



# Assessing the maturity of crowdventuring for corporate entrepreneurship

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## KEYWORDS

Assessment tools;  
Collective intelligence;  
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Maturity

**Abstract** Corporate entrepreneurship is a process of strategic renewal and development of an existing business through the creation of new products, services, and activities, as well as new competitive postures and independent ventures. The performance of this process, which leverages the creativity and the initiative spirit of employees and managers, is thus relying on the capacity of the organization to create favorable conditions for the emergence of such latent entrepreneurial potential. The development of participatory innovation models and collective intelligence offer new insights for conducting research on factors enabling corporate entrepreneurship. In particular, the internal company ‘crowd’ can be investigated with the purpose to study the conditions under which the corporate entrepreneurship process can be successfully nurtured and conducted. In such view, this article moves from an extended review of corporate entrepreneurship and organizational innovation literature to define the concept of crowdventuring and to present an assessment tool aimed to evaluate the maturity of the crowdventuring process within an organization. The tool, which captures both individual and organization-related factors, is also used for an illustrative application into a multinational IT company. Some implications are also drawn at theory and practitioner levels.

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## 1. Corporate entrepreneurship: Quo vadis?

Corporate entrepreneurship (CE) is an all-encompassing concept that indicates the process of strategic renewal of existing business (Zahra,

1991), as well as the creation of new ventures, products or services, or new strategic postures driving organizational innovation (Antoncic & Hisrich, 2004; Antoncic & Prodan, 2008). The construct is multi-faceted and includes several dimensions such as innovation, corporate venturing, intrapreneurship, strategic renewal, and industry rule breaking (Guth & Ginsberg, 1990; Hanan, 1976; Hornsby, Kuratko, & Zahra, 2002; Kuratko, Covin, & Garrett, 2009; Kuratko, Montagno, & Hornsby, 1990; Thornberry,

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2001; Vesper, 1984; Zahra & Covin, 1995). As a company process, CE is strongly associated with increased financial performance measured in terms of profitability, market share, and growth (Lumpkin & Dess, 1996; Zahra, 1991; Zahra & Covin, 1995) with success cases such as Apple, 3M, Procter & Gamble, Google, and Philips (Ford, Garnsey, & Probert, 2010; Kuratko, Hornsby, & Covin, 2014).

The relevance of the topic has attracted considerable interest of researchers, particularly for the analysis of the factors that may enable (or hinder) the successful undertaking of entrepreneurship processes within organizations. The CEAI (*Corporate Entrepreneurship Assessment Instrument*; Hornsby et al., 2002; Hornsby, Holt, & Kuratko, 2008) was introduced to focus on antecedents like management support, work discretion/autonomy, rewards/reinforcement systems, time availability, and organizational boundaries. Ireland, Kuratko, and Morris (2006a, 2006b) presented the Entrepreneurial Health Audit, a tool for assessing the firm's entrepreneurial intensity and identifying the characteristics that may support or hinder the internal entrepreneurial process. The entrepreneurial intensity is described in terms of degree (innovativeness, risk-taking, and proactivity) and frequency (new products, services, or processes), where the organizational characteristics are evaluated using the Corporate Entrepreneurship Climate Instrument (similar to the CEAI).

Later, Ireland, Covin, and Kuratko (2009) proposed a model including the antecedents of CE (individual entrepreneurial cognitions and external conditions), the founding elements (entrepreneurial vision of top management and organizational conditions), and the expected outcomes (competitive capability and strategic repositioning). Morris, van Vuuren, Cornwall, and Scheepers (2009) identified four building blocks for the design of supportive work environments (i.e., culture, structure, resource controls, and human resources management).

Kelley (2011) presented the Evolve and Connect model based on three key elements (entrepreneurial process tools, entrepreneurial strategy, and entrepreneurial structure) to improve the entrepreneurial capabilities of the firm. Soleimani and Shahnazari (2013) validated a research model based on four groups of factors supporting CE: personal characteristics of entrepreneurs (e.g., risk taking and result orientation), HRM practices (e.g., compensation strategies and job design), organizational culture (e.g., team spirit and empowerment), and employee satisfaction (e.g., relationships with colleagues and loyalty).

Based on Hornsby et al. (2002), Kuratko et al. (2014) proposed the CEAI to assess the antecedents

of entrepreneurial behavior by focusing on the same elements proposed by Hornsby et al. (2002): management support, work discretion/autonomy, rewards/reinforcement systems, time availability, and organizational boundaries. Finally, Turner and Pennington (2015) developed a new framework based on motivation, opportunity, and ability to demonstrate that knowledge sharing and organizational learning are necessary ingredients to drive corporate entrepreneurship.

An essential element discussed within most of such frameworks is the relevance of the HRM practices as important boosters of CE (Hayton, 2005; Mustafa, Lundmark, & Ramos, 2016; Özdemirci & Behram, 2014; Zhang & Jia, 2010). In particular, these studies highlight these practices as crucial to drive a successful corporate entrepreneurship process: performance appraisal, management support, use of rewards, orientation and training, job design, resource availability, encouragement to learning and cooperation, and a culture of individual risk taking (Hornsby, Naffziger, Kuratko, & Montagno, 1993; Jiang, Wang, & Zhao, 2012; Morris & Jones, 1993).

In addition, HRM may stimulate the employees' entrepreneurial attitudes and behaviors by supporting cooperation, motivation, commitment, and learning (Kaya, 2006; Kuratko et al., 1990; Montoro-Sánchez & Ribeiro Soriano, 2011; Rutherford & Holt, 2007; Schmelter, Mauer, Börsch, & Brettel, 2010; Schuler, 1986; Zhang, Wan, & Jia, 2008).

HRM practices are also associated with increased employee creativity (Jiang et al., 2012) since they can reduce the sense of uncertainty and stress of individuals, thus leading to a sense of psychological availability (Binyamin & Carmeli, 2010). Creativity is a key ingredient of the entrepreneurial process; it refers to the generation or production of ideas that are both novel and useful (Amabile, 1988), and it can occur at individual, team, or combined levels (Anderson, Potočník, & Zhou, 2014). Many studies investigated the enabling factors of creativity, which include learning and goal orientation (Hirst, Van Knippenberg, & Zhou, 2009), job complexity (Shalley, Gilson, & Blum, 2009), emotional ambivalence (Fong, 2006), intrinsic motivation (Shalley, Zhou, & Oldham, 2004), extrinsic motivation (Amabile, Conti, Coon, Lazenby, & Herron, 1996), and team composition (Somech & Drach-Zahavy, 2013).

Whereas the roles of human resource management and employee creativity driving successful CE were clearly recognized, the study of enabling factors at individual and organizational levels can benefit from the application of findings in the collective intelligence field. In its broadest sense,

collective intelligence refers to the capacity of a human community to face complexity, problem solving, and innovation through extended collaboration and integration (Lévy, 2010; Malone, Laubacher, & Dellarocas, 2009, 2010; Pór, 1995, 2008).

In the business context, collective intelligence approaches can foster participative forms of collaboration, support innovative business modeling (Täuscher, 2016), and collective entrepreneurship (dos Santos & Spann, 2011; Ribeiro-Soriano & Urbano, 2010). The main factors required for a group to practice collective intelligence are diversity of members (in terms of knowledge and abilities) and their independence, a dense communication structure, informal learning processes, intergroup competition, a system of incentives, and management encouragement and support (Bloom, 2001; Girgensohn & Lee, 2002; Lee, Danis, Miller, & Jung, 2001; Surowiecki, 2004).

A specific example of collective intelligence is crowdsourcing (Buecheler, Sieg, Fuchslin, & Pfeifer, 2010; Doan, Ramakrishnan, & Halevy, 2011; Estellés-Arolas & González-Ladrón-de-Guevara, 2012; Prpić, Shukla, Kietzmann, & McCarthy, 2015), which can be adopted to support company operations as well as the development of entrepreneurial actions (Laubacher, 2012), particularly idea screening and selection (e.g., Quirky, Springwise) or project funding (e.g., Indiegogo, Kickstarter, ProFounder).

It is thus of interest to understand how and under which conditions the internal crowd and collective intelligence of an organization can support the process of corporate entrepreneurship. In particular, the core factors at individual and organizational levels should be investigated to determine the enabling conditions for CE to emerge as a distributed and participative effort. The next section presents a definition of crowdventing and the results of an extended review of literature that identifies the core enablers of employee-driven entrepreneurship.

## 2. Crowdventing: Definition and enabling factors

Entrepreneurship processes within organizations are evolving toward more distributed and participative forms. Based on the concepts of corporate entrepreneurship, collective intelligence, and crowdfunding, *crowdventing* can be defined as a structured and systematic process aimed to leverage the distributed intelligence and creativity inside the organization (the crowd) to initiate and develop effective entrepreneurial activities

bringing new products, services, processes, and businesses (venting).

In order to identify the key enabling factors of such employee-driven and participative entrepreneurship approaches, an extended review of literature was conducted through a structured process of document retrieval (Tranfield, Denyer, & Smart, 2003). A list of keywords was first defined using preliminary literature findings and included 6 terms that captured the main subject of the study (i.e., corporate entrepreneurship, corporate venturing, intrapreneurship, organizational entrepreneurship, organizational innovation, and strategic renewal). A second list of keywords was defined to capture the specific focus of the investigation as related to the main subject (i.e., antecedent, collaboration, collective, creativity, crowd, enabler, environment, framework, human resource, model, practice, and process).

A combined search (AND search) of primary and secondary keywords was conducted of article titles and abstracts contained in the Scopus database. As a result, 118 articles were found and isolated for further analysis in search of definitions, claims, classifications, findings, and frameworks about corporate entrepreneurship drivers and enablers. Based on such analysis, an initial list of constructs and related authors was extracted from articles. The work was refined to eliminate duplicates and aggregate comparable items, thus leading to a final list of 44 elements associated with either individual- or organization-related dimensions.

Individual-related elements include soft characteristics of employees (personal and psychological traits) and hard aspects (related to technical competencies and professional background), which were found to be positively linked to the emergence of entrepreneurial dynamics. Organization-related conditions include elements associated with the psychology of the company (the system of shared principles and values), and the physiology of the organization (mostly management practices), which were found to create the conditions for employee-driven entrepreneurship to emerge. The four groups of elements and the related literature are reported in Table 1 (individual factors) and Table 2 (organizational factors).

## 3. Assessing the maturity of crowdventing

### 3.1. The crowdventing checklist

The performance of crowdventing is related to the ability of the organization to nurture distributed

employee contributions with the goal of developing new business ideas and translating them into new products, services, or ventures. In order to understand if and to which extent an organization possesses such capacity, an examination of enabling factors is required. Building on the idea developed with the CEAI (Kuratko et al., 2014) of defining a diagnostic assessment tool for managers aiming to understand the internal environment, we researched how to develop a maturity assessment checklist aimed at measuring the company capacity to support crowdventuring.

The checklist includes 50 Likert-style questions/statements built upon the list of factors reported in Tables 1 and 2. The full questionnaire, which represents the core tool for crowdventuring assessment, is reported in the Appendix. In particular, 11 questions/statements measure psychological employee characteristics (e.g., employees of your organization possess team-working, networking, and social skills), 6 are associated with professional employee characteristics (e.g., employees in your organization possess entrepreneurial experience), 15 items relate to the system of values of the

company (e.g., your organization promotes knowledge sharing and learning), and 18 are related to management practices adopted within the company (e.g., job rotation is normally applied to your organization). A 1–5 scale was used for answers, where 1 stands for completely false and 5 indicates completely true.

### 3.2. The crowdventuring matrix

The use of the assessment tool can provide valuable insights about the level of maturity achieved by individual and organizational enablers of crowdventuring. Such data can also be used to classify the organizational model or archetype in terms of strong or weak degree of employee-driven entrepreneurship.

One attempt to classify companies based on their approach to corporate entrepreneurship was realized by Wolcott and Lippitz (2007). The authors focused on two important dimensions (under the direct control of management) that differentiate how companies approach corporate entrepreneurship. The first dimension is *organizational ownership*,

Table 1. Individual-related elements

Personal and psychological factors	Literature
Creativity, capability to propose innovative ideas/solutions	Hayton & Kelley (2006)
Discovering and experimentation	Dyer, Gregersen, & Christensen (2008); Edwards-Schachter, García-Granero, Sánchez-Barrioluengo, Quesada-Pineda, & Amara (2015)
Flexibility against changes, tolerance with ambiguity, comfort with complexity, challenging work	Dul & Ceylan (2014); Soleimani & Shahnazari (2013)
Independence, autonomy	Dul & Ceylan (2014); Hornsby et al. (2002); Surowiecki (2004)
Observation	Dyer et al. (2008)
Positive influence	Hayton & Kelley (2006)
Risk-taking	Hayton & Kelley (2006); Soleimani & Shahnazari (2013)
Self-motivation, self-confidence, self-efficacy, desire of achievement, goal-orientation	Ahlin, Drnovsek, & Hisrich (2014); Hayton & Kelley (2006); Soleimani & Shahnazari (2013)
Social skills, team-working, networking	Dul & Ceylan (2014); Dyer et al. (2008); Hayton & Kelley (2006)
Tenacity, passion for work	Hayton & Kelley (2006)
Willing to assume responsibilities	Soleimani & Shahnazari (2013)
Technical and professional factors	Literature
Analytical thinking, imagination, intuition	Piffer (2012)
Education levels	Harris & Gibson (2008); Madsen, Neergaard, & Ulhøi (2003)
Entrepreneurial experiences	Harris & Gibson (2008)
Multidisciplinary knowledge background	Hayton & Kelley (2006)
Technical knowledge and social skills	Hayton & Kelley (2006)
Use of experimentations and scientific methods	Dyer et al. (2008)

Table 2. Organization-related elements

Principles and system of values	Literature
Autonomy, delegation, empowerment, tolerance to failures	Ahmad, Nasurdin, & Zainal (2012); Dul & Ceylan (2014); Kuratko et al. (2014); Srivastava & Agrawal (2010)
Collaboration and team-working	dos Santos & Spann (2011); Kaya (2006); Soleimani & Shahnazari (2013)
(Dense) communication and networking	Girgensohn & Lee (2002); Lee et al. (2001); Rutherford & Holt (2007); Soleimani & Shahnazari (2013)
Creativity, problem solving, ideation and innovation	Dul & Ceylan (2014); Kaya (2006); Schmelter et al. (2010); van der Hoog & Saly (2001)
Diversity of backgrounds, knowledge, and abilities	Amabile & Khaire (2008); Surowiecki (2004); Zahra, Nielsen, & Bogner (1999)
Job satisfaction	Comeche & Loras (2010)
Knowledge sharing and (informal and unstructured) learning	Lee et al. (2001); Martín-Rojas, García-Morales, & Bolívar-Ramos (2013); McGrath, Venkataraman, & MacMillan (1994); Surowiecki (2004)
Participative leadership and decision making	Ahmad et al. (2012)
Rewarding and career development based on entrepreneurial results	van der Hoog & Saly (2001)
Risk-taking, achievement of ambitious goals	van der Hoog & Saly (2001)
Trust and loyalty	Welter (2012)
Management practices	Literature
Availability of free time	Dul & Ceylan (2014); Kuratko et al. (2014); Rutherford & Holt (2007)
Career promotion based on successful development of innovative ideas	Kuratko et al. (2014)
Cooperation and knowledge sharing among departments	dos Santos & Spann (2011); Kuratko et al. (2014)
Cooperation with external partners	Chesbrough (2003)
Exploitation of new ideas, technologies and prototypes, and protection of intellectual property assets	Eckhardt & Shane (2003); Lumpkin & Dess (1996); Shane & Venkataraman (2000); Schmelter et al. (2010)
Hiring people with entrepreneurial characteristics	Schmelter et al. (2010)
Job rotation	Dul & Ceylan (2014)
Management support and encouragement to propose improvement, new ideas and entrepreneurial projects	Bloom (2001); Dul & Ceylan (2014); Hornsby et al. (2002); Kuratko et al. (1990); Kuratko et al. (2014); Rutherford & Holt (2007)
Organization of initiatives to stimulate intergroup competition, entrepreneurial behaviors and competencies	Bloom (2001); Harris & Gibson (2008); Surowiecki (2004)
Presence of dedicated funds	Kuratko et al. (2014); Wolcott & Lippitz (2007)
Presence of dedicated support and formalized procedures	Wolcott & Lippitz (2007)
Provisioning of dedicated spaces and tools	Hornsby et al. (1993)
Rewards, incentives, and compensation based on creative ideas and innovative projects	Bloom (2001); Dul & Ceylan (2014); Kuratko et al. (2014); Surowiecki (2004)
Risk taking, tolerance to failures	Kuratko et al. (2014); Rutherford & Holt (2007)
Training activities based on enforcement of new ideas and prototypes	Schmelter et al. (2010)
Training on creativity and problem solving	Kaya (2006); Schmelter et al. (2010)



related to who within the company has primary title for the creation of new businesses; the second is *resource authority*, related to the existence (or absence) of a dedicated corporate pool of money for such purposes. Together, the two dimensions generate a matrix with four dominant models: *opportunist* (diffused ownership, ad hoc authority), *enabler* (diffused ownership, dedicated authority), *advocate* (focused ownership, ad hoc authority) and *producer* (focused ownership, dedicated authority).

Adopting a different perspective on enabling individual and organizational conditions rather than specific management dimensions, four possible models can be identified based on the application of the crowdventing assessment tool. Whereas the best scenario is represented by the case in which both organizational and individual enablers are strongly developed within the company, the worst scenario is where both organizational and individual conditions are lacking or underdeveloped. Two intermediate situations are those in which only individual conditions or only organizational conditions are favorable. Figure 1 shows the crowdventing matrix with the four models or archetypes.

The evaluation is based on a 1-5 Likert scale where low values are those considered significantly below 3 (which is a neutral value for the scale) and high values are those significantly above 3.

- *Entrepreneurship vacuum model*. When the maturity of both individual and organizational factors is low, the organization is likely to be characterized by a status quo in terms of entrepreneurial development. Employees lack personal and/or professional attributes supporting entrepreneurship and the company is not able to create a favorable climate and ensure support to bottom-up entrepreneurship processes.

**Figure 1.** Crowdventing matrix with company archetypes

Maturity of INDIVIDUAL-related Factors	HIGH	<b>Left Alone Intrapreneur</b>	<b>Crowdventing Factory</b>
	LOW	<b>Entrepreneurship Vacuum</b>	<b>Untapped Context</b>
		LOW	HIGH
		Maturity of ORGANIZATION-related Factors	

- *Crowdventing factory model*. If both individual and organizational factors are high, the company has a relentless approach to entrepreneurial development. Competent and autonomous individuals are stimulated to propose creative ideas and innovative projects, which receive full management support and resources. The organizational climate is thus favorable for entrepreneurship.
- *Untapped context model*. If individual factors are low and organizational factors are high, the presence of favorable contextual and management conditions are not accompanied by the existence of entrepreneurial attitude and competencies within employees who tend to stick to routine work and avoid risky and uncertain initiatives.
- *Left alone intrapreneur model*. Finally, if individual factors are high and organizational factors are low, passionate and motivated employees with entrepreneurial spirit strive to develop innovative projects since the organization does not provide them with proper resources and facilities. Employees are open to risk but they are discouraged to carry on new initiatives since the organizational context is not appropriate for experimenting with creativity and innovation.

## 4. Crowdventing in Exprivia

### 4.1. Case background

In order to obtain a preliminary validation, the assessment tool was applied in a real case (Yin, 1994). The company investigated is Exprivia S.p.A., which operates in the software and consulting business with a major focus on risk management, business analytics and big data, security/infrastructure monitoring, and enterprise resource planning. Its customers belong to different industries such as oil and gas, energy, defense, aerospace, government, health care, finance and insurance, telecommunications, and media. In the last six years, the company (listed on the Italian Stock Exchange since 2000) achieved 50% growth in revenues (144 million euros at the end of 2015) and 60% growth in employees, with about 2100 people that are mainly located in Italy with foreign branches in Spain, Mexico, Guatemala, Peru, Brazil, and China. For 2015, the company ROI was 9%, the investments in R&D were 5% of turnover, and about 7% of employees were involved in R&D activities. Exprivia participates in many research consortia to carry out innovative projects in collaboration with companies, universities, and research centers.

The data collection procedure included two steps: (1) a structured questionnaire based on the crowdventing checklist was submitted by e-mail to the general director of the R&D department; (2) two semi-structured and in-depth interviews with the general director of R&D and with a senior R&D project manager were conducted to collect more qualitative and detailed information. The twofold approach to data collection is in line with the recommendation of Woodside and Wilson (2003) about case study research.

The focus on R&D was motivated by the fact that the research department is the internal area of reference for single employees and teams aiming to propose new ideas and innovative projects. Respondents were chosen for their longstanding industry experience and for a comprehensive view of both research and production aspects. The interviews were conducted through a conference call until a convergence of views was accomplished (Miles & Huberman, 1994). The interviews lasted about 2 hours and were recorded to ensure the information's reliability (Bourgeois & Eisenhardt, 1988). Data collected have been also triangulated

(Johnson, 1997) with public information about the company.

## 4.2. Findings

The study allowed the measurement of the level at which individual and organizational enablers of crowdventing were developed within Exprivia. The numerical results from the questionnaires were integrated with the content of interviews conducted with managers, which provided more qualitative arguments and explanations of findings obtained in the survey. Table 3 reports some highlights about factors assessed within the company.

Concerning individual enablers, both personal and professional employee characteristics reported average values above 3 (namely 3.55 and 3.17). Aspects that are particularly positive, according to the questionnaire and the interviews with managers, are the willingness of employees to experiment and operate in network for achieving innovative results and the presence of self-motivated and passionate people interested in market and industry trends. People with different backgrounds

Table 3. Elements of the maturity checklist within Exprivia

Individual-related factors	Highlights
Personal and psychological characteristics	<ul style="list-style-type: none"> <li>Employee show a feel for discovery and experimentation</li> <li>Team working and other social skills are present and appreciated</li> <li>Younger employees are motivated and eager for action</li> </ul>
Technical and professional factors	<ul style="list-style-type: none"> <li>Mixed HR profiles include business and technical competencies</li> <li>People possess specialized and horizontal skills (e.g. analytical thinking)</li> <li>Technical and professional certifications are recommended</li> </ul>
Organization-related factors	Highlights
Principles and system of values	<ul style="list-style-type: none"> <li>Challenging and risky initiatives are sponsored when possible</li> <li>Creative behaviors and tenacity are stimulated to let the innovation potential of employees emerge</li> <li>Delegation and empowerment is recognized for employees engaged in creativity and innovation-related issues</li> <li>Job satisfaction is crucial and supported by an internal job posting system to favor the sharing of distributed skills and expertise, inside the corporation and nearby the customers</li> <li>Knowledge sharing and informal/unstructured learning are highly recommended</li> <li>Proposition of new ideas is encouraged when aimed to improve product/service portfolio and explore entrepreneurial opportunities</li> <li>Team working is particularly important, especially in large and multi-stakeholder projects</li> </ul>
Management practices	<ul style="list-style-type: none"> <li>Interdisciplinary teams are assembled to focused on innovative ideas in emerging domains</li> <li>Periodic meetings with new companies and spin-offs are held to explore possible collaborations</li> <li>Research programs are sponsored using internal funds</li> <li>Roadmaps for innovation are collaboratively defined</li> <li>Small companies are acquired to be re-launched on the market</li> </ul>

(mostly management, engineering, and computer science) are also endowed with the scientific methods and the intuition needed to pursue innovative goals.

Concerning organizational enablers, the code of conduct of the company in terms of innovation and entrepreneurship was measured above 3 (3.50 for the system of values and 3.65 for management practices). A point of specific strength is the autonomy/empowerment ensured to individuals willing to take creative and risky initiatives. The company promotes a sense of trust and encouragement for activating the entrepreneurial journey via the creation of dynamic teams that span different company functions and divisions to collaborate on creative ideas in emerging business and technology domains (e.g., big data, homeland security, defense, aerospace).

Management practices and purposeful initiatives also have a specific relevance in stimulating employee-driven entrepreneurship in Exprivia. The interview with managers allowed us to obtain information about some of these initiatives or programs: Idea-Cards, R&D Impact, Open Mind, Smartnet, I-Learn, and Talent.

- *Idea-Cards*. This initiative encompasses a structured process, under direct and continuous management monitoring, aimed to collect creative inputs and ideas directly from the employees. An internal (ad-hoc), cross-unit committee evaluates ideas and selects the most promising ones based on technical feasibility and the proximity with the company business. Whereas the proponents of the best ideas receive a prize (e.g., smartphone, tablet), the company management decides which idea to transform into new products or services. A pre-allocated budget is available for such purposes. In the 2015 edition, three proposals were selected for market development: a mobile ticketing platform, a diabetes management system, and a big data solution for homeland security.
- *R&D Impact*. This initiative aims to understand how the results of the R&D projects can renew/revitalize the company processes and product portfolio. A shared repository is available for managers and employees involved in R&D activities to upload synthetic descriptions of research outcomes and prototypes generated. Each contributor can thus provide comments and suggest improvements, applicative scenarios, or future developments. In 2015, 8 entries were uploaded to the repository, which generated 6 research projects submitted to public funding calls and 4 pilot projects presented to potential customers.
- *Open Mind*. This initiative aims to collect opinions and interests about artificial intelligence and the Internet of Things. The ultimate goal is to capture the perception of employees and to elaborate new conceptualizations of services, products, and technologies able to open new market niches. In 2015, two services were proposed and inspired the design of a new prototype that is currently in the implementation phase.
- *Smartnet*. This is an initiative to design a collaborative virtual environment to encourage knowledge sharing, collaboration, and continuous learning within Exprivia. The objective is to discover innovative ideas as well as creative and talented people, to promote new collaborations, and identify external resources and partners with high potential.
- *I-Learn*. This initiative focuses on developing competencies of human resources working in both research and production activities. In 2015, the company organized 5 training programs involving more than 450 employees, 9 internal experts, and 5 external mentors. The programs covered technical, management, and innovation-related aspects.
- *Talent*. This program was launched to recruit brilliant profiles with backgrounds in business and social and basic sciences. In 2015, 3 young talents were hired to work with experts and managers on new projects focused on big data, homeland security, defense, and space. In such fields, skills like lateral thinking, innovation, creativity, and problem solving are particularly crucial and are thus specifically looked for in candidate profiles.

Based on the results of questionnaire analysis and the interviews held with managers, it is possible to classify Exprivia as a crowdventing factory. Both individual and organizational factors are high in the company (average values are significantly above 3, with 3.55, 3.17, 3.50, and 3.65), which is positive in terms of entrepreneurial development. Competent and autonomous individuals are stimulated to propose creative ideas and innovative projects, which receive proper management support and resources. The organizational climate is thus favorable for employee-driven entrepreneurship to emerge and be conducted successfully.



## 5. Final thoughts

The study of collective intelligence to create new business value is a relatively new but extremely impactful research trend. Crowd-based business models lead to an important competitive advantage although they simultaneously present new challenges for managers associated with determining which is the real value of the crowd to the organization, how to create value for the crowd, and how to capture value from the crowd effectively (Täuscher, 2016).

Corporate entrepreneurship is a strategic company process, which is particularly impacted by the emergence of collective and distributed approaches. Organizations today are required to create the most favorable conditions to nurture the entrepreneurial potential of their employees and managers. Based on an extended literature review, this article introduced the concept of crowdventuring as a systematic process of leveraging the in-house creativity of employees and managers (the crowd) to develop effective entrepreneurial activities. The article also proposed and applied an instrument to assess the maturity of the crowdventuring process within an organization, along with a matrix of four organizational archetypes.

The most advanced archetype, the crowdventuring factory, is characterized by the existence of a number of enabling factors placed at the individual and organization level and a set of key practices aimed to capture the most value from the company crowd. Such practices include: identifying members' motivation, stimulating ideas and contributions through purposeful drivers and tools, aligning contributions to the company goals, creating complementarities between diverse contributions, fostering entrepreneurial behavior and capabilities, and lock in high-value crowd members (Ebner,

Leimeister, & Krcmar, 2009; Täuscher, 2016). A crowdventuring factory can be also presented as a collective intelligence system enabled by the existence of six key building blocks or pillars (Boder, 2006; Bonabeau, 2009): a collective goal to achieve, competent actors working on those goals, key enabling resources, a set of interaction mechanisms, a structure of culture and norms, and an effective assessment strategy.

Some implications and avenues for future activities can be identified at the theory and practitioner level. By a theoretical viewpoint, the application of the assessment tool with a larger number of organizations can allow us to obtain a more robust validation of the instrument and indications about the usability and reliability of the proposed approach. From a practitioner perspective, managers can adopt the crowdventuring assessment method and tool as a checklist for self-assessing the company climate and designing better individual and organizational conditions and mechanisms to support the internal entrepreneurial process.

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## Appendix. Questionnaire (Crowdventuring assessment tool)

1 - Completely False; 2 - False; 3 - Neither False nor True; 4 - True; 5 - Completely True

### Section [A]: PSYCHOLOGICAL CHARACTERISTICS of EMPLOYEES

Items	Evaluation				
	1	2	3	4	5
[A1] Employees are flexible against changes and are comfortable with complexity					
[A2] Employees are independent and able to operate autonomously					
[A3] Employees are creative and capable to propose innovative ideas and solutions					
[A4] Employees are self-motivated, possess self-confidence, and have a desire of achievement					
[A5] Employees are willing to assume responsibilities					
[A6] Employees are able to influence positively colleagues and managers					
[A7] Employees possess social skills and are able to network					
[A8] Employees have a good attitude towards risk-taking					

[A9] Employees possess tenacity and passion for work

[A10] Employees actively engage in observation of customer behavior and market trends

[A11] Employees have a feel for discovering and experimentation

#### Section [B]: PROFESSIONAL CHARACTERISTICS of EMPLOYEES

Items	Evaluation				
	1	2	3	4	5
[B1] Employees possess high education levels (Master's and PhD degrees)					
[B2] Employees have previous entrepreneurial experiences					
[B3] Employees use experimentations and scientific methods to achieve specific goals					
[B4] Employees have a specialized core of technical knowledge					
[B5] Employees possess multidisciplinary knowledge (legal, business, technical, etc.)					
[B6] Employees possess analytical thinking, use imagination and intuition during the job					

#### Section [C]: SYSTEM of VALUES of the ORGANIZATION

Items	Evaluation				
	1	2	3	4	5
[C1] Your organization stimulates knowledge sharing and learning processes					
[C2] Employees are stimulated to take risks and achieve ambitious goals					
[C3] Trust and loyalty are important values in your organization					
[C4] Your organization valorizes the peculiar skills and competencies of people					
[C5] Collaboration and team working involving people of different functions (e.g., marketing, R&D) are encouraged and fostered					
[C6] Your organization promotes delegation and empowerment of employees					
[C7] Your organization endorses communication and informal links among employees					
[C8] Training activities are focused on developing creativity and problem solving skills					
[C9] Creativity and the ability to take entrepreneurial risks are important elements when management is appraised and recognized					
[C10] The earnings of the management are linked to the level of entrepreneurial results and innovation performances they achieve					
[C11] The successful development of new activities (e.g., capture of a new market, introduction of a new product, improvement of a process) plays a central role in personal career development					
[C12] Creative ideas are highly appreciated in your organization					
[C13] Your organization promotes participative leadership and decision making					
[C14] Your organization pursues job satisfaction and gives commitment to the teams					
[C15] Failure is tolerated in your organization					

#### Section [D]: MANAGEMENT PRACTICES of the ORGANIZATION

Items	Evaluation				
	1	2	3	4	5
[D1] Employees with innovative ideas receive management encouragement and feedback					
[D2] Your company provides spaces (e.g., brainstorming rooms, laboratories) and tools (e.g., software, technical equipment) for developing new ideas, prototypes, and projects					
[D3] Employees with a good idea are given free time to develop it					
[D4] Job rotation is generally applied at operational and managerial level					
[D5] Your organization is active in inventing and protecting (e.g., patents) new artifacts, processes, technologies and solutions					
[D6] In your organization, there are dedicated funds to launch entrepreneurial initiatives					
[D7] In your organization, there is a dedicated unit to support employees and managers aiming to realize an entrepreneurial initiative					
[D8] In your organization, there is a formalized procedure to follow for employees and managers willing to realize an entrepreneurial initiative					
[D9] Your organization cooperates with external partners (e.g., customers, suppliers, distributors, research centers) to develop new products, services, and ventures					
[D10] Your organization encourages employees to suggest improvements to processes, products, and practices					
[D11] Your organization organizes initiatives (e.g., courses, seminars, workshops) to develop entrepreneurial behaviors and competencies in the employees					

- [D12] Training is focused on the enforcement of ideas/innovations by developing key competencies (e.g., project management, resource sourcing, networking)
- [D13] Recruitment is addressed to hire people with entrepreneurial characteristics (e.g., creativity, autonomy, proactivity, risk orientation)
- [D14] A career promotion usually follows from the development of innovative ideas
- [D15] Individuals with successful innovative projects receive additional rewards and compensation beyond the standard reward system
- [D16] People are encouraged to talk to employees working in other departments about innovative ideas for new projects
- [D17] Employees have autonomy on their job and can use own methods to do the work
- [D18] Managers help employees to get the work done by removing obstacles and barriers

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