered for implementation into the product or service. This could be time consuming.

Table 1 List of idea generation tools (non-exclusive list) (continued)

<i>Name URL:</i>	<i>Description</i>	<i>Strengths</i>	<i>Weaknesses</i>
IdeaScale http://ideascale.com	This tool is an innovation management online platform, which uses crowdsourcing to help a user to find and develop a project (IdeaScale, 2016).	Interesting way of crowdsourcing. One can get feedback from customers, which can be implemented into this new product or service. One can share the ideas.	Registered users can vote and comment on the ideas. A person has to go through all of the ideas to consider the ones to be implemented. It would be beneficial to have a subscription (which requires a fee) to receive access to more features.
Trello http://trello.com	This tool is a flexible and visual way to share everything with anyone for free. One can view a whole project at one glance	One can generate boards, lists, maps, users, check lists, attachments, etc., in the free version. There are more features in the bought version (subscription, fee). The users that one has invited onto the board can add content on it. It all happens in real-time.	For a full version, which includes the ability to create a team, one must buy a subscription of this tool.

All the examined tools assist with the co-creation of ideas and with the assessment of ideas in networks of brainstorming. Specifically, all are seen as online interactive instruments that offer a range of capabilities beyond other systems for brainstorming (Prante et al., 2002). The tools are simple to understand and use since each idea is formed via generating, communicating, analysing and assessing information (Ardaiz-Villanueva et al., 2011). Basically, all tools try to help users with producing ideas by eliminating restriction to the amount of ideas that can be monitored as well as debated. Additionally, Wikideas and Creativity Connector tools show potential to assist with generating ideas and forming teams (Ardaiz-Villanueva et al., 2011). Both of these tools are realised with Wiki technology and social networking. These technologies include tools, mechanisms and standards that assist with the cooperative actions of user communities on websites. The Wiki technology allows the concurrent generation and editing of online web pages (Cunningham and Leuf, 2001). The transformation of collaboration is permitted over time by the evolution of technologies in idea generation tools (Gabriel et al., 2016). Collaborative functionalities are key elements when using digital instruments in idea generation systems that are a 'hybrid real-virtual environment' (Sorli and Stokic, 2009).

5 Discussion and conclusions

Although there is a large amount of literature on open innovation and crowdsourcing for idea generation, there are only a few that review and assess the practical relevance of existing web-based tools. We contribute to closing this gap selecting 17 open source idea generation tools and sketching some of their strengths and weaknesses. The results add to the literature of user innovation literature by presenting ways to produce new, creative and innovative ideas for entrepreneurship (Brem and Bilgram, 2015).

As a next step, it is essential to create indicators to quantify the influence of each tool on ideation mechanisms and ideation procedures. Van der Lugt (2003) concentrates on self-evaluation of ideas from participants. Shah and Vargas-Hernandez (2003) and Nelson et al. (2009) used metrics to estimate the efficiency of the ideation (Tyl et al., 2015). In other words, the tools need to be analysed regarding their potential for producing successful ideas for the long run. A measurement of idea generation performance and novelty of the generated ideas is required.

Regarding measuring the performance of idea generation tools, prior literature provides useful indicators. For instance, Oman et al. (2012) compare creativity metrics and present novel approaches. Amara et al. (2008) sum up various actions containing items and scales. Lastly, Kudrowitz and Wallace (2013) propose a metric including the novelty, usefulness and feasibility to assess a large amount of ideas (Tyl et al., 2015). Fundamentally, the assessment should also provide scales related to usability, perceived level of satisfaction and ease of use (Lund, 2001; Davis, 1989) and perceived expectations connected to the used tool (Ardaiz-Villanueva et al., 2011) as well as the entrepreneurial discovery process (Tang et al., 2012).

Because of increasing competition in ICT, an important success criterion of web-based tools is their ability to bring end users closer together. Platforms regarding crowdsourcing and open innovation already tried to reduce the gap through providing opportunities for individual developers and start-ups to share their 'dream' with other people to endorse their idea, build it cooperatively and receive the capital to make the idea a reality (Franken et al., 2015). Overall, several digital tools are available to assist creativity, which focus on the stage of the process of creativity, especially the ideation phase (Puccio and Cabra, 2012). Based on the overview of some tools provided by this paper, individuals will gain from the presented instruments idea generation, sharing ideas with others and assessing ideas from others. The outcome is similar to other studies that examined creativity and support of relevant tools (e.g., Florida, 2002, 2005; Jang, 2009; Shneiderman, 2007; Chidambaram and Tung, 2005; Dornburg et al., 2009; Michinov and Primois, 2005; Ardaiz-Villanueva et al., 2011). However, digital tools for idea generation are no panacea for being successful in finding the key idea. Many other success indicators will influence a successful implementation of an idea at an early stage, such as psychological empowerment (e.g., Gumusluoglu and Ilsev, 2009), entrepreneurial competence (e.g., Obschonka et al., 2012) or mindfulness (e.g., Baas et al., 2014).

Selecting a small amount of implementable ideas from the large pool of ideas takes time. This issue is confirmed in many studies (Jouret, 2009; Bayus, 2013). Nonetheless, the crowd and idea generation communities do not bother about the usefulness of the generated ideas (Hossain and Islam, 2015). The authors (Hossain and Islam, 2015) discovered that although the crowd may immensely grow over time, the amount of useful ideas does not grow at an equal rate. This outcome is verified in some studies (Bayus, 2013; Westerski et al., 2013). Thus, the evolvement of an idea seems to be essential. The

tools sketched in Section 4 show at least potential and provide a useful basis for future comparative evaluations within further investigations in this framework.

Open source, open innovation, co-creation processes and crowdsourcing are being used more and more in making decisions in business. Furthermore, the research regarding these topics is also reaching momentum to create (entrepreneurial) opportunities. A large number of research studies have already been issued on this topic. This article contributes to the discussion by focusing on the practical implications of using these tools through providing a mapping of available open source idea generation tools within the open innovation phenomenon to present an organising framework for characterising these tools and to find possible areas of interest for further research (Chiu et al., 2014).

This paper contributes to a systematic discussion of idea generation tools. In a next step the selected tools need to be evaluated using a comparative approach and a large set of users. In this framework, a diverse set of stakeholders should be asked to evaluate the platforms regarding usefulness, ease of use and impact on the idea generation's success. In the future, researchers could then draw on qualitative and quantitative research that offers a groundwork for structured comparisons for idea generation tools. In addition, the outcome of this paper could differ across geographical regions given cultural variations (Brem and Freitag, 2015). However, to the best of our knowledge, this is the first comprehensive overview of web-based idea generation tools using and therefore offers fundamental groundwork for future evaluation studies.

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