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Foreword

First and foremost, it is an honour to count on the participation of members of the Universitat Politècnica de València, not only as contributors, but also as editors of "Advances in Crowdsourcing", a valuable and comprehensive resource, containing international research findings on a significant subject for the development of modern society.

So, what exactly is crowdsourcing? Based on the principle that more heads are better than one and taking into account the combination of the words "crowd" and "outsourcing", it is the process of getting tasks done by professionals in massive online communities via a flexible open call.

Used mainly in a business context, but also applicable to many other areas, including research and education, crowdsourcing is an ideal way of stimulating growth and innovation, providing solutions more quickly that are of a better quality and greater in number, whilst lowering costs.

In fact, the very concept of crowdfunding is in itself revolutionary, reinventing the traditional structure of the business and the economy based on hierarchy and control, into a model that is based on the principles of collaboration, acting globally and self-organisation, allowing individuals to participate on a global scale and make an impact on the arts, culture, science, education, government and the economy.

The benefits of crowdsourcing can be seen both globally and locally, and this book examines its application in areas such as tourism and in SMEs (small and medium enterprises), where the potential for development is significant.

From an academic point of view, the possibilities of crowdsourcing are endless and as a dynamic and innovative institution, the *Universitat Politècnica de València* takes pride in its involvement with the creation of "Advances in Crowdsourcing".

Finally, I take this opportunity to thank everyone involved in making the publication of “Advances in Crowdsourcing” possible, and I would especially like to congratulate the researchers who have contributed to the book. I sincerely hope that you find the book informative and I now invite you to discover more about the fascinating concept of crowdsourcing.

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Contents

Chapter 1
From Crowdsourcing to the Use of Masscapital. The Common Perspective of the Success of Apple, Facebook, Google, Lego, TripAdvisor, and Zara

Fernando J. Garrigos-Simon and Yeamduan Narangajavana

Abstract In the organizational arena, outsourcing processes and the creation of company networks are becoming obsolete in light of the new era of globalization. In the new framework, some mechanisms such as crowdsourcing, defined as outsourcing to the crowd, and essentially the capturing, management, or use of what we call "Masscapital," defined as the capabilities of the mass relevant to the organization, are the answer to new changes. This chapter analyzes the importance of crowdsourcing and its evolution in the so-called management of "Masscapital" and looks at how they are becoming the new business model which is changing the arena of competition. This chapter explains how the most successful companies in the current business environment base their success on the use of what we call "Masscapital" and gives some recommendations about the use of space, time, and volume, in the success of its use as the key competitive factor for organizations.

Keywords Masscapital · Crowdsourcing · Knowledge · Strategy · Technology · Innovation · Entrepreneurship

1.1 Introduction

Advances in new information and communication technologies and the preponderance of social networks are impacting on the new environment of the Web 3.0 era. Technology has expanded horizons (Garrigos-Simon et al. 2012), and in the

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new framework, organizations have to constantly advance and satisfy the needs of the customer [by harvesting information before, during, and after contact with them (ibid)] and to reinvent their business structure to remain competitive. In the new and globalized competitive arena, innovation is growing in all the phases of the value chain, and organizations cannot respond with just their own capabilities or those of their partner firms to face the growing complexity of their environment. While in the past century firstly the vertical integration of multinational firms, and later in recent decades the outsourcing of the diverse phases of the value chain (while maintaining the core resources and capabilities of the organizations) were seen as key elements to remain competitive, mainly due to the advances in new technologies, in the new globalized environment, these perspectives alone are becoming obsolete.

The explanation is that while in the past the key success factor of many companies consisted of the creation of multinational networks of firms that could work together to face the globalization processes, these processes are being overcome. Previously, multinational companies could base their advantage on the economies of scale based mainly on their size and the control of information. In recent decades, new technologies have allowed the new networks to combine the strengths, capabilities, and innovations of the diverse firms in the different phases of the production process and then overcome, with the flexibility of their own networks, the previous advantages of multinational companies. However, in the new socioeconomic arena, this is not enough.

The reason is that nowadays information cannot be controlled and innovation is generally characterized as a process that consists of two broad stages: idea generation and idea implementation (Oldham and Da Silva 2015). Therefore, the only thing that companies can do to remain competitive is to identify and implement the information and new ideas before others and to a broad extent. Here, in the constant innovation in the diverse task, it is essential to compete, but the groups of business networks are not flexible enough to cope with the diverse innovations that continually appear in the globalized world. In addition, companies cannot maintain and promote their core resources and capabilities only by themselves for much time. The explanation is that if previously the innovations of the firms and those of the diverse components of the networks helped them to overcome the other networks' competitiveness, the consolidation of the networks of firms means the consolidation of their own rigidity, and nowadays, individuals, and the crowd, overcome the advantages of the networks of firms.

We have to bear in mind that the development of outsourcing processes for all the secondary task of the firms, and the consolidation of networks of firms, means that the firms that remained as the center or the core of the networks were those that previously searched for efficient partners that allowed them to remain competitive and even to find which resources and capabilities they had to develop first. However, this also means remaining inflexible to new innovations, as these central firms cannot control and have all the information about where the new innovations are, and obviously, all the main innovations cannot be in their partner companies.

The point is that the organizations have to understand that the sources of innovation are not in firms anymore, but in individuals. In addition, it is impossible for firms to continuously be up to date with who has innovated and in what area, as this means a waste of resources. We have to consider that although employees can have an important role, the creative ideas of individuals, not employed by the organization, can also make a substantial contribution to innovation (Bayus 2013; Boudreau and Lakhani 2013; Oldham and Da Silva 2015). As Prahalad and Ramaswamy (2004) point out, the future of competition lies in a new approach to value creation based on an individual-centered co-creation of value between consumers and companies. The co-creation with the virtual participation of the customer is essential nowadays (Fuller 2010), and without the participation of users, we could not understand the new business environment (Garrigos-Simon et al. 2011, 2014). However, customers are not the only ones who can co-create (especially in small and medium organizations or reduced networks). Co-creation should lead to a "value network" in which value must be co-created by a combination of players in the network (Peppard and Rylander 2006), or outside these networks. Diverse and dispersed individuals without a previous relationship with the company can also contribute, and the co-creators can now come from any part of the world.

In order to overcome this situation, organizations have to be creative. If the innovations are in the brains of the individuals from all over the world, and it is impossible for the organizations to constantly find these individuals in the crowd, the perspective needs to change. From our point of view, the way to do it is not by looking anymore, but by creating the conditions that allow them to find us and contribute to our firm. How? By using and improving the crowdsourcing processes? By extending these processes to the use and management of "Masscapital"?

1.2 From Outsourcing to Crowdsourcing, from Crowdsourcing to Masscapital

The analysis of outsourcing is broad in the literature of management (Parmigiani 2007). In particular, the outsourcing process is justified by the classical literature of the resource and capabilities-based view. According to this perspective, organizations must focus on the development of only the activities linked to their strategic resources, capabilities, and core competences (Peteraf 1993) and outsource the other activities (Prahalad and Hamel 1990). In this vein, corporations who outsource non-core aspects of their activities can substantially reduce costs and concentrate in their core activities. Thus, "companies should commit most of their resources to their core competence, while outsourcing the rest of their functions to specialized entities" (Li and Petrick 2008, p. 237).

However, the specialized entities are more and more broadly dispersed, and due to the globalization process, it is difficult for the firm to have information about where the best organizations that can provide the best innovations in the diverse

phases of the value chain are, or better, in the "value network" (Peppard and Rylander 2006; Garrigos-Simon et al. 2014) of the firm. In this arena, organizations must concentrate on creating the mechanism to attract these organizations instead of searching for them. Moreover, nowadays, it is not the companies but freelances and individuals dispersed in the mass, who are the ones that can provide the best innovations, in order to improve each and all of the activities of the value chain of the firms. In addition, firms not only need the information from individuals, but also need other kinds of help that the crowd or mass can provide. In this vein, organizations must concentrate on capturing and using the capabilities of the entities or the crowd that are closely related to the company, what we can call "folk capital" or "community capital," or more broadly "global capital" or "Masscapital" from individuals that could have, or not, a previous direct relationship with the organization. Focusing on this aspect, in this work, we conceive "Masscapital" as the capabilities of all the individuals or organizations, related closely or not to the company, which can help it to innovate or improve any of its activities or processes. In our opinion, the core competences are not inside the firm anymore, and the core competences are mainly outside. Organizations can and must create the conditions to capture and manage the continuous core competences needed to compete. These core competences reside in individuals, mainly outside, although in big corporations and networks also inside, although most of them outside the areas where innovation is required, what we call "Masscapital." These will be the successful companies in the new business environment.

Actually, this task is not new. In a broad review of the new business environment, we can find many mechanisms used to reach this goal and to understand them; we only have to take a look at the most successful firms nowadays.

For instance, some authors point to the importance of crowdsourcing processes. Crowdsourcing, also known as "massive outsourcing" or "voluntary outsourcing", is conceived as "the act of taking a specific task and outsourcing it to a large group of people via the Internet, through an open call" (Galdon et al. 2015), or the act of taking a job or a specific task essential for the making or sale of a product, previously performed by an employee of the company, or more widely termed by a "designated agent," such as a contractor (Howe 2006), and outsourcing it through an open call to a large group of people, a community or the general public (crowd or mass) over the Internet (Garrigos-Simon et al. 2014; Kleemann et al. 2008, p. 6). Crowdsourcing can be viewed as a development of the classical "self-service" which emerged with the evolution of department stores and the introduction of the first vending machines at the end of the nineteenth century (Kleemann et al. 2008; Garrigos-Simon et al. 2014) or as a combination of classical outsourcing, with the participation of a wide number of stakeholders or crowd in the process (Galdon et al. 2015).

Authors such as Boudreau et al. (2011), Estellés-Arolas and González-Ladrón-de-Guevara (2012), Garrigos-Simon et al. (2012), Ranade and Varshney (2012), Avolio et al. (2014), and Boudreau and Lakhani (2013) explain the importance of the crowdsourcing process. Hence, Estellés-Arolas and González-Ladrón-de-Guevara (2012) define it as "a participative distributed online process that allows

the undertaking of a task for the resolution of a problem," while Boudreau et al. (2011) or Ranade and Varshney (2012) point out that Crowd power has been harnessed to design everything from T-shirts to software to artificial intelligence algorithms by soliciting contributions via open calls. Additionally, managers can use crowdsourcing techniques to collect opinion data on ideas, products, processes, and services that can be used by them to help solve organizational problems and support innovation (Boudreau and Lakhani 2013; Avolio et al. 2014).

Moreover, crowdsourcing can be widely applied not only to the production process, the generation of ideas, or specific problem solving, but as a new source of innovation in almost every step of the value chain (Garrigos-Simon et al. 2014). As Brabham (2008) points out, "the crowd outperforms industry faster and cheaper than even the top minds in the fields" and therefore crowdsourcing techniques are critical because they stand for "a profound paradigm shift in our view of the professional, of the corporation, of the global commons, and of the value of intellectual labor in a transnational world" (ibid, p. 79). Actually, Boudreau and Lakhani (2013) observe that crowdsourcing has been applied by entire industries for years, although it is the development of the technology which has transformed it by allowing the participation and contribution of huge number of people. Hence, and according to its importance, Crowdsourcing is an approach that is receiving substantial attention (Bayus 2013), being currently one of the most discussed key words within the open innovation community (Ebner et al. 2010).

From our point view, the key importance of crowdsourcing, when compared to other networking mechanisms, is that firms do not have to find partners or innovators. The partners are the ones who find the firm, if they think that they can provide the firm with a solution to its problem and if this solution is interesting for them. However, organizations cannot continuously obtain the participation of the crowd by launching open calls. In addition, crowdsourcing is mainly based on the fact that it is the firm that identifies the problem and that asks for the solution to the problem. Crowdsourcing is conceived when it is the firm that focuses on the problem and tries to manage its solution (Benkler 2006). As highlighted by Howe (2006): "It's only crowdsourcing once a company takes the idea, fabricates it in mass quantity and sells it." However, we think that this fact is reduced, especially in an environment where many individuals outside the organization can detect better than the actual organization where the possible problems are, or the tasks that can and must be improved by the firm.

In this vein, some successful companies have found the formula to create mechanisms to continuously capture what we call "Masscapital", the capabilities of the mass, by using more broad crowdsourcing techniques, by rewarding, or not, the individuals in diverse forms (from money to social relevance), without launching open calls and without asking for a solution to concrete problems. For instance, Wikipedia has created a tool to capture "Masscapital," using peer production in order to create their encyclopedia by using the participation of the crowd. In addition, some authors such as Prpic and Shukla (2013, p. 3505) point out the importance of what they call "crowd capital", which means, "heterogeneous organizational knowledge resource, generated by the organization's crowd

capability," by focusing on the importance of having an IT mechanism to capture information from the crowd. Actually, these improvements were already pointed by Garrigos-Simon et al. (2012, p. 1881), when they stressed the relevance of Web 3.0 technologies to capture and apply information from the mass and posited that "New networks and the advances in so-called Web 3.0 technologies are changing firm structures and value chains or value networks, and the configuration of decision-making processes for managers."

However, we think that the main capabilities are not essentially inside the organizations, or inside firm networks, but outside, in the mass, so the organizations have to focus on them and formulate a way to capture or take advantage of them. In addition, "Masscapital" cannot be reduced to the management of information or even knowledge from the crowd, because there are capabilities that are not related to simple information and knowledge and because internal machines can also create the possible knowledge required, from the data and information provided by the crowd. For instance, as Garrigos-Simon et al. (2012, p. 1883) stress, Web 3.0 technology "not only allows the use of semantics but also space, images, sounds and feelings in a concept where the traditional static web is transformed into another very interactive one. In the new context, intelligent machines read, understand, interrelate, and can manipulate data from cyberspace, allowing this process to be adapted by different users or firms according to their own needs." Thirdly, the organizations can manage some of the Masscapital, but some of it escapes to the control of the organization. Fourthly, the management of Masscapital cannot be reduced to the use of technological mechanisms. Fifthly, as in the case of crowd-sourcing, "Masscapital" cannot be reduced to the participation of the partners of the customers, it must also include the participation of all kinds of stakeholders who are not employees of the organization (Garrigos-Simon et al. 2012), amateurs or even the general public ["students, young graduates, scientists or simply individuals" (Estellés-Arolas and González-Ladrón-de-Guevara 2012, p. 196)], or even the organization's employees, in order to improve the production process, carry out any of the organization's tasks, and undertake the problem solving and the generation of open innovations by the crowd. Finally, we have to consider the importance of space, time, and volume, in the success of using the "Masscapital."

1.3 The Use of Masscapital by Successful Business Firms

Actually, many successful companies are using our "Masscapital" without the use of reduced crowdsourcing processes, "open calls," or asking for the solution to specific problems. In addition, this "Masscapital" is sometimes used with the participation of the mass in processes where the crowd is not conscious of the crucial importance of their diverse contributions to the firms, or simply does not know about their involvement in the process.

In this vein, it has been pointed out in the literature how diverse companies have used the new technologies to appropriate some of the "Masscapital" or capabilities

of their customers. For instance, following the approaches of Garrigos-Simon et al. (2012), the new technologies, which help to capture information from customers, combined with their internal information, are used efficiently by firms such as the retail firm Zara, Carrefour, or almost all the main airlines. In this vein, and by using these new technologies, "Zara is able to adapt to rapidly changing markets, and predict the sales of an item in a single store during a replenishment period depending on demand forecasts, the inventory of each size initially available, and the aforementioned store inventory management policy" (Garrigos-Simon et al. 2012, p. 1884). We have to realize that in these processes, "Masscapital" is the one that is continuously revealing the "fashion" to the company, which item they have to produce and in what quantity, through the specific demand for the diverse items of the company.

Similarly, the information systems used by airlines allow them to set prices according to demand and some production factors (Narangajavana et al. 2014). The customers indicate when and how to increase prices and the capacity they have to offer. With a similar perspective, Carrefour and other businesses, by using IT systems, "can also use this information to automatically determine its customers' needs (by knowing the previous products they have consumed and their demographic and family situations) and offer them new promotions according to these needs and the characteristics of the products in stock in its stores" (Garrigos-Simon et al. 2012, p. 1885). With their purchases, individuals indicate which discounts on the next purchase Carrefour has to offer them personally, in order to increase sales of their products.

We can think about the success of companies such as Google and Microsoft, which use their software or search engines, utilized by the mass, based on the cookies and information provided by the people that for instance connect to Internet, visit some Webs, or use and store information in some programs, and which tastes and preferences help these firms for instance to promote and expand their business and products, and to improve the efficiency of their products, such as software, or even efficiency the of the algorithms in the search engines, or the impact of their publicity about their clients (for example with SEO and SEM techniques). When visiting a Web page, when looking at a product or firm, or even when looking at one part of the page, potential customers are indicating their tastes to these companies and hence which similar pages they could search, which publicity must be offered to him/her, how to manage this individual, or the products of their suppliers that can be offered successfully, so that they can take advantage of these individuals personally and individually.

But as we pointed out before, knowledge is not everything. For instance, other firms use some of the "Masscapital" efficiently through innovations in the classical "self-service" or "self-producing." For instance, we could also use the success of firms such as fast food companies, IKEA, low-cost airlines, or even petrol station companies or banks, which use "Masscapital" through the co-work of their customers, with the use or not of Internet and other technological innovations, in their processes of producing and delivering their products. For example, the capabilities of customers are used in diverse ways while serving fast food

customers: when reserving, ordering, or in the process of self-delivering the food. These capabilities of customers are also used in self-service processes, when customers are looking for, finding and buying airline tickets, indicating prices and tastes, or in the check-in process of airlines. The self-production of customers of IKEA, when customers indicate their preferences when purchasing or visiting the Web page of the company, and when they are contributing with their capabilities in the transport and assembly the products. The use of self-service in petrol stations, or the use of Internet and other technologies by customers to carry out routine financial services. In this vein, Peppard and Rylander (2006) and Garrigos-Simon et al. (2014) highlight the relevance of the change in the conception of the firms' value chain, especially in cases where both the product and supply chain are digitalized, as in sectors such as banking, insurance, telecommunications, news, entertainment, music, advertising, and certain areas of the public sector.

Nevertheless, we have to highlight that the use of technologies has also allowed the incorporation in the systems of people that are not clients of the organizations. In this point, Garrigos-Simon et al. (2012) posit the importance of the work of community managers, to promote the participation of stakeholders and other possible individuals in the relationship with the firms, and the use of crowdsourcing techniques to enhance crowd participation and so to increase what we call the appropriation of "Masscapital," or individual capabilities of the crowd. Accordingly, many companies are promoting the use of communities, essentially with customers who have specific knowledge about the problems with the products and who are motivated to freely contribute with new ideas (Von Hippel 2005a; Fuller 2010; Bayus 2013). Actually, companies, such as Dell, Starbucks (Sullivan 2010; Bayus 2013), Nike or Lego, are adopting and implementing successful innovations, after the creation and use of what Von Hippel (2005b) calls "Innovation communities" that allow them to create and innovate their products, to reformulate the structures of their firms, and to promote their brands.

Finally, we have to talk also about technological companies such as Apple or Telefonica, which have created platforms to capture the "Masscapital" of individuals and dispersed "developers." These developers are nowadays creating apps for a wide variety of innovations for these companies, acting as suppliers of these companies, or of the systems promoted by these companies, consciously. In addition, some firms are externalizing the service to the clients and customers who are experts in their products. According to Boudreau and Lakhani (2013, p.60), "From Apple to Merck to Wikipedia, more and more organizations are turning to crowds for help in solving their most vexing innovation and research questions." Nevertheless, let us think also, for example, of user-generated content for social media Web sites, such as Facebook (Rieder and Voß 2010), Twitter, YouTube, or even TripAdvisor, which use the advice that customers give to other customers (Buhalis et al. 2011; Sigala 2009). These firms use, and their business models are based on, the information and/or media from the "Masscapital," from individuals that sometimes unconsciously, and without any monetary remuneration, are acting as suppliers of their content.

1.4 Space, Time, and Volume in the Promotion of Masscapital

However, as pointed before, we think that "Masscapital" cannot always be captured or used through a simple mechanism. In addition, sometimes it cannot be managed by the companies; it only can be used by them.

For instance, the promotion of "word of mouth" (both in Internet or outside), the called "viral marketing", some operational marketing activities [i.e., Starbucks Idea (Rieder and Voß 2010; Müller 2011; Sigala 2012a, b)], the fact of publicizing through customers, with the simple carrying of bags from the retail firms in the street, or the use of their labeled products, or the creation of the publicity spots by the mass (e.g., L'Oreal) can also be considered as mechanisms to capture and promote the "Masscapital" that can be important for the organization's competitiveness, as it influences the loyalty of customers and the image of the brands. And these mechanisms are recognized as some of the key factors of success of companies such as Coca Cola, Walmart, or even Apple. Actually, fashion and popularity is a matter of "the mass," and if a firm can capture its essence, or can manage this "Masscapital," of course this can have a determinant influence in the success of this company. However, this "Masscapital," which is also produced with the participation of the crowd, cannot be interiorized inside the organization (although it can be effectively used and promoted by the firm), as in the crowdsourcing processes, a fact that does not make them less important.

Some Masscapital is also in the space or the specific environment where the firms are located and also cannot be captured with technological tools. We have to think for instance about the importance of the theories that emphasize the industrial districts of firms (Pyke and Sengenberger 1992; Becattini 1990), or in the case of popular areas such as Silicon Valley, where of course the "Masscapital" that is interiorized through the employees with their relationships with this environment is in the "ambience" of the specific territory or environment, and although available for the firms, it is not captured with IT techniques. The relevance of "Masscapital" is also when we look at some of the essential conditions of the general or even competitive environment of the firms and its influence on the success of the companies, as was clearly pointed out by Porter (1980, 1985), who stressed how our "Masscapital" (related to the conditions of the society, stakeholders such as suppliers, competitors, and clients), also with other factors in the environment that are not obviously related to this "Masscapital," can have a determinant influence on the success of the firms.

Finally, the use of "Masscapital" also has a temporal dimension, timing, and a dimension of volume. The organizations have to for instance think about the innovations in technology that were not successful at the beginning of our century and that are now successful, just when the mass is prepared for these innovations, or when the "Masscapital" of the capabilities of the mass has been already developed. In this vein, "Masscapital" has to be considered mainly as a source of innovation, but also a receptor and potential element of innovation, as, if the crowd is not

prepared, some of its potential cannot be used (i.e., the advances in new technologies cannot be used, or applied to the crowd, or with the use of the mass, if the people do not have the capacity to use them). In addition, innovations from the mass have a caducity, so the important factor is not only to capture them, but the importance is when the organization started to capture them and if they are able to capture them massively before competitors. As we point out, sometimes it is a question of volume. Let us consider for instance the example of Zara, Google, Facebook, or YouTube, models which other companies are trying to replicate, but which is impossible to do in the same way, as they have massively captured the "Masscapital" related to their business, as they innovated first and quicker than their competitors, so no company can now compete with them effectively and efficiently, as they arrived too late to capture the essential and the great volume of the "Masscapital" related to their business.

1.5 Conclusions

In the present environment, from our point of view, the capabilities needed for firms to remain competitive do not reside within the company anymore, but outside, in the mass. In this chapter, we postulate for the importance of what we call "Masscapital," that is, the capabilities of all the individuals or organizations, related closely or not to the company, which can help it to innovate or improve any of its activities or processes.

This chapter explains that our theory of "Masscapital" is an evolution of the theory that includes innovative mechanisms such as crowdsourcing processes, the use of the Web 3.0, or the use of social networks for the improvement of the effectiveness of the organizations. This chapter provides examples of how our "Masscapital" is used and is the basis of the success of the most important firms in the present business environment. This chapter also emphasizes the importance of the time, space, and volume of the "Masscapital" for the success of its use and also stresses that although its use is important, sometimes firms cannot manage it, just use it; and when it is possible manage it, this management is not always related to technology.

This chapter opens new visions to be considered by practitioners and authors, in the search for the key to the competitive advantage of the organizations. This chapter is important for directors of firms and entrepreneurs as it explains some success factors used by firms and opens new ideas to be used to create successful organizations. It also opens new developments and fields in several theoretical perspectives. For instance, the work overcomes the classical strategic theories that focus on the environment or the resources and capabilities of organizations, offering a perspective that includes both, but that extends them highlighting and focusing on the importance of the capabilities of the mass, our "Masscapital." This chapter refers to the importance of the managerial information systems as an important mechanism to capture the essence of the "Masscapital" sometimes and to integrate

it with the aims and the information of the organizations, but overcomes its importance, as it focuses on the capabilities of the individual more than on technological capabilities, as the key success factors factor, and because it considers some important factors outside technology that are key to the success of some organizations.

This chapter also postulates for the relevance of factors beyond the management of knowledge and opens new areas of research inside the "Knowledge management" literature, as it considers "Masscapital" as an essential capital to provide knowledge and to be managed and studied. Our postulates also open new themes of research into the analysis of the structure or the design of effective organizations, as our "Masscapital" opens the development of new organizational forms that overcome the classical "networking" structural organizations. This work also opens new spheres of research to the classical human resource management perspectives, as "Masscapital" opens the management of the human capital to individuals that are non-employees of the organizations. Finally, this chapter opens new questions of research in the literature about innovation and entrepreneurship, such as formulating some critical sources of innovation, and on some key success factors for entrepreneurs to be considered in their development.

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Chapter 2
Recruiting Individuals to a Crowdsourcing Community: Applying Motivational Categories to an Ad Copy Test

Yannig Roth, Daren C. Brabham and Jean-François Lemoine

Abstract This study operationalizes different motivational categories to participate in crowdsourcing and tests them with a series of advertisements in different countries. We found that internalized extrinsic motivations were more appealing to individuals overall and that results differed across countries, which is novel in research about crowdsourcing.

Keywords Crowdsourcing · Online advertising · Click-through rate · Cultural differences

2.1 Introduction

As crowdsourcing becomes an increasingly common way to gather input from an online community for problem solving and product design, businesses have become concerned with how to build and sustain these online communities in the first place. Research into the motivations for participation in crowdsourcing applications has identified a range of extrinsic and intrinsic motivators, but there is, to our knowledge, a lack of empirical evidence that points to which of these many motivators are more effective for recruiting individuals to online communities to participate in crowdsourcing activities. This study aimed to identify which kinds of motivators

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are most effective for recruiting individuals to crowdsourcing applications. In this study, we crafted a series of Google AdWords advertisements for the crowdsourcing community eYeka, with each ad operationalizing a proven motivational category for participation in crowdsourcing. These 20 different ads ran on Google in late 2011 and gathered a total of 496 click-throughs. We analyzed the click-through rate (CTR) for each ad in order to determine which ads, and, by extension, which kinds of motivators, were most effective for recruiting individuals to a crowdsourcing community. Interestingly, participants from different countries were motivated by different motivational categories. This study contributes to our understanding of motivations in crowdsourcing applications by being among the first to rank motivational categories to join a crowdsourcing community from most effective to least effective. It also contributes to the discussion about the global nature of crowdsourcing ventures and raises additional questions about how best to tailor crowdsourcing experiences for different cultures.

2.2 Literature Review

Crowdsourcing is an online, distributed problem solving and production model that leverages the collective intelligence of online communities for specific purposes (Brabham 2008a). In crowdsourcing applications, an organization broadcasts a challenge to an online community, and the online community supplies ideas and solutions to the organization to address the challenge (Brabham 2008a; Howe 2006, 2008). Crowdsourcing blends the efficiency and control of traditional, top-down managed process with the benefits of bottom-up open innovation and creativity. Furthermore, crowdsourcing takes advantage of the network structure of the Internet by harnessing individual far-flung talent for targeted efforts (Afuah and Tucci 2012; Lévy 1995; Terranova 2004; Wexler 2011). Crowdsourcing has been well documented in such cases as Threadless.com, InnoCentive.com, Amazon's MechanicalTurk.com, TopCoder.com, and TaskCN.com (Barr and Cabrera 2006; Boudreau et al. 2011; Jeppesen and Lakhani 2010; O'Mahony and Lakhani 2011; Zheng et al. 2011). Even though crowdsourcing is a very recent term, we can see that the process has been used in a variety of contexts. Companies can launch crowdsourcing initiatives on their own branded platforms, such as Dell did with IdeaStorm, but they can also commission permanent crowdsourcing platforms which host contests on their Web sites for a fee (Bayus 2013).

One way to engage in crowdsourcing initiatives for a company is indeed to start a private online platform. This is typically suited to traditional companies that want to leverage the power of the crowd but whose core competencies do not lie in setting up, managing, and sustaining a community (Bayus 2013; Feller et al. 2012; Lakhani and Panetta 2007; Penin and Burger-Helmchen 2011). In order to benefit from the creativity of the crowd, they create branded platforms, such as Dell's IdeaStorm, Starbucks' myStarbucksIdea, or Nokia's IdeasProject. These are the examples of participatory Web sites that are being initiated directly by companies.

These companies build Internet platforms on which individuals can contribute ideas and suggestions, allowing them to benefit from the sheer diversity of the crowd to gather innovative and consumer-rooted ideas (Sawhney et al. 2003). The crowd may or may not be asked to select the best ideas, and contributions are open and visible to everyone (Alexy et al. 2012). Here, the initiating company has no experience in crowdsourcing, but it takes the risk to start a platform from scratch, hoping that people will be attracted by the brand's reputation or the topic of the challenge (Fournier and Lee 2009).

Another operative mode to initiate crowdsourcing is to externalize the whole process to a platform whose job is to organize crowdsourcing, often in the form of a contest, on behalf of companies (Penin and Burger-Helmchen 2011; Schenk and Guittard 2011). These platforms are specific in that they leverage a private community of contributors who participate in contests sponsored by client organizations (Lakhani and Panetta 2007; Williams et al. 2011; Zwass 2010). When applied to innovation, these platforms are usually called innomediaries (Sawhney et al. 2003) or idea marketplaces (Morgan and Wang 2010). These platforms count on crowd contributions for the supply and/or selection of ideas and designs (Brabham 2013; Lakhani and Panetta 2007). Typical examples of such crowdsourcing applications can be found in clothing with Web sites such as Threadless.com, Zazzle.com, or LaFraise.com; in multimedia content with platforms such as iStockphoto.com, Fotolia.com, or Jamendo.com; and in industrial design with communities such as Shapeways.com, GrabCAD.com, or Sculpteo.com. Crowdsourcing is not only being used in innovation-related topics; companies also use crowdsourcing to tap external talent in marketing-related tasks. Platforms can also organize crowdsourcing for the creation of print advertising or the production of user-generated video content (Roth and Kimani 2014; Teixeira 2013; Whitla 2009).

Whether platforms use crowdsourcing to generate ideas, designs, or videos, all of these examples describe companies whose business model is based on a crowd of voluntary contributors who regularly add content to the site and participate in contests sponsored by client companies (Zwass 2010). By doing this, participants allow these platforms to receive a constant flow of ideas, which allows the platform to have fresh content from diverse sources while still having a large amount of control over contributors and buyers (Boudreau and Lakhani 2009). These platforms could be described as "pure players" of crowdsourcing since they totally rely on contributions from their own crowds to be sustainable (Feller et al. 2012). They are not producing nor buying the output that they generate, such as creative ideas or videos; they are just acting as intermediaries between client companies and the dispersed problem-solving capability of the crowd (Prpić and Shukla 2013). This is different from traditional companies which use crowdsourcing only on a sporadic basis to get new ideas and content, but have other principal revenue sources (the sale of their products, the fees of their services, etc.) like the ones described above. Because the online community—the crowd—is at the heart of any crowdsourcing application, how to recruit individuals to a crowdsourcing community and sustain their participation are the pressing questions for crowdsourcing practitioners.

Attracting a critical mass of members is the very first milestone to be reached by virtual communities (Hagel and Armstrong 1997). After setting up a functional Web site, companies can attract members with interesting content or useful tools, but also by actively marketing their Web site with online advertisements. In that case, Hagel and Armstrong (1997) highlight that "operating costs in a virtual community have little to do with technology and much more to do with acquisition of members" (p. 63). After the creation of the online environment, there is an initial step of traffic generation, which allows Web site owners to increase awareness and to attract members whose participation will eventually be part of the Web site's value proposition. The advertising budget of community Web sites can be substantial, especially in a phase where organic growth reaches a tipping point. We posit that this is equally true in crowdsourcing communities, which have to rely on active member acquisition to grow the crowd of potential contributors, but also to compensate for churn effects and lurking effects that are present in every virtual community (Fuster Morell 2010; Huberman et al. 2009; Porter et al. 2011).

An emerging body of research has explored motivations for participation in crowdsourcing applications specifically, and these studies have catalogued a wide variety of motivators common across some crowdsourcing cases, but not across all cases. For example, at crowdsourced scientific research company, InnoCentive, Lakhani, Jeppesen, Lohse, and Panetta (Lakhani et al. 2007) found that intrinsic motivators such as "enjoying problem solving," as well as financial reward, were related to success on the site. At crowdsourced stock photography company, iStockphoto, the extrinsic financial motivator was found to be strong, both in a survey of the community (Brabham 2008b) and in anecdotal evidence (Mack 2006). On the other hand, participants in the crowdsourced science fiction film *Star Wreck: In the Pirkinning* were motivated by the sheer enjoyment of creating the film and other altruistic reasons, but not by financial gain (Lietsala and Joutsen 2007). At crowdsourced clothing company Threadless, the love of the community itself—and even addiction to it—was one of the five strong motivators for participation, according to a series of interviews with individuals in the community (Brabham 2010). Also, important for Threadless members, as well as for participants in the crowdsourced bus stop design contest Next Stop Design or the idea contest SAPiens Ideas Competition, is the opportunity to build a portfolio of creative work for future employment (Brabham 2010, 2012b; Leimeister et al. 2009), a concept Kuehn and Corrigan (Kuehn and Corrigan 2013) appropriately term "hope labor." Anecdotally, portfolio-building hope labor is also a driver for some user-generated advertising contest participants (Brabham 2007; Horovitz 2009). In a study conducted among Chinese participants on the crowdsourcing platform, TaskCN.com, Zheng et al. (2011) found that the desire to earn money and to gain recognition were significantly linked to participation intention, even though pure enjoyment of creating was a stronger predictor of participation intention.

Perhaps unsurprisingly, the motivational categories for participation in crowdsourcing activities resonate with motivators for participation in similar online activities, such as open source software production (Bonaccorsi and Rossi 2004; Ge et al. 2006; Hars and Ou 2002; Hertel et al. 2003; Lakhani and Wolf 2005; Oreg

and Nov 2008; Shah 2006), editing Wikipedia (Nov 2007; Rafaeli and Ariel 2008; Schroer and Hertel 2009), uploading and tagging photographs on Flickr (Morgan and Wang 2010; Nov et al. 2008), social voting (Smadja 2009), and blogging (Huang et al. 2007; Liu et al. 2007; Nardi et al. 2004). These phenomena have been collectively called "participatory culture" or "Web 2.0," but we find Füller's (2010) label "virtual co-creation" to be more precise and useful for this study. Füller (2010) uses the umbrella term "virtual co-creation" to include "crowdsourcing, co-creation, user innovation, virtual customer integration, and open innovation" which are different forms of the "promising, active role consumers may play in the previously firm-dominated world of product development and production" (p. 98). His work is particularly relevant to the study of motivations in online projects because his work focuses precisely on the link between motivations and online activity.

Summarizing the work of other scholars who have studied motivation for many years, Füller (2010) uses self-determination theory to better understand peoples' participation in online activities. According to Edward L. Deci and Richard M. Ryan, who have been developing this theory since the 1970s, human motivations can be grouped into two broad categories: intrinsic motivations, by which individuals act in a particular way because they enjoy the act in itself, and extrinsic motivations, by which people act in order to receive something else than the mere satisfaction of performing the act (Deci and Ryan 1980; Deci 1972). These two broad motivation categories have recently been refined (Ryan and Deci 2000) to include a third, intermediate category: internalized extrinsic motivations. Internalized extrinsic motivations are extrinsic motivations, meaning that individuals still perform certain behaviors for a specific outcome, but individuals have internalized the reasons to act and assimilated them to the self. In other words, internalized extrinsically motivated individuals force themselves to act, because they have understood the benefit of their actions. "The more one internalizes the reasons for an action and assimilates them to the self, the more one's extrinsically motivated actions become self-determined" (Ryan and Deci 2000). The three aforementioned types of motivations have been used by Füller (2010) in his research about participation about virtual co-creation, but also by Lebraty and Lobre-Lebraty (2013) in their studies of crowdsourcing participation. Building on this solid framework, our study therefore uses the following categories to study individuals' reactions to different ad copy in the context of crowdsourcing:

- *Intrinsic Motivators*, which include tasks that are intrinsically playful;
- *Internalized Extrinsic Motivators*, which include motivators such as self-efficacy, status development and the desire for recognition or visibility, the opportunity to make friends, self-efficacy, information seeking, and skill development; and
- *Extrinsic Motivators*, which include personal need and dissatisfaction as well as the opportunity for monetary compensation.

Many studies mentioned above rely on self-reports through surveys and interviews and are highly valuable in developing our understanding of the variety of motivators for participation in existing crowdsourcing communities. However, it is

worth noting that these studies reveal the motivations of the most active and engaged segment of participants, and that these studies' findings are of little use to those who have not yet built an active community of participants. Yet, as explained above, building an active and vibrant community is also one of the most challenging and costly steps to undertake before even thinking about crowdsourcing, and many companies have failed because they could not attract and sustain their crowds of participants (Bishop 2007; Chanal and Caron-Fasan 2010; Feller et al. 2012; Oberoi 2013). To our knowledge, research has not addressed the crucial step of attracting participants to crowdsourcing applications, and the little evidence that suggests what the most important motivators are for individuals in the crowd is not sufficient to help practitioners built a crowdsourcing community ("An Inside Look at Lufthansa's Air Cargo Innovation Challenge," n.d.; Mergel and Desouza 2013). Moving beyond descriptive categories of motivators and into more advanced theory-building is a necessary evolution in motivations and uses and gratifications research (Ruggiero 2000). The several motivational categories for participation listed above are useful, but the question still remains as to what is the most important motivational category for driving initial participation. Given this discussion, then, this exploratory study seeks to answer one broad question:

RQ: What kinds of motivators are most effective for recruiting individuals to a crowdsourcing community?

In light of the discussion of different consumer types, too, it is anticipated that, when operationalized, each of these motivational categories will succeed at least somewhat in getting participants to join a crowdsourcing site. Understanding exactly which motivational categories outperform others in a particular crowdsourcing context may help future crowdsourcing practitioners craft recruitment tactics for growing successful online communities. This is thus the focus of this exploratory study. This study aimed to sort this question out by testing individuals' actual behaviors clicking through online ads that operationalize these motivational categories.

2.3 Method

To field test which motivational categories were most effective at recruiting individuals to a crowdsourcing community, Füller's (2010) three motivational categories for virtual co-creation activities were operationalized in a series of online advertisements using Google AdWords. With AdWords, marketers purchase certain keywords with which they want simple text-only ads to appear alongside in a Google search results page (Kim et al. 2012). For the purposes of this study, for example, the keyword "video contest" was the target keyword for which the test ads would appear. "Video contest" was chosen because the study site, eYeka, is a creative crowdsourcing company that facilitates, among other things, crowdsourced video contests. Presumably, individuals searching for open video contests would have an interest in a site like eYeka and would click on an accompanying ad.

eYeka is a global company based in France which operates a Web site on which brands and organizations can host creative contests (King and Lakhani 2013). These contests are visible to anyone on the Internet, and participation is open to registered members of the platform. In mid-2013, the eYeka community consisted of about 250,000 members from more than 150 countries. In late 2011, when the data for this study were collected, eYeka had about 200,000 members, with a growth rate between 200 and 300 members per day. Discussions with eYeka executives revealed that an estimated 50 % of this growth was fueled by online advertising such as Google AdWords. These members all share a common interest for creative tasks, such as photography, design, or video production. In one of its reports about creative crowdsourcing, Forrester Research claims that "co-creation contest vendors provide a specialized form of crowdsourcing [as they] typically cultivate their own communities" (Williams et al. 2011, para. 9). As one of these vendors, eYeka "develops, manages, and nourishes this community" with incentives such as "cash awards for the top ideas to 'fame'—such as using a winning video in a co-created marketing campaign" (Williams et al. 2011, para. 9). While this description falls in line with previous research about motivations to participate in crowdsourcing, it does not say why people initially chose to enter a crowdsourcing community.

Survey research conducted internally by eYeka shows that 35 % of active users of the site found out about eYeka by clicking on a banner ad or on a link, the most common response. The second most cited answer was that people found out about eYeka through a specific contest, which led them to join and participate (see Table 2.1).

This survey was conducted in March 2011 by eYeka and does not claim to be representative of the whole community, because only active members were surveyed, which may not be representative of the whole community. These results show that external links directing to the eYeka Web site are a major source of traffic, but they do not tell what motivational triggers are most effective in attracting potential members and contributors. This is the objective of this study.

To operationalize the three motivational categories, simple ads were developed to speak to each category. To test the internalized extrinsic motivational category, for instance, this ad appeared in search results for the keyword "video contest":

Table 2.1 How active members of the eYeka community found out about the site

How did you find out about eYeka?	Count	Percentage (%)
A friend/acquaintance of mine	97	21
An article in the press, on the Web or a TV spot	48	11
A specific call for entries that interested me	136	30
A banner on a Web site or a link on a search engine	157	35
Other	15	3
Total	453	100

source internal eYeka community survey, March 2011

"Participate in Video Contests for Free & Improve your Skills!" In this ad, the wording "improve your skills" taps into the "skill development" aspect of the internalized extrinsic motivational category. Examples of wording used in the ad copy to operationalize the motivational categories can be seen in Table 2.2.

Because the Internet is a global medium and participants at eYeka come from all over the world, a diverse selection of countries was chosen for the AdWords campaign. The countries were India, Malaysia, Singapore, the United Kingdom, and the USA. These countries were chosen in collaboration with eYeka because they constituted a strategic priority for the crowdsourcing company at the time of the study and reflected a diversity of countries in terms of user behavior (Chau et al. 2002; Singh and Baack 2004; Singh et al. 2005). The AdWords campaign ran for 14 days in 2011, and all ad copy was tested in English, as represented in Table 2.2.

Ad copy testing is a long-standing method for refining tactics and messaging before or during a campaign and for measuring a campaign's effectiveness. Ad copy testing has been used across several media to determine precisely which words, images, and themes arouse certain feelings in audiences, often with the goal of triggering a specific behavior, such as intent to purchase an advertised product (Cook and Dunn 1996; Dunn 1994; Jones 1998). Early works about virtual communities highlight the importance of online advertising for community member acquisition (Hagel and Armstrong 1997). In her book about community building on the Web, for example, Kim (2000) describes how two different versions of a banner ad were used to attract people to fill out a survey. One version offered monetary compensation, and the other just highlighted the opportunity to contribute; results showed no significant differences between both approaches.

For this study, click-through rate (CTR), defined by the American Marketing Association (American Marketing Association, n.d.) as "the number of click-throughs [the number of users who clicked on a specific Internet advertisement or link] per ad impression, expressed as a percentage," was used to assess the effectiveness of the various motivators as operationalized through the slate of ad copy options.

Table 2.2 Examples of advertising wording used to operationalize motivational categories

Motivational category	Advertisement wording example
Intrinsic	Enjoy yourself by participating in awesome video contests!
	Participate in contests and express your ideas in creative ways!
Internalized extrinsic	Curious to discover and create? Participate in video contests!
	Participate in video contests and challenge yourself on cool briefs!
	Participate in video contests and find new inspiration!
	Participate in video contests for free and improve your skills!
	Participate in video contests on eYeka and be recognized!
Extrinsic	Participate in video contests—show and share your own approach!
	Participate in video contests and win amazing prizes!

2.4 Results

During the campaign, a total of 29,435 impressions resulted in a total of 496 clicks, for an overall CTR of 1.69 % (see Table 2.3). Ads which operationalized the internalized extrinsic motivational category resulted in the highest CTR overall, at 1.76 %, with the lowest CTR, at 1.50 %, tied to the intrinsic motivational category. Parsing the results across the five countries included in the study—India, Malaysia, Singapore, the UK, and the USA—provided more complex picture of overall click-through behavior in the ad campaign (see Table 2.4). The internalized extrinsic motivational category resulted in the highest CTRs for all countries except for Malaysia. The extrinsic motivational category resulted in the highest CTR for Malaysia, with the internalized extrinsic category resulting in the lowest CTR.

There were no consistent patterns among the countries for which motivational categories ranked second or last in terms of CTR, so the researchers recombined the data in various ways to make sense of these results. There are some fault lines between these five countries, as they represent different geographic regions, cultural traditions, and levels of economic development. One comparison was made between countries in Asia (India, Malaysia, and Singapore) and countries in "the West" (UK and the USA). In this comparison of the average CTRs for Asian and Western countries, the extrinsic motivational category resulted in the highest CTR for the Asian countries, while the internalized extrinsic category resulted in the highest CTR for the Western countries (see Table 2.5).

Another comparison was made based on economic development in each country, an especially important analysis given the fact that eYeka functions as a vehicle for participants to potentially earn money for themselves. The International Monetary Fund (IMF) categorizes countries in a three-level hierarchy according to economic development. The least economically developed countries are "developing countries," the most developed are "advanced economies," and countries in between these extremes are "countries in transition." India and Malaysia are considered by the IMF to be developing countries, and Singapore, the UK, and the USA are classified as advanced economies. Comparing these average CTRs for these two groupings shows that the developing countries had a higher CTR for the extrinsic motivational category, while the advanced economy countries had a higher CTR for the internalized extrinsic motivational category (see Table 2.6).

Table 2.3 Total CTRs for the entire campaign, by motivational category

Motivational category	Impressions	Clicks	CTR (%)
Intrinsic	5,943	89	1.50
Internalized extrinsic	15,101	266	1.76
Extrinsic	8,391	141	1.68
TOTAL	29,435	496	1.69

Table 2.4 CTRs for each motivational category, by country

Motivational category	India		Malaysia		Singapore		UK		USA	
	Impress.	CTR (%)	Impress.	CTR (%)	Impress.	CTR (%)	Impress.	CTR (%)	Impress.	CTR (%)
	Clicks		Clicks		Clicks		Clicks		Clicks	
Intrinsic	909	2.86	819	2.56	343	1.46	2,717	0.92	1,155	1.04
	26		21		5		25		12	
Internalized extrinsic	3,287	**3.29**	1,356	2.14	1,267	**1.58**	6,203	**1.05**	2,988	**1.47**
	108		29		20		65		44	
Extrinsic	1,750	3.03	964	**2.90**	641	1.40	3,432	1.02	1,604	1.00
	53		28		9		35		16	
TOTAL	5,946	3.14	3,139	2.48	2,251	1.51	12,352	1.01	5,747	1.25
	187		78		34		125		72	

Top motivational category indicated in bold type

Table 2.5 CTRs for each motivational category, comparing the average of the CTRs of Asian countries (India, Malaysia, and Singapore) and Western countries (UK and the USA)

Motivational category	Asian countries (%)	Western countries (%)
Intrinsic	2.29	0.98
Internalized extrinsic	2.33	**1.26**
Extrinsic	**2.38**	1.13

Top motivational category indicated in bold type

Table 2.6 CTRs for each motivational category, comparing the average of the CTRs of countries considered by the International Monetary Fund to be "developing countries" (India and Malaysia) and "advanced economies" (Singapore, UK, and the USA)

Motivational category	Developing countries (%)	Advanced economy countries (%)
Intrinsic	2.71	1.14
Internalized extrinsic	2.71	**1.37**
Extrinsic	**2.81**	1.26

Top motivational category indicated in bold type

2.5 Discussion

The internalized extrinsic motivational category resulted in the highest CTR overall and for all countries except for Malaysia, for which this category was the worst performing in terms of CTR. These findings suggest that an advertising campaign that tapped into internalized extrinsic motivators—such as self-efficacy, status development and the desire for recognition or visibility, the opportunity to make friends, self-efficacy, information seeking, or skill development—would attract more participants to a crowdsourcing site than an ad campaign driven by wording that connected to intrinsic or extrinsic motivators. In simple terms, then, a crowdsourcing practitioner would do better to build an online community by advertising the opportunity to learn a new skill through participation (internalized extrinsic) than to emphasize the simple enjoyment of playing on the site (intrinsic) or the opportunity to make money (extrinsic). The generally higher CTRs from Indian, Malaysian, and Singaporean participants are perhaps not surprising. In a report from DoubleClick (2010), these countries also had higher CTRs overall for display Internet ads (0.18, 0.30, and 0.19 %, respectively) compared to the USA (0.10 %) and the United Kingdom (0.07 %) (p. 16).

Malaysia's divergent performance in this study, as well as the differing top motivational categories comparing Asian and Western countries and comparing developing countries and advanced economies, raise new and interesting questions about cultural differences and the motivations to participate in crowdsourcing ventures. Because crowdsourcing ventures take place on the global platform of the Internet, even sites targeted to specific national audiences may attract unexpected, international participants, and different management techniques for these communities are required (Brabham 2012a). This means that crowdsourcing sites would be

wise to advertise with different ads targeted to different cultures, targeting participants in Asian and developing countries with ads operationalizing extrinsic motivators and targeting participants in Western countries and advanced economies with ads operationalizing internalized extrinsic motivators. This finding is in line with anecdotal findings from research about motivations to participate in Amazon's Mechanical Turk, where a survey found that more Indian workers treat Mechanical Turk as a significant source of income compared to American workers, who see it as a supplementary source of income (Ipeirotis 2010). However, and interestingly, our findings contradict the assumption made by Zheng et al. (2011), who argued that Eastern crowdsourcing participants might be more intrinsically driven to participate than Western participants. Clearly, more rigorous research is needed to explore cultural influences on crowdsourcing participation motivations, which is a surprisingly scant area of interest in academia.

It is unclear, however, how to target participants in countries such as Singapore, which is both an Asian country and an advanced economy. Further still, none of these countries have monolithic cultures. Each country in the study has large numbers of first-generation immigrants and vibrant minority communities that may be driven by different motivators than the majority population. Also, each country has a complex cultural history—and some have colonial pasts with other countries in the study—and is home to at least one large transnational metropolis. Making broad claims about how to target the whole of a country's people in an ad campaign for a crowdsourcing site should be done with caution. Additional research is needed to more fully address this question of culture and motivation in regard to joining crowdsourcing communities (Hsieh 2011; Zheng et al. 2011). The work of Geert Hofstede (De Mooij and Hofstede 2010; Hofstede 1984a, b), Appadurai (1996), Hall (1976), Gelfand et al. (2006, 2011), and other perspectives from a range of disciplines that have examined cultural difference would be useful to further deepen our understanding of crowdsourcing participation across borders.

2.6 Limitations and Conclusions

This study illustrated which motivational category performed best at getting participants to visit a crowdsourcing site by using the CTR as a measure of motivation to participate. While the CTR indeed demonstrates that participants were interested in the advertisement to the point where they chose to click on the link, it does not necessarily indicate that these participants eventually signed up at eYeka and became full participating members of that crowdsourcing community. Surely, many did not. What it does demonstrate, though, is that some ads worked better than others to get participants' attention and get them to explore the eYeka site, and that some motivational categories generated more of these exploratory visits than others. This advances what is known about how crowdsourcing systems work. To date, studies on motivations for participation in crowdsourcing have either simply catalogued which motivators were present among a community or have examined the

connection between types of motivation and quality of participation in open innovation contests (Frey et al. 2011), but scant research has been done to sort these motivators by their effectiveness at getting individuals to join a crowdsourcing community.

Another limitation in this study is that broad motivational categories were measured rather than more nuanced levels of analysis. That is, future research could build on this study by tracking the performance of individual motivators even within broad motivational categories, comparing, for instance, whether an ad that taps into the motivator of curiosity performs better than an ad that taps into the motivator of skill development, both of which fall under the umbrella category of internalized extrinsic motivations.

It would be helpful to test an ad campaign in more countries and in different languages as well. The five countries could be clustered into a few groupings—Asian and Western, developing and advanced economies—but the addition of many more countries to a future study could make these groupings more robust and, assuming the inclusion of South American, Middle Eastern, and African countries, could include entirely new groupings for comparison. For crowdsourcing companies who seek global participation, understanding the effect of culture on motivation to participate is an important pursuit.

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Chapter 3
Crowdsourcing Fundamentals: Definition and Typology

Enrique Estellés-Arolas, Raúl Navarro-Giner and Fernando González-Ladrón-de-Guevara

Abstract Crowdsourcing is a problem-solving and task realization model that is being increasingly used. Thanks to the possibility of harnessing the collective intelligence from the Internet; thanks to the crowdsourcing initiatives people can, for example, find a solution to a complex chemical problem, get images tagged, or get a logo designed. Due to its success and usefulness, more and more researchers have focused their interest on this concept. This fact has shown that the concept of crowdsourcing has no clear boundaries, and although over time the concept has been better explained, some authors describe it differently, propose different types of crowdsourcing initiatives, or even use contradictory crowdsourcing examples. In this paper, an integrated definition and typology, developed in 2012, are analyzed to check whether they are still valid today or whether need a reformulation.

Keywords Crowdsourcing · Typology · Definition · Crowd · Task · Web · Collective intelligence

3.1 Introduction

The development of Web 2.0 has led to the emergence of new models for business, for communication, for personal relationships, for learning, etc. One of these models, related to business and innovation, is known as crowdsourcing.

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The term "crowdsourcing" was first coined in 2006 by American journalist Jeff Howe. In a first attempt to conceptualize the term, Howe (2006) defined it as "the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and general large) network of people in the form of an open call. This can take the form of peer-production (when the job is performed collaborative), but is also often undertaken by sole individual."

Thanks to the collaborative nature of Web 2.0, crowdsourcing allows a person, institution, or company to benefit from the work, ideas, or wisdom of the crowd of Internet. This crowd, usually heterogeneous, can be formed by amateurs, volunteers, experts, companies, etc. (Howe 2008), which may or may not belong to a specific user community (Brabham 2012). The work of this crowd is rewarded in some way: tangible (money, prizes, etc.) or intangible (recognition, entertainment, prestige, etc.).

This model, which was born in the business environment, has evolved and spread. Currently, crowdsourcing is being used for different purposes in fields as diverse as medicine (King et al. 2013a, b) or geography (See et al. 2014).

The problem is that the wide use of crowdsourcing has made many people to use the term referring to any initiative in which a large number of people are recruited through an open call that is usually distributed through Internet (Howe 2008; Brabham 2008; Estellés-Arolas and González-Ladrón-de-Guevara 2012a; Littmann and Suomela 2014).

For this reason, sometimes the boundaries of what is or is not crowdsourcing are not completely clear. An example is the case of Wikipedia: taking it as a crowdsourcing platform raises both defenders (Bazilian et al. 2012; Ghani and Zakaria 2013) and detractors (Brabham 2013; Estellés-Arolas and González-Ladrón-de-Guevara 2012a). The proliferation of different crowdsourcing definitions and typologies neither help too much.

To alleviate this situation, in 2012, Estellés-Arolas and González-Ladrón-de-Guevara carried out a literature review with the objective of stating an integrative crowdsourcing definition (2012a) and crowdsourcing typology (2012b).

Though both the typology and the definition proposed by Estellés-Arolas and González-Ladrón-de-Guevara are correct and useful, the concept of crowdsourcing continues evolving and being applied in different areas. This situation makes necessary the review of both integrative proposals to test its validity.

For that purpose, this chapter contains the results obtained by repeating the literature review realized in Estellés-Arolas and González-Ladrón-de-Guevara (2012a) in order to find new definitions and new typologies since 2012. The aim was to check whether the definition and typology proposal remain valid or need to be reformulated.

It is true that the crowdsourcing definition and typology mentioned above are not the most used within the literature. The most used are the Howe's (2008) and Brabham's (2008). But certainly counts in its favor that both, definition and typology, seek for consensus integrating different proposals.

3.2 Theoretical Background

3.2.1 Toward an Integrated Definition

In 2012, Estellés-Arolas and González-Ladrón-de-Guevara sought through a literature review different crowdsourcing definitions (2012a). The purpose of their research was to extract all the elements which would allow distinguishing between crowdsourcing and any other Internet initiative.

After analyzing more than 200 documents, they found more than 40 different definitions. The authors identified within these definitions eight fundamental elements that any crowdsourcing initiative must contain. These elements are as follows:

1. There is a clearly defined crowd (E1).
2. There exists a task with a clear goal (E2).
3. The recompense received by the crowd is clear (E3).
4. The crowdsourcer is clearly identified (E4).
5. The compensation to be received by the crowdsourcer is clearly defined (E5).
6. It is an online assigned process of participative type (E6).
7. It uses an open call of variable extent (E7).
8. It uses the Internet (E8).

As a result of this research, its authors developed a definition of crowdsourcing, which although being wordy, defines in detail the concept. The definition is as follows: "Crowdsourcing is a type of participative online activity in which an individual, an institution, a nonprofit 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. The user will receive the satisfaction of a given type of need, be it economic, social recognition, self-esteem, or the development of individual skills, while the crowdsourcer will obtain and utilize to their advantage that what the user has brought to the venture, whose form will depend on the type of activity undertaken." (Estellés-Arolas and González-Ladrón-de-Guevara 2012a).

3.2.2 Toward an Integrated Typology

Later, Estellés-Arolas and González-Ladrón-de-Guevara (2012b) conducted another literature review searching for different crowdsourcing typologies. They obtained six documents that reported a task-based typology (Reichwald and Piller 2006; Howe 2008; Brabham 2008; Kleemann et al. 2008; Geerts 2009; Burger-Helmchen and Pénin 2010). After comparing all different typologies (Codina 1997; Pinto-Molina et al. 2007), an integrated typology was stated. It comprises 5 main types:

1. Crowdcasting. Contest-like crowdsourcing initiatives, where a problem or a task is proposed to the crowd, being rewarded who solves it first or do it better (i.e., Innocentive).
2. Crowdcollaboration. Crowdsourcing initiatives in which communication between individuals of the crowd occurs, while the initiator of the initiative stays on the sidelines. There can be found two subtypes which differ on the ultimate goal:
   - Crowdstorming. Massive online brainstorming sessions, in which different ideas are raised and the crowd can support those ideas with their comments and votes (e.g., IdeaJam).
   - Crowdsupport. In this case, the customers themselves solve the doubts and problems of other customers, so they do not need to contact the official customer support (i.e., Getsatisfaction).
3. Crowdcontent: In these crowdsourcing tasks, the crowd uses their labor and knowledge to create or find content of various types but not in a competitive way. Three subtypes can be found:
   - Crowdproduction. Initiatives where the crowd should create content, as it is done individually when translating short pieces of text or tagging images (i.e., Amazon Mechanical Turk).
   - Crowdsearching. Crowdsourcing initiatives where the crowd searches for content on the internet for any purpose (i.e., Peer to Patent Review).
   - Crowdanalyzing. Initiatives where the crowd searches but not in the Internet but inside multimedia documents such as videos or images (i.e., Stardust@home).
4. Crowdfunding. In the crowdfunding initiatives, an individual, organization, or company seeks for funding from the crowd in exchange for a reward (i.e., Kickstarter).
5. Crowdopinion. In this case, the objective is to know the user opinions about a particular issue or product through votes, comments, tags, or even sale of shares (i.e., ModCloth, Intrade).

3.3 Methodology

3.3.1 Regarding the Definition

The methodology used to verify whether the integrated crowdsourcing definition is valid is performed in three steps: a systematic review of the literature to find documentation that includes crowdsourcing definitions (as shown in Estellés-Arolas and González-Ladrón-de-Guevara 2012a), the identification of the definition elements following the Tatarkiewicz's approach (1980), and the comparison with the actual integrated definition.

In first place, the systematic review of the literature is done again following the Delgado approach (2010) based on Petitti (2000) and Egger et al. (2008). Five

databases have been selected (SAGE, IEEE, ScienceDirect, Emerald, and ACM), and documents with the word "crowdsourcing" in the title, abstract, or keywords have been consulted. Only those documents with an original definition for crowdsourcing, and published from 2012, are selected.

Finally, found definitions will be analyzed. It will be checked whether some of the 8 parameters published in the original article using Tatarkiewicz's approach (1980) appears, or if instead, any new characteristic should be taken into consideration.

3.3.2 Regarding the Typology

Regarding the typology, a similar literature review has been performed. Same databases have been consulted, but search criteria have been modified. In this case, any document containing the term "crowdsourcing" in its title, abstract, or keywords has been selected. Also, in the same fields, the terms "typology" or "taxonomy" (either or both) should appear.

Once obtained the documents, those containing a general typology different to the ones found out previously are selected. These typologies will be compared to Estellés-Arolas and González-Ladrón-de-Guevara typology proposal (2012b), updating it if necessary.

3.4 Results

In this section, the results obtained by performing the reviews of the literature, both in the search for new definitions as in the search for new typologies, are shown.

3.4.1 Results on the Definition

After searching documents in the five databases previously cited, a total of 777 documents were retrieved among journal papers, books reviews, books, and proceedings (Table 3.1). It should be noted that the most numerous documents found

Table 3.1 Summary table of the literature review

	Total	Journal paper	Book review	Book	Proceedings	Use new definition
SAGE	28	24	4	0	0	5
Science Direct	95	86	0	9	0	8
IEEE	248	54	0	0	194	5
ACM	394	1	0	0	393	8
Emerald	12	8	2	2	0	2
Total	777	173	6	11	587	30

are proceedings, fact that coincides with the results of the original review of the literature performed by Estellés-Arolas and González-Ladrón-de-Guevara (2012a).

Among all the documents found, only 28 (the 3.86 %) contains a definition not citing explicitly others such as Howe's (2008) or Brabham's (2008). In Table 3.2, this definitions can be seen.

Table 3.2 New crowdsourcing definitions found through the literature review

No.	Document	Page	Definition: crowdsourcing is …
1.	Folorunso and Mustapha (2014)		"referred to as human computation, a methodology that lets humans process tasks which are difficult to implement in software"
2.	Lee et al., n.d.	60	"the practice of obtaining needed services, ideas, or content by soliciting contributions from a large group of people, particularly from an online community, rather than from traditional employees or suppliers"
3.	Satzger et al. (2013a, b)		"a new paradigm for performing computations in Web-based environments by utilizing the capabilities of human workers. The idea of crowdsourcing is sometimes referred to as human computation, a methodology that lets humans process tasks which are difficult to implement in software. Such tasks include transcription of documents, reviewing of articles or evaluating the quality of ranking algorithms"
4.	Sutherlin (2013)	397	"the technological union of humans and software"
5.	Ambati et al. (2012)	1191	"is the process of farming out tasks to a large user population on the Internet. These tasks broadly belong to the language or vision community, where for a number of tasks it is either impossible or challenging and time-consuming for computers to complete them, whereas only requires a few seconds for a human to complete"
6.	Sprugnoli et al. (2013)	8116	"the process of segmenting a complex task into smaller work units and distributing these among a large pool of non-expert workers, usually via the web"
7.	Pedersen et al. (2013)	579	"a collaboration model enabled by people-centric web technologies to solve individual, organizational, and societal problems using a dynamically formed crowd of people who respond to an open call for participation"
8.	Roopa et al. (2013)	272	"a technique wherein a task is outsourced to a distributed group of people (crowd).Thus crowdsourcing is a collaborative or distributed problem solving model. Problems are broadcast to unknown group of people asking for solutions. Users (crowd) submit the solutions. The solutions are consolidated by the "crowdsourcer". The crowd may be rewarded monetarily, with prizes, with extra talk time or some other form of recognition. In some cases, the reward could be just intellectual satisfaction"

(continued)

Table 3.2 (continued)

No.	Document	Page	Definition: crowdsourcing is …
9.	Wu et al. (2014)	728	"a process that involves outsourcing tasks to a distributed group of people, which is normally much cheaper than hiring experts"
10.	Zeinalipour-Yazti et al. (2013)	1240	"a distributed problem solving model where a population of undefined size, engages in the solution of a complex problem for monetary or ethical (i.e., intellectual satisfaction) benefit through an open call"
11.	Parvanta et al. (2013)	2	"a problem-solving approach that taps the knowledge, energy and creativity of a global, online community"
12.	Brabham et al. (2014a, b)		"an online, distributed, problem-solving, and production model that uses the collective intelligence of networked communities for specific purposes"
13.	Marjanovic et al. (2012)		"under-researched type of open innovation that is often enabled by the web"
14.	Lampe et al. (2014)		"online communities that could help with issues of managing information and users, including the ability to solicit small contributions from a large number of users to help provide important meta-data about people or information"
15.	Britton et al. (2013)	3	"distributed problem-solving technique leveraging the efforts of a group, known as "the crowd." A project is defined and volunteers are invited to contribute to its accomplishment. The volunteers are dispersed and may not even be members of the organization"
16.	Soleymani and Larson (2013)	1111	"human computation techniques that exploit human intelligence and also take advantage of a large population of contributors. Crowdsourcing is frequently facilitated by crowdsourcing platforms where crowd-members can find and carry out microtasks in exchange for a small payment"
17.	Perera and Perera (2014)	93	"a process of outsourcing tasks of an organization to general public, where the term 'crowd' equals to 'general public'"
18.	Gupta and Sharma (2013)	14	"the act of outsourcing tasks, traditionally performed by staff or a contractor, to an undefined large group of people or crowd"
19.	Azzam and Jacobson (2013)	2	"Paid recruitment of an independent global workforce for the objective of working on a specifically defined task or set of tasks"
20.	Demartini et al. (2013a, b)	668	"term used to define those methods to generate or process data asking to a large group of people to complete small tasks. It is possible to categorize different crowdsourcing strategies based on the different types of incentives used to motivate the crowd to perform such tasks"
21.	Schumaker (2013)		"another form of market efficiency where groups of individuals perform forecasts on provided information and results are averaged for use as a predictive tool"

(continued)

Table 3.2 (continued)

No.	Document	Page	Definition: crowdsourcing is …
22.	Raford (2014a, b)		"Large-scale collective intelligence systems"
23.	Geiger and Schader (2014)		"an umbrella term for approaches that harness the diverse potential of large groups of people via an open call for contribution over the Web. Using information technology as a facilitator, crowdsourcing organizations implement socio-technical systems to channel the contribution of human workforce, knowledge, skills, or perspectives into the generation of digital information products and services. Such crowdsourcing information systems have recently gained in popularity for a variety of organizational functions such as problem solving, knowledge aggregation, content generation, and large-scale data processing"
24.	Stanley et al. (2013)	155	"rooted in the process of asking others to help you with a problem that you cannot resolve on your own. This may be due to limited resources, skills, or time constraints"
25.	King et al. (2013a, b)		"Collective effort"
26.	Tong et al. (2014)	861	"a service has a common framework: each employer (a.k.a the task publisher) poses a task, and then this task is responded or finished by many different and unknown crowd employees. Thus, the "task-response pairs" is the unique structure of crowdsourcing data"
27.	Stol and Fitzgerald (2014)	187	"an emerging and promising approach which involves delegating a variety of tasks to an unknown workforce—the crowd"
28.	Chiu et al. (2014)	41	"can be viewed as a method of distributing work to a large number of workers (the crowd) both inside and outside of an organization, for the purpose of improving decision making, completing cumbersome tasks, or co-creation of designs and other projects"

3.4.2 Results on the Typology

The typology literature review results have been much less numerous. In fact, after consulting the same databases, 40 documents have hardly been retrieved, of which only one provides an innovative general typology.

Typologies focused on specific areas were found: Linders (2012a, b) stated a typology of the crowdsourcing initiatives that can be carried out in e-government; and Gomes et al. (2012) stated a crowdsourcing typology focused on musical scene.

The only document that provides a general Typology is the one proposed by Geiger et al. (2012). These authors described an information system-based typology that could sustain the crowdsourcing initiatives. It consists of 4 types:

1. Crowdprocessing, where the crowd produces a large amount of homogenous contributions with equal value. 'Re-captcha' and other microtasks like the ones that can be found in AMT or in many citizen science projects (i.e., Galaxy Zoo), are examples of this type of crowdsourcing.
2. Crowdrating, where the crowd also produces a large amount of contributions, with equal value. In this case, the value that emerges from the total contribution is sought. This is the case of votes, reviews, and opinions (i.e., "eBay reputation system"). It would also include prediction markets (i.e., "Hollywood Stock Exchange").
3. Crowdsolving initiatives seek value from heterogeneous contributions, where each contribution has its own qualitative properties. This crowd solving initiatives look for alternative or complementary solutions to a given task or problem (i.e., Goldcorp Challenge, Netflix prize, or Innocentive).
4. Crowdcreation initiatives, finally, seek the collective value arising from the accumulation and relation of contributions. In this case, also each contribution is important toward the creation of a collective result (i.e., iStockPhoto).

3.5 Discussion

3.5.1 Regarding the Definition

Comparing found definitions with the Estellés-Arolas and González-Ladrón-de-Guevara's (2012a) integrated definition proposal, there cannot be found any relevant difference. All of them meet some of the 8 proposed elements, and those aspects that do not accord with the elements make reference to specific applications or particular visions of crowdsourcing.

Definitions around other concepts or models like to open innovation (Marjanovic et al. 2012), human computation (Demartini et al. 2013a, b; Satzger et al. 2013a, b), or collective intelligence (Raford 2014a, b) can be found. Other definitions are focused in specific crowdsourcing types such as the crowdproduction using microtasking (Sprugnoli et al. 2013; Demartini et al. 2013a, b; Lampe et al. 2014) or the use of crowd contest for complex problem solving (Zeinalipour-Yazti et al. 2013; Stanley et al. 2013).

It is important to highlight that there are two definitions, those of Roopa et al.'s (2013) and Geiger and Schader's (2014), which are highly general, and in fact meet almost all elements of the integrated definition.

About the elements, it is important to notice that almost the totality of the definitions makes reference to a crowd (E1) that undertakes a task (E2). Other elements have been taken much less into account: 9 definitions refer to the use of Internet to carry these initiatives out (E8) and 8 of them refer to a process that involves individual online participation (E6).

The remaining elements are less reflected in the found definitions. This indicates that, although those elements allow crowdsourcing identification, they are not considered fundamental by authors.

3.5.2 Regarding Typology

In this case, the 4 general types Geiger et al. (2012) proposed could be integrated into the types contemplated by Estellés-Arolas and González-Ladrón-De-Guevara (2012b). In fact, there is direct correlation between both typologies. Geiger's Crowdrating, Crowdcreation, and Crowdsolving corresponds with Estellés-Arolas' Crowdopinion, Crowdproduction, and Crowdcontest. In the case of Geiger's Crowdprocessing, this type corresponds with Estellés-Arolas' Crowdsearching and Crowdanalysing.

3.5.3 Regarding the Literature Review Results

Comparing the literature review carried out with the one performed by Estellés-Arolas and González-Ladrón-de-Guevara (2012a) has allowed a limited study of the evolution of crowdsourcing as a research topic.

First of all, it should be highlighted the difference between the number of publications found in 2012 (209) and the number found in 2014 (777). Applying the same criteria and consulting the same databases, 372 % more documents were found. It is also significant the increase in the amount of conference paper (127 in 2012 and 587 in 2014; 462 % more) and also in journal papers (68 in 2012 and 173 in 2014; 254 % more).

These data show that crowdsourcing has gone from being an emerging issue, which in 2012 still did not receive much attention, to an actual issue. Besides, this indicates a consolidation in the scientific research on the subject.

Another fact that supports this statement is that, in the first literature review, the 19.13 % (40 of 209) of the documents found, used original definitions. In this literature review, this percentage has fallen to the 3.86 % (28 of 777). This shows that authors are less interested in defining and conceptualizing crowdsourcing and more interested in researching of concrete applications.

Regarding the definitions found, it is important to highlight some aspects.

1. Firstly, the vast majority of authors use already existing definitions, mainly Howe's (2006) and Brabham's (2008). Estellés-Arolas and González-Ladrón-de-Guevara (2012a) definition, because its integrative nature, is also used although to a lesser extent.
2. Secondly, some documents does not have any definition of the term. Some, like Monahan and Mokos (2013) or Su et al. (2013), for example, obviate the

crowdsourcing definition when mentioning it. It is assumed that the topic already has its own identity or has become popular enough.

3. Occasionally, the verb "crowdsource" is being used naturally (Garrido and Faria 2012; Rana et al. 2014; Kalantari et al. 2014). Although the verb does not exist as such in the dictionary, it is a term frequently used to denote the action of using crowdsourcing. This shows that crowdsourcing use is increasingly widespread.

Concerning definitions which are not based in any other, those typically arise from the need to define crowdsourcing from the point of view of a specific task.

Some authors define crowdsourcing relating it to another concepts or models. King et al. (2013a, b) defined it as a collective effort, referring to tasks where everyone's contribution is necessary. Others focus on the use of crowdsourcing for co-creation activities (Gatautis and Vitkauskaite 2014), open innovation (Feller et al. 2012; Ren et al. 2014), collective intelligence (Garrido and Faria 2012; Filippi et al. 2013; Raford 2014a, b), or human computation (Satzger et al. 2013a, b).

Crowdsourcing is also understood, for example, as a tool for customers' participation in product development (Djelassi and Decoopman 2013), public participation (Hildebrand et al. 2013) and e-government (Linders 2012a, b), citizen science (Harvey et al. 2014), collecting data (Armstrong et al. 2012), search (Ren et al. 2014), or microtasking (Chen et al. 2014).

It is also important to note that in the literature review carried out by Estellés-Arolas and González-Ladrón-de-Guevara (2012a) there were found different papers referred to the theoretical basis of crowdsourcing. Brabham (2008) analyzed and studied the motivations that move the crowd to participate, Geiger et al. (2011) proposed a taxonomy of crowdsourcing activities, Schenk and Guittard (2009) studied what kind of tasks can be performed using crowdsourcing, and so on.

In the literature review carried out in this work, it can be seen that there are practically no such documents. Most items listed study the application of crowdsourcing in some activity or specific area. Schriner and Oerther (2014) study it as way to fight poverty. Brabham et al. (2014a, b) analyze it in the area of public health and medical domain. Related to this field, King et al. (2013a, b) study the use of crowdsourcing in skin self-examination for detecting cancer.

Other applications are establishing the fingerprint of past sea-level changes (Rovere et al. 2012), validate data to generate overall landcover maps (See et al. 2014), urban surveillance (Monahan and Mokos 2013), or animal identification for ecological monitoring and conservation (Duyck et al. 2014).

3.6 Conclusions

Crowdsourcing refers to a problem-solving and completing tasks model which involves the participation of the Internet crowd. It represents just one of the many ways to harness collective intelligence. Its use has spread increasingly, being used

in many areas: medicine, biology, astronomy, etc., being business area the one in which it was born and in which has been more used.

The popularity of crowdsourcing has made different authors to define and conceptualize crowdsourcing in different ways, even proposing different typologies and definitions. In 2012, Estellés-Arolas and González-Ladrón-de-Guevara suggested, using a literature review, an integrated definition of crowdsourcing based in 8 elements (2012a) and also an integrated crowdsourcing typology (2012b). It is a wordy definition, but it defines the concept in depth. The same applies to the typology.

In the present work, the same literature review has been carried out. The objective is to see whether the definition and the typology proposed remain valid. Both have been specifically chosen because they share the intention to seek consensus on what is crowdsourcing.

The results of the literature review points that both the definition and the typology remain useful and remain relevant. Firstly, none of the 28 new definitions found identify a new differentiator element. Regarding the typology, only one new general typology has been found. This new typology integrates seamlessly into the 2012b typology.

It is true that there is a limitation resulting from the limited number of databases consulted and from using restrictive search criteria. Despite this fact, the literature review, compared to the one conducted by Estellés-Arolas and González-Ladrón-de-Guevara (2012a, b), has partially revealed the development of crowdsourcing in the scientific field.

Crowdsourcing is clearly a researching field that is burgeoning, that now receives increased attention and that has passed from theoretical approaches to the systematic study of its concrete applications in a wide number of fields.

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Chapter 4
Crowdsourcing and the Evolution of a Business Ecosystem

Claude Guittard, Eric Schenk and Thierry Burger-Helmchen

Abstract This chapter explores a specific implementation of ideation-oriented crowdsourcing. In the follow-up of previous studies, we consider that ideation crowdsourcing does not necessarily mobilize highly skilled technical competences, but rather the ability of individuals to generate new ideas. Typical applications of ideation or creative crowdsourcing are artistic design activities. One can thus wonder about the role of creative crowdsourcing in the innovation process, upstream from the problem-solving steps. In this paper, we address this issue within a particular context: the evolution of an ecosystem based on an ICT platform. This chapter relies on a case study: Parkeon, a company specialized in the development and manufacture of multi-space parking meters, ran two crowdsourcing competitions in parallel, designed to uncover new ideas for services based on the use of multi-space meters. The case study highlights the convergence between certain conditions for the success of crowdsourcing and the factors contributing to the development of a BE: openness and modularity. Furthermore, it accentuates the role of users, who become the providers of new service concepts, and confirms the central role of the company leader for the development of the BE. Last, we discuss the not-invented-here (NIH) syndrome that can be encountered when crowdsourcing is implemented.

Keywords Crowdsourcing · Knowledge management · Modularization of knowledge · Leadership · Smart city · Creativity

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4.1 Introduction

Crowdsourcing was first described by Jeff Howe in 2006 and in recent years has led to numerous publications. This term is a contraction of the words crowd and outsourcing. Its meaning is thus relatively explicit:

> Simply defined, crowdsourcing represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call. This can take the form of peer-production (when the job is performed collaboratively), but is also often undertaken by sole individuals. The crucial prerequisite is the use of the open call format and the large network of potential laborers. (Howe 2006)

Some crowdsourcing platforms such as InnoCentive are experiencing spectacular results, not only in terms of the number of participants, but also in their success rate in crowdsourcing competitions.[1] The enthusiasm for this approach, in the scope of Web 2.0, calls for clarification of the concept and has led to various proposed taxonomies (Brabham 2012; Burger-Helmchen and Pénin 2011; Estellés-Arolas and González-Ladrón-de-Guevara 2012; Schenk and Guittard 2011, 2012). As pointed out by Estelles-Arolas and González-Ladrón-de Guevara (2012), the highly flexible nature of crowdsourcing allows it to take on various different forms.

Crowdsourcing allows a company to gain access to skills that are far removed from its core business activities. For Afuah and Tucci (2012), crowdsourcing's performance in a context of distant search depends on several factors:

- The characteristics of the problem,
- The characteristics of the knowledge needed to solve it,
- The characteristics of the crowd,
- The evaluation of solutions,
- Access to ICT.

Crowdsourcing is an exploration mode in the sense expressed by March (1991), and one of its natural applications is to deal with the solving of complex problems (Brabham 2008; Lakhani and Jeppesen 2007). This crowdsourcing approach makes use of the outside-in aspects of open innovation (Chesbrough 2003). A second application of this phenomenon, which has been scarcely studied in the literature, is ideation itself (Schenk and Guittard 2011, 2012). This concerns situations in which a business consults the crowd for creative ideas, in the field of design for example. In the follow-up of our previous studies, we consider this type of crowdsourcing to no longer be positioned in the register of problem solving, but rather in that of the emergence of new ideas. Creative crowdsourcing does not necessarily mobilize highly skilled technical competences, but rather the ability of individuals to ideate, and as a consequence is relevant to an extremely broadly defined crowd.

[1] http://www.innocentive.com/about-innocentive/facts-stats.

Typical applications of creative crowdsourcing are artistic design activities. One can thus wonder about the role of creative crowdsourcing in the innovation process, upstream from the problem-solving steps. In this paper, we address this issue within a particular context: the evolution of an ecosystem based on an ICT platform.

The method used in this study is that of a case study: Parkeon, a company specialized in the development and manufacture of multi-space parking meters, ran two crowdsourcing competitions in parallel, designed to uncover new ideas for services based on the use of multi-space meters. The remainder of this paper is organized as follows: Sect. 4.2 provides a theoretical outline of the concepts surrounding a business ecosystem (BE). Section 4.3 presents the methodology used and the studied case. Finally, in Sect. 4.4, we propose our analysis of this case.

4.2 Business Ecosystems

The notion of a BE, introduced by James Moore in the mid 1990s, is based on an analogy with biological ecosystems. This concept makes it possible to account for the development of inter-business relationships, which extend beyond momentary cooperation, to create deeper bonds. Thus, starting from the pioneering work of Moore (1996), Torrès-Blay (2000) defined the BE concept as "a heterogeneous coalition of companies from different industries forming a strategic community of interests or values, structured as a network, around a leader who succeeds in imposing or sharing its business vision or its technological standard."

This BE concept has been widely studied and used in Management Science literature (Attour and Ayerbe 2012; Gueguen and Torrès 2004; Moore 2006; Iansiti and Levien 2004; Loilier and Malherbe 2012; Teece 2007) or, more rarely, has been treated from the theoretical point of view (Koenig 2012). Starting from this set of studies and the definition presented here, we are of the opinion that BE is characterized by two fundamental elements: a technological standard and a network.

The appearance of a technological standard is both the cause and the consequence of the creation of a platform characteristic of BEs. As defined by Koenig (2012), "the design (or layout) is controlled by an actor who, according to rules specified ex ante, makes a key asset available to other actors, so that they can develop their own activity." Moore (2006) also insists on the open and modular nature of this platform. The starting point of a BE is thus a leading business which proposes a platform, although this project can lead to an ecosystem only if it allows others to share this platform. The second fundamental element can then be created: the network.

The notion of business network takes on an entirely new form of importance in the present day, especially in the field of innovation (Nooteboom 2004). This is clearly revealed by Loilier and Malherbe (2012) in their research into the genesis of BEs. They compare this with the more recent concept of open innovation

(Chesbrough 2003) which, although centered on innovation, also reveals the importance of the network's openness. By referring to the pioneering work of Moore (1993), they insist on the diverse phases of the process leading to the development of a BE. Their research is original in that it takes a close look at the genesis of a BE, by mobilizing the dynamic capabilities approach of Teece (2007).

Although the notion of dynamic capability is central to the emergence of a BE, the development of these ecosystems should be associated with the growing importance of digital technology (Gueguen and Torrès 2004). Here, we make the assumption that it is this digital technology that allows BE platforms to become modular and open.

For the leading business, the development of a BE has a strategic dimension and is part of its innovation strategy. In particular, for this company, the identification of partners and activities surrounding the platform depends, at least partially, on exploration in the sense described by March (1991): The stakes are related not only to the selection of partners or complementary activities within an existing base, but also to the need to develop a network of actors and new activities.

In this paper, we investigate a specific aspect of innovation within a BE: the provision of new services. This question was studied by Attour and Ayerbe (2012), through the use of a dual analysis: the theory of BEs and the C/K theory proposed by Le Masson et al. (2010). This theory of innovative design describes innovation as the outcome of the expansion of the concept space (C) and the expansion of the knowledge space (K). When applied to the emergence of a new service, concept space is related to the full set of offered services (Attour and Ayerbe 2012). According to Lenfle (2005), the knowledge space associated with the emergence of a new service is composed of 6 dimensions:

- The types of targeted users;
- The support product;
- The front-office process centered on the management of interactions with the customer;
- The back-office process allowing the service to be delivered;
- A contract defining the reciprocal commitments of the supplier and the beneficiary;
- An economic model for financing of the service.

One of the characteristics of crowdsourcing is indeed that it allows solutions or ideas to be explored through an open call over the Internet. In the remaining sections of this paper, we analyze the role of crowdsourcing in the emergence of new services within an ICT platform ecosystem.

4.3 The Case Study

4.3.1 Methodology

The decision to use a case study (Yin 2009) for our research can be explained in two ways. Firstly, in a constructivist approach, we attempt, via the detailed analysis of a phenomenon, to infer various elements in order to enrich the existing theories. Secondly, we were able to access the particularly rich data corresponding to a specific case: the Parkeon company, member of the "Véhicule du future" competitiveness cluster in France, which implemented two crowdsourcing strategies in parallel. The case study provides us with particularly detailed information concerning the process and its success, as perceived by the company.

Our work began in the autumn of 2013, and data were recorded in several manners. Firstly, interviews with the project leader from the company (2 telephone interviews lasting 1 h each), and with the project leader from the VdF competitiveness cluster (1 telephone interview and a face-to-face interview, each lasting one and a half hours), allowed us to gain detailed insight into the context and the implemented strategies. We were then able to access the qualitative and quantitative elements of analysis produced by the participants, following the crowdsourcing competitions. Finally, we appraised the various documents concerning the Parkeon competition, published on the Internet (Table 4.1).

4.3.2 Presentation of the Case

For 40 years, the Parkeon company has been specialized in the design and manufacture of transportation payment terminals and multi-space meters. The company has more than 1000 employees throughout the world and in 2013 had a turnover of

Table 4.1 Webs pages consulted

List of Web pages
– http://www.clustercrowd.ch/en/
– http://www.clustercrowd.ch/en/projects/Parkeon-Cluster-Contest
– https://clustercrowd.atizo.com/projects/ideas/2237/stellen-sie-sich-einen-parkautomaten-vor-den-sie-m/
– http://cordis.europa.eu/projects/rcn/101331_en.html
– http://www.future-mobility.eu/
– http://www.parkeon.com/
– http://www.parking-net.com/parking-industry-blog/parkeon/parking-meter
– http://www.vehiculedufutur.com/
– http://www.vehiculedufutur.com/lettre/64/

185 M Euros (of which 85 % was from exportation) with more than 200,000 multi-space meters installed in the world, including large cities such as New York, Paris, and Madrid. Parkeon is thus one of the leaders in its industrial sector.

4.3.2.1 Multi-space Meters as BE Platforms

Thanks to their primary function, multi-space meters are positioned at the center of a BE, including the parking management operator (which can be a public or private sector organization) and the payment service provider (banks and other payment intermediaries). There is a need for this ecosystem to evolve, for example, through the emergence of contactless payment solutions. In a context of smart city development (Komninos et al. 2013), the embedded technologies currently used in multi-space meters provide new development opportunities for this BE. Thus, one of Parkeon's strategic orientations is to open its platform, with the aim of allowing it to include new service providers.

The development of a BE around the multi-space meter raises several questions for Parkeon: Which services should be built into the ecosystem? Who are the potential service providers? In 2013, Parkeon introduced two Crowdsourcing competitions designed to tackle these questions.

4.3.2.2 The Parkeon Pulse Your City Project

The Parkeon Pulse Your City project resulted from the convergence of interests expressed by various stakeholders. On the one hand, these included the representatives of the European ELMO project (ELectroMObility solutions for cities and regions[2]): the Vehicle of the future competitiveness cluster, Atizo, Mundi, and the ICT cluster from Berne. On the other hand, the Parkeon company was looking for service concepts that could be implemented through the use of multi-space meters. The aim of the Parkeon Pulse your City project was thus to organize a competition open to the general public, to envision new services associated with the company's multi-space meters. In practice, the technologies embedded into multi-space meters allow new ICT services to be included the following: making a payment, printing a ticket or a coupon, consulting or providing information over the Internet, or even controlling other physical objects.

The Parkeon Pulse your City project was effectively launched in April 2013, through the use of two distinct crowdsourcing competitions.

- The first competition (General public competition) was publicized on the Atizo Crowdsourcing platform, for a total expected duration of 5 months, including the preparation, the competition itself (4 weeks), and selection of the winners.

[2]Project with a total budget of 2.2 M Euros for the period 2011–2014, co-financed by the European Union's 7th FPRD.

The participants' assignment was expressed in very general terms: "Imagine a multi-space meter that you like—if this multi-space meter was converted to an interactive kiosk, which applications and services should it offer?" The total compensation paid to the winners was 2000 Euros. Finally, Atizo's general conditions were applied during this competition.

- A second competition, intended for professionals from the ICT sector only (ICT cluster competition), was publicized via a proprietary crowdsourcing platform from Mundi Consulting, for a total expected duration of 9 months. The competition was designed to take place in three phases: an initial phase open to all ICT service providers, a second concept development phase, and a final phase during which from 3 to 8 finalists would be required to present their ideas to a jury, during the European mobility week. During the first phase, the following was expected of the participants: a short description with an explanation totaling 1000 characters, description of the business model, and presentation of graphical interface. The partners developed the general conditions relevant to all aspects of intellectual property arising from this competition.

A posteriori, the partners' evaluation of the two competitions was irrevocable: With a total of 479 ideas of which 17, proposed by 13 participants, received an award, the general public project was considered to be "totally successful," whereas the project intended for ICT service providers was a failure, since no proposals were received. Following this competitive process, a questionnaire was sent to all potential applicants, to find an explanation for their absence from the competition. Forty-one replies were received, revealing various reasons for their non-participation: The project was not relevant for the service company, the general conditions were too complex, the allocated time was too short, etc.

Table 4.2 summarizes the main elements differentiating the general public and dedicated ICT service provider competitions.

Table 4.2 The *Parkeon pulse your city* project competitions

	General public competition	ICT cluster competition
Public	General public	ICI service providers
Expected outcome	General ideas	Detailed description of the service du service
Participants' rewards	2000 Euros shared among winners	Winner: commercial implementation Finalist: présentation lors de la semaine de la mobilité
Diffusion	Atizo: general platform	Clustercrowd: specific platform
Outcome	479 proposals—17 rewarded ideas	0

4.4 Analysis and Discussion

The two Parkeon competitions are aligned with a methodology for the development of an existing BE, built around the multi-space meter platform, since the aim was to uncover ideas for third-party services, based on the Parkeon multi-space meter.

For Parkeon, crowdsourcing offered two advantages:

- With the general public competition, the aim was to mobilize a large number of potential users, in order to uncover the greatest possible number of ideas for new services.
- In the case of the ICT service providers, the aim was not only to uncover ideas for new services, but also to identify potential partners for the implementation of such services. In fact, this competition was characterized by certain features typical of a call for projects, designed to reveal the skills of potential partners that could be beneficial for the development of the BE.

4.4.1 Mobilized Knowledge: Comparative Analysis of the Competition

The first step of our analysis involves comparing the two competitions, in terms of the nature of the knowledge mobilized by the participants. For the general public competition, the brief expression of new ideas mobilizes the experiential knowledge of the user, associated with the creative aptitude of individuals (Amabile 1988). The generic nature of these skills translates into the existence of a major base of potential respondents. As this has to do with an ideation process, the questions are not asked in terms of the complexity or implicit character of knowledge. The ideation is associated with personal experience and the users' individual needs. One thus encounters one of the principles of innovation by users, defined by von Hippel (1988, 2005). In this context, crowdsourcing takes on its full meaning.

For the ICT service provider competition, the requirements expressed by Parkeon were related to the conditions for the system's future implementation (detailed description of the concept, business model, and graphical interface). Participation in this competition implies both an ideation capacity (to propose a new concept) and the mobilization of professional skills for the design of ICT services (Lenfle 2005). Without necessarily being complex, it is relatively time-consuming to mobilize the skills needed to develop a proposal.

4.4.2 Service Innovation Within a BE

Intrinsically, the multi-space meters lie at the center of a BE, which comprises various actors whose activities are centered on the management of parking. The development of technologies embedded into multi-space meters and their growing

connectivity with the Web or even other physical objects offers almost unlimited prospects for the innovation of services within the BE. The literature dealing with BEs emphasizes the importance of openness and modularity as evolutionary factors in these ecosystems. The Parkeon case is in line with this logic, since the company is seeking to make its platform available to digital service providers. As a remote research tool (Afuah and Tucci 2012), crowdsourcing appears to be particularly well adapted to support the expansion of the concept and knowledge spaces, required for the innovation of services (Attour and Ayerbe 2012; Lenfle 2005).

The general public competition is considered to have been a success, since the foreseen awards were granted for ideas related to new services. The implementation of a service proposed by crowdsourcing—that of producing commercial coupons with multi-space meters—is moreover now an ongoing project in Parkeon. This crowdsourcing competition thus contributes to innovation in services and to the evolution of the BE assembled around the Parkeon platform. Paradoxically, although this competition enabled the emergence of new concepts that are useful for the BE's evolution, it did not provide Parkeon with the necessary knowledge for their implementation. Using the terminology of Le Masson et al. (2010) in the context of the C/K theory, this competition generated growth in the concept space. However, the implementation of service ideas requires a knowledge acquisition step (for example, the search for possible partners, evaluation of projects), which is partially disconnected from the crowdsourcing competition. In other words, the crowdsourcing was a success, but the implementation of its results required an increased level of knowledge at Parkeon. The relevance of crowdsourcing is thus placed far upstream in the evolutionary dynamics of the BE: the identification of new concepts.

On the other hand, the ICT service provider competition, which was similar to a call for projects, was designed to mobilize and identify potential service providers. In a certain sense, this competition was intended to generate concepts, but also to reinforce knowledge growth activities. In spirit, the project was intended to bring forward new concepts, but also technico-commercial studies, market research, and of course BE partners. By encouraging the expansion of not only its concept space, but also its knowledge space, for Parkeon, the returns from this competition were potentially greater than those derived from the general public competition.

We interpret the comparative success of the two competitions as the outcome of two different phenomena. On the one hand, due to its nature, crowdsourcing is better adapted to the production of knowledge bricks (modules, tasks) than to the design of knowledge brick systems (Afuah and Tucci 2012; Pénin and Burger-Helmchen 2012; Schenk and Guittard 2011, 2012). On the other hand, the dynamics of a BE are related mainly to the notions of modularity and networks. By inviting a large number of individuals to contribute to the production of ideas and concepts, the general public competition responds both to a fundamental criterion of crowdsourcing and to a factor contributing to the development of the BE. The ideas and concepts indeed correspond to "elementary bricks" of knowledge, which are simply the first elements in a project for the implementation of a new service.

On the other hand, the ICT service provider competition was designed to yield near "turnkey" solutions for Parkeon and to help identify relevant service providers.

The case of Parkeon provides us with input concerning crowdsourcing as a tool for the innovation of BE services around an ICT platform. It turns out that openness and modularity are factors contributing to the success of a crowdsourcing initiative, as well as determinants in the development of a BE.

The case of Parkeon also confirms and complements two results related to the innovation of services in a BE (Attour and Ayerbe 2012). The first of these has to do with the role of the user in the development of a BE. Crowdsourcing is in line with this logic, since it allows potential users to express their needs and desires. The second has to do with the role of the pivot company in the development of the BE. Although Parkeon occupies a leading position within the BE, as a consequence of its expertize in the technologies used for multi-space meters, it is also a driving force in the emergence of new services. Crowdsourcing simplifies this role insofar as interactions with the contributors is externalized to a crowdsourcing platform, using relatively standard procedures.

4.4.3 The Not-Invented-Here Syndrome

Crowdsourcing has been the center of numerous academic studies in recent years. Yet only a few, if any, address the internal management dimensions of crowdsourcing: How to integrate new knowledge or ideas made outside the firm?

Blohm et al. (2013) are interested in the absorptive capacity of firms when they use crowdsourcing to gather ideas and information. The absorptive capacity of the firm allows her to transform the information obtained by crowdsourced knowledge and draw a project. Thus, the absorption capacity of the company depends on the routines that the company has put in place to assess the ideas, diffuse it, and assimilate it (Cohen and Levinthal 1990; Teece 2007).

Besides, the use of crowdsourcing can be interpreted as defiance from the manager toward the internal research ream of the firm or recognition of their inability to find an adequate solution. Management therefore faces the not-invented-here (NIH) syndrome,[3] which is a negative attitude toward knowledge from outside the company boundaries (Lichtenthaler and Ernst 2006; Lichtenthaler et al. 2010; Burcharth et al. 2014). The NIH syndrome leads to the non-utilization or under-utilization of outside knowledge and may have negative consequences on the performance of the company (Katz and Allen 1982; Lichtenthaler and Ernst 2006).

Not only researchers can be exposed to NIH, the managers can also reject solutions coming from outside. The negative attitude of managers toward external

[3]Some authors consider also the opposite situation, a strong attraction toward products and knowledge produce elsewhere, this also can have negative consequences for the firm (Menon and Pfeffer 2003).

knowledge can be explained by the following factors: (a) their belief in their own skills and knowledge, (b) belief in the negative impact of external knowledge on the performance of the company, (c) the fear of a negative impact on their career, (d) adoption of technology produced internally or knowledge that a scientist has developed is a career booster that allows upward mobility in the hierarchy; this method of promotion would disappear, and (e) fear, if type of practice becomes widespread, that a reduction of staff dedicated to the research is establishing or restoring the balance between research and applied research takes place.

The NIH syndrome is a negative attitude toward external knowledge. In a business context, individual attitudes are shaped by the culture, norms, values, and organization-specific routines. Attitude is a major concern for managers because it guides the processing of information and knowledge (Cohendet and Llerena 1999) and influences the behavior of individuals. In general, individuals seek and approve the information and knowledge that are consistent with their past attitudes. They attach more importance and credibility to this type of information. When employees feel threatened by outside ideas, they have a tendency to denigrate them in order to promote internal ideas. Reitzig and Sorenson (2010) speak of "provincialism" of knowledge.

The simplest way to increase the acceptance of a solution that comes from crowdsourcing is to integrate the various individuals who will implement it. More generally, Lichtenthaler and Ernst (2006) list the following tactics that help reducing NIH syndrome:

- All persons involved in the integration of external knowledge should be involved in the process of decision making.
- The presence of a "Gatekeeper" a "leader" is a very important element.
- Conversely, it is conceivable to cut all links between users and producers of knowledge so that no one knows the real origin of the solutions or to blend the external solution with internal knowledge in order to hide the external proposition.
- Find a way to prove the superiority of radical external solution (Menon and Pfeffer 2003).

In the Parkeon case, the crowdsourcing project barely suffered from a NIH syndrome. Internally, the project leader has the characteristics of an intrapreneur (Burgelmann 1983) with large autonomy, legitimacy, and hierarchy support. Several persons form the company were involved in the follow-up of the project, including in the selection of the winning ideas. These ideas did not imply a radical breakthrough for the company. Rather, they converged with ideas already existing within Parkeon, but in a diffused an unrevealed manner.

4.5 Conclusion

Through the use of a case study, we have attempted to understand how creative crowdsourcing can contribute to the development of a BE based on an ICT platform.

In 2013, the Parkeon company launched two crowdsourcing competitions. The knowledge activated through participation in these two competitions was quite different: knowledge through use for the general public competition and professional skills in the case of the ICT service providers' competition. It is revealing to interpret this case in the light of the C/K theory: The general public competition, considered as a success, is associated with the emergence of new concepts. Implementation of the concepts proposed during this competition relies on the acquisition of knowledge, which raises the issue of optimizing the use of knowledge acquired via crowdsourcing. The ICT service providers' competition, which was expected to contribute both concepts and knowledge, was undeniably a failure.

This case study highlights the convergence between certain conditions for the success of crowdsourcing and the factors contributing to the development of a BE: openness and modularity. Furthermore, it accentuates the role of users, who become the providers of new service concepts, and confirms the central role of the company leader for the development of the BE.

The phenomenon described here is part of a strategic vision of knowledge, with the latter being one of the key elements in the innovation process. Complementary aspects which should be further studied in future research include, on the one hand, the absorptive capacities (Cohen and Levinthal 1990) acquired through crowdsourcing and, on the other hand, the relationship between crowdsourcing and dynamic capabilities (Teece et al. 1997).

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Chapter 5
From Leakage to Crowdsourcing: A Model for Enhancing the Participation of Local Firms

José Luis Galdón Salvador and Ignacio Gil-Pechuán

Abstract Tourism is a critical part of the economy of any country. This is essentially because in addition to being the world's largest industry, tourism also has an important multiplier effect on other industries. However, not all tourism revenue remains in the local region, and for this reason, the concept of leakage becomes critical. Leakage studies the amount of revenue generated by tourists which does not stay in the destination country. This phenomenon occurs especially in developing countries, where lower local industrial development increases dependence on foreign countries. Therefore, the second part of the paper highlights the need to implement new business models in order to minimise leakage. For many authors, the best way to reduce the impact of leakage on the economy of different companies in a region is by enhancing linkages between local companies. The main concept in this case is to achieve the participation of the community. In this vein, one of the most important activities being used by firms is crowdsourcing, an activity defined as taking a specific task and outsourcing it to a large group of people via the Internet through an open call. This study delves into the concept of crowdsourcing presented as a technique for reducing leakage with the aim not only of increasing the satisfaction of employees and customers but also building a new business model that empowers local economies by improving their entrepreneurial environment and helps hotels to improve their profitability.

Keywords Crowdsourcing · Leakage · Participation · Tourism impact · Business models

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5.1 Introduction

As has been seen in recent years, tourism has an extremely significant impact on an economy. For decades, numerous authors have emphasised the effects that tourism has on the development of regional economies (Bryant and Wilson 1998; Leiper 1979), whilst the evolution of international tourist arrivals and productivity in the tourism sector evidence the industry's growing share of important ratios, such as production and employment worldwide (Capó et al. 2007).

Given that countries use tourism as an engine for development, such development has to be sustainable. This is the case when the wealth brought by tourists actually leads to an improvement in the local economy. At this point, authors like Mbaiwa (2005) argue that in nations where the tourism industry is dominated by foreign countries, its contribution to the GDP of local economies is greatly diminished. This is because tourism service bookings and payments are made in these foreign countries. Hence, both who really controls the main tourism enterprises (travel agencies, internet channels, tour operators, etc.) and also how many of the products bought by tourists are imported need to be weighed up. In the same vein, Torres (2003) avers that tourism development is usually associated with a growing demand for imported products which results in leakage to the economies of the countries of origin and competition with local producers.

This is where the idea of leakage comes into play, defined as revenue from tourism which does not remain in the country visited (imported products, taxes, foreign suppliers, etc.) (Lejárraga and Walkenhorst 2010). As Sandbrook (2010) puts it, leakage can be seen as "the failure of tourist spending to remain in the destination economy".

Thus, given the potential that tourism has for the development of a particular region on one hand and the problems of leakage on the other, a balance has to be found that enables efficient management of tourism. We are thus faced with a new paradigm which is game changing for tourism businesses which need to adapt to a complex and diverse environment that has to be addressed using new business models (Garrigós-Simón et al. 2014).

In this chapter, the concept of leakage is defined, its problems in the tourist sector are presented, and remedies that make it possible to reduce leakage are proposed. After examining the admittedly sparse literature about leakage, this chapter suggests reducing leakage by encouraging the creation of links that make it possible to build a strong business community in the place that receives the tourists (Chirenje et al. 2013). To achieve this, organisations, local councils, governments, businesses and other stakeholders need to enhance the participation of all local business owners. This will mean that tourism services in a particular region will be delivered by local firms and this directly lessens leakage.

To encourage participation by local business owners, this chapter examines the concept of crowdsourcing and suggests techniques based on it. Since the term is new, this chapter makes an important contribution to the literature as for the first time, it proposes using crowdsourcing techniques as a way of reducing leakage in

tourism. Hence, this paper's main contribution is to show that crowdsourcing can increase the participation of local business owners by increasing linkages between firms, thereby reducing leakage and maximising the benefits that tourism brings to the local economy.

5.2 The Importance of Leakage: The Problem and Its Solutions

There are relatively few studies about leakage in spite of its importance for the impact of tourism on the economy of a region. Authors such as Fennel (2003) discuss the importance of studying leakage because of its multiplier effect on the economy of a specific region. Leakage can also impact other industries and sectors, but it is precisely in tourism where leakage is particularly important because tourism is one of the most important sectors for the economic development of any region (Mowforth and Munt 2003).

Although studies of leakage are predominantly qualitative, some authors have quantified approximate leakage rates in certain regions. One of the most interesting conclusions drawn from these studies is the significant gap between developed and developing countries. Thus, developed countries have an average leakage of approximately between 10 and 20 %, whilst in developing countries the average goes up to 40–50 % (Diaz Benavides 2001; Meyer 2007).

The concept of leakage is based on the idea that a major part of tourism expenditure returns to the region of origin. Thus, leakage occurs when income earned from tourist services in the host countries is not available because it does not stay in the local economies (Rahman 2012). Examples are imports from suppliers outside the region (food, beverages, materials, subcontracting, etc.) or even foreign workers (Blake et al. 2008). Another case in which leakage is evident is when tourism spending does not even reach the destination region but stays in the tourists' home country. This happens when, for instance, tourism services are purchased from foreign operators, when commissions are paid to intermediaries and when there are airline taxes.

To better grasp the possible cases of leakage, some authors (Supradist 2004) have differentiated between four types.

Pre-leakage means leakage taking place before tourists arrive in their destination. As mentioned above, the most frequent cases of this type of leakage would be bookings with foreign companies, tour operators, airlines, etc. Internal leakage is the proportion of goods and services which are imported and where direct labour comes from. External leakage is tourism spending that occurs outside the tourist region but is linked to local firms, such as when investors in a company are foreigners. Finally, there is invisible leakage which includes currency payments, currency exchange, taxes, etc. (Supradist 2004).

Some authors maintain that leakage is directly related to the business community of an area. For example, Lejárraga and Walkenhorst (2010) argue that tourism has both direct economic impacts (hotels, transport, etc.) and also indirect impacts which are the ones that directly affect local economies, such as foodstuffs, beverages, furniture and tour operators. In turn, some studies relate job creation in a given area with the level of entrepreneurship of firms in that region (Sexton and Bowman-Upton 1991).

At this point, it is important to note that there are certain localities which are more likely to suffer high levels of leakage than others. Regions whose economies are not able to meet the tourism industry's production and quality requirements for tourism services are much more vulnerable (Meyer 2007). There always has to be a balance between tourism demand in a region and the ability of local companies to meet this demand (Loon and Polakow 2001).

Given the above, it is clear that even though leakage is an as yet little explored term, it is nonetheless a critical factor in tourism development in any community and especially in developing countries (Sandbrook 2010). Hence, a more in-depth quantitative study of leakage is required in lockstep with putting forward solutions to decrease leakage in regions.

Few authors have investigated possible measures to reduce leakage. The study conducted by Supradist (2004) puts forward a series of practical measures to lessen it. These measures are arranged into a number of points that are summarised below:

- Increase online marketing to boost local tourism businesses vis-à-vis foreign ones.
- Try to reduce seasonal workers.
- Encourage setting up local businesses.
- Forge a strong link between local businesses so they become suppliers and meet tourism demand.
- Promote local products in terms of food, beverages, souvenirs and other items.

Furthermore, research by Galdon et al. (2013) suggests an appealing way to reduce leakage by creating an entrepreneurial environment in local businesses. Therefore, we believe that a region will have a greater entrepreneurial spirit when the business community is strongly tied to local economies so that the majority of the benefits associated with tourism stay in the region and consequently lead to economic development. The entrepreneurial framework does not focus on isolated individuals but centres on the ties and links created in order to build a business community that enhances the likelihood of success (Herrera Echeverri 2009).

Chirenje et al. (2013) propose a similar solution which is based on the idea that strong links should be forged between local businesses so that they can cater for all tourist service needs. To accomplish this, the study points out that the active engagement of local communities should be encouraged in order to retain as much tourism revenue in the region as possible (Chirenje et al. 2013).

This leads to the important conclusion that strong links have to be fashioned between local firms generating a powerful business community in order to reduce leakage (Lacher and Sanjay 2010). The resources required to deliver tourism

services would thus be provided by local businesses which would mean that the benefits would not leak away from the region.

Therefore, the involvement of entrepreneurs, organisations and workers has to be encouraged to build this local business community. In places where there are high levels of leakage, economic profits dwindle when the participation of local communities in tourism falls (Kokkranikal et al. 2003). Consequently, our major contribution to the literature is to go one step further and propose crowdsourcing techniques as tools for promoting this participation. The next chapter delves into the concept of crowdsourcing and in particular emphasises how it can be used to create ties between local firms and thus directly reduce leakage in any region.

5.3 Crowdsourcing: The Power of Local Participation

Over the past 10 years, there have been significant developments in new information and communication technology (ICT) which, when combined with the rapid expansion of the Internet and social media, have created a new scenario with new business models for entrepreneurs and customers (Egger and Buhalis 2011). This new scenario is based on the active participation of both workers and customers in all business processes. As a result, the importance of participation is crucial to understanding this new business environment (Garrigos et al. 2011).

Many authors have used the term Web 2.0 to describe this new technological environment. In this new scenario, the way we use the Internet changes and, of course, business models based on the Internet also change. The key difference lies in the user's new role as the core of the system. In fact, the main difference from the original Web 1.0 is that in the latter users had a passive role, being merely spectators and consumers of information. By contrast, in Web 2.0 the user becomes an active player and may even become a co-producer and co-creator of information (O'Reilly 2007).

Hence, the transformation of the customer from a passive to a hyperactive one who can participate in all processes (Shiffman 2008), and the development of social media are changing the viewpoint not only of new business models but also production itself. Companies are being forced to adapt to this new paradigm in which they have to work hand in hand with customers and other stakeholders throughout the production process.

Consequently, if we combine the importance of the participation of people with advances in new technology based on Web 2.0, we come directly to the concept of crowdsourcing. The term was coined in 2006 by American journalist Jeffrey Howe, who defined it 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" (Howe 2006). Even though under this definition proposals are made openly, that is to everyone, it is possible to limit the public who will participate in the proposal. Following Leimister's study (2010), there are two potential audiences to which crowdsourcing proposals can be

addressed: the Internet crowd (a large and heterogeneous group) and a smaller group of people who are organised hierarchically. This makes sense because not all Internet users will be able to collaborate and contribute their knowledge to a particular initiative.

This new concept has been gradually clarified and fine-tuned over the years. This is because the concept is very broad and covers a multitude of possibilities, which means the types of crowdsourcing need to be classified in order to examine which one best dovetails with each situation. Howe himself (2008) defined the types of crowdsourcing based on four groups: crowd wisdom, crowd production, crowd voting and crowdfunding. Below is a definition of each one, together with how they can be customised in each case as initiatives to reduce leakage, which is the main purpose of this paper.

Crowd wisdom

This is a type of crowdsourcing based on collective intelligence. In turn, it can be subdivided into other types such as crowdcasting, where a contest is held with a prize for the first person to solve a particular problem, and crowdstorming, where ideas or solutions to tackle a problem are brainstormed.

Customising crowd wisdom as a corrective measure to reduce leakage might, for instance, involve internal competitions held in hotels in which customers suggest improvements. One of the real examples already in place using this approach is the Hesperia Hotels chain "Suite H" project. Under this programme focused on the theme of "putting ideas into practice", customers can share their innovative ideas with hotel managers. After careful examination, the best ideas are implemented and the owners of the ideas get a prize by way of reward. These initiatives improve customer and employee satisfaction and encourage them to take part, which leads to a better environment that decreases leakage. This relationship is anchored in the work of Galdón et al. (2013) in which the connection between leakage and customer and employee satisfaction is empirically demonstrated.

Crowd production

In this case, a specific product is sought rather than a solution to a problem. There are products in any line of business which may require assistance of this kind when it comes to, for example, choosing a design. In the case studied in this paper, we propose using such initiatives for finding local suppliers and companies required to deliver tourist services in a region. More specifically, in the case of the hotel industry, hotel managers could find local suppliers to provide items such as food, consumables, office supplies, furniture and laundry. Thus, these local companies could be invited to "compete" to be subcontracted by the hotels. In this way, and as long as local government policies support such initiatives, a strong local business community could be built that would lead to a significant reduction in leakage in the region (Chirenje et al. 2013).

Crowd voting

This is based on collecting information from users. In the tourism sector in particular, these techniques have been on the rise in recent years. Companies like

Tripadvisor and Booking base their content on information posted by users on their websites. This is extremely significant since having thousands of views for free is invaluable for businesses when getting feedback on the quality of their services and the degree of customer satisfaction. The reviews and ratings given by customers are an important source of information as can be seen in actual cases such as IgoUgo, TripAdvisor and Wayn.com (Buhalis et al. 2011; Sigala 2009), and on the websites of hotel firms such as the Mel Sheraton (Sigala and Marinidis 2009).

Thus, crowd voting can be used to reduce leakage basically by ensuring customer satisfaction is as high as possible so that they choose local businesses (restaurants, entertainment venues, hotels, etc.) because they are the best rated ones.

Crowdfunding

These techniques are used not to solve problems or put forward ideas but rather to obtain direct financing. In this type of initiative, funding is sought for a given project so users participate by making a financial contribution.

In the hotel industry, there are real examples of websites that run crowdfunding projects. Power4projects.com is a crowdfunding platform in the tourism and leisure sector. The platform is aimed at a wide audience who is asked to provide funding for various projects. Another platform with a large number of projects based on crowdfunding is www.lanzanos.com. On this platform, there are entrepreneurs who seek funding, for instance, to open hotels of all types and categories. It also features projects that are underway but need extending or refinancing.

These financing techniques greatly help local enterprises that are starting out or which require funding to undertake business improvements. Again the involvement of people is crucial to foster links between local firms and thus reduce leakage. In addition, this often entails a way to compete with foreign companies that are economically more powerful.

5.4 Conclusions

Considered to be the world's largest industry, tourism is, in turn, crucial as the driving force behind the economies of many countries, especially developing ones. Therefore, companies and agencies alike seek to optimise the benefits that tourism can bring on all levels. Nonetheless, not all revenue from tourism remains in the region since some of it returns to the region of origin or even never reaches the destination. This is called leakage and occurs in all tourist regions, although it is developing regions that suffer from it most. This chapter has defined the concept of leakage and presented possible solutions that researchers have proposed in their studies, even though the newness of the concept means there are very few of them.

One of the first conclusions drawn in this paper is that tourism industry enterprises need to seek out new business models to reduce leakage to the point required to increase their profits and by extension, the benefits for the region. Hence, the measures proposed to remedy leakage consist of those which are geared towards

enhancing ties with local businesses in order to build a robust business community able to compete with foreign capital. As has been shown in this chapter, doing this means encouraging local entrepreneurs and customers to get involved in order to join forces and stimulate the local economy.

This active involvement and the expansion of new technology-based applications are the twin pillars on which crowdsourcing rests. This chapter proposes crowdsourcing-based measures to enhance ties between local firms and thus reduce leakage in a given region.

Our study is essential for companies because it sets out measures they can put in place to diminish leakage, and also for tourism planners who can acquire the tools they need to ensure that tourism revenue becomes a bigger driving force for the economic development of their regions by reducing leakage. Therefore, our main contribution to the literature is to have laid the theoretical foundations for reducing leakage using crowdsourcing techniques.

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Chapter 6
Crowdsourcing: A New Way to Citizen Empowerment

Diego Álvarez Sánchez, David Pardo Gimilio and Jorge Isnardo Altamirano

Abstract Empowerment has for a long time held a prominent place in the theoretical development of fields as diverse as development studies, community psychology or studies on social movements and organisations, among other areas. In parallel, multilateral agencies and non-profit organisations have launched empowerment processes in different sociocultural and political contexts with an uneven impact. On the other hand, the advance of Web 2.0 technologies has allowed crowdsourcing to establish itself as one of the most successful collaborative approaches through the Internet, particularly in the business world. In this chapter, the authors present a definition of the concept ***empowerment-oriented crowdsourcing*** on the basis of the review of the theoretical and practical developments of both dynamics. The objective is to delineate the framework that facilitates the implementation of processes of citizen empowerment through crowdsourcing projects that seek social benefit.

Keywords Empowerment · Crowdsourcing · Citizenship · Framework · Empowerment-oriented crowdsourcing

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6.1 Introduction

This chapter is concerned with the relationship between empowerment, citizenship and crowdsourcing. The authors believe that the interaction of the three elements can help significantly to facilitate the participation of citizens in processes of social change that pursue the creation of a more just society. Under this approach, our study intends to be a contribution, both from the theoretical reflection and practical application, to the strengthening of citizenship capabilities to achieve this objective.

The notion of empowerment used in this study is built on contributions made in the field of development, and it is complemented with other contributions of disciplines such as education, psychology or social work. On the basis of this review, we establish the elements of the concept of empowerment in the context of a developed country at the present time. From that point, the term crowdsourcing is defined together with its typology, and both a definition and a characterisation are suggested for the empowerment-oriented crowdsourcing.

6.2 Understanding Empowerment

The literature review of the concept of empowerment shows a wide variety of ideas which have in turn resulted in different definitions by different disciplines related to several sociocultural and political contexts. From its origins in popular education approaches, with the development of critical pedagogy described by Freire (1970), empowerment has received theoretical contributions from other disciplines such as the model established by Rappaport (1987) in the theoretical development of community psychology, the study of power from political science by Weber (1977) or Foucault (1999), or the research work on women's empowerment from a gender perspective conducted by Rowlands (1997) and Kabeer (1999), among others. At present, in development studies and practice, the concept of empowerment has transcended the gender perspective and has been widely used in development studies, community and social work or development cooperation, and it is widely used by development agencies, the United Nations or the World Bank, among others (Murguialday et al. 2006).

The remarkable variety of application fields has resulted in an excessive laxity which, although it has helped to spread its use, it has also made it significantly difficult to define a framework for its practical use beyond the approaches aimed at specific groups. An overview of the most significant definitions will establish the elements that will compose the framework for understanding empowerment that can be used to define crowdsourcing empowerment-oriented practice.

Among the works aimed at the development of mechanisms for the empowerment of women, the contributions made by Rowlands (1997) stand out. This author believes that empowerment is bringing people who are outside the decision-making process into it. Therefore, empowerment is related to the different ways in which

power operates. Thus, in line with the conventional definition of "power-over", she emphasises the participation in political structures and formal processes of decision-making. On the other hand, on the basis of "generative" forms of power ("power for" and "power with"), empowerment has to do with the processes by which people become aware of their own interests and how these relate to those of others. According to this author, empowerment takes place in three dimensions: personal, developing a sense of self and individual confidence; relational, the ability to influence and negotiate the nature of relations; and collective, working together to achieve a more extensive impact.

Awareness and participation in decision-making is associated with the sense of control over one's own life included in the works of Rappaport et al. (1984) in community psychology. According to this author, empowerment means that people have to acquire new competences in the context of everyday life, rather than such competences come from experts. On this basis, only those people involved in the processes of empowerment can decide the success of them. Thus, he emphasises the rights and abilities rather than the lacks and needs by developing a sense of empowerment from a political conception of the human being as a "citizen" immersed in a political and social context. The idea of the necessity to acquire competences is also found in Kieffer (1984), who suggests a vision of empowerment as a process of learning and long-term development.

At an institutional level, we can find the extensive theoretical and practical work by the World Bank in this field (FRIDE 2006). The World Bank, in a broad sense, considers empowerment as an expansion of the freedom of both choice and action, which means that people acquire control over the resources (assets and capabilities) and the decisions that affect life itself. In order to make this possible, the Bank identifies, along with the suitable institutional condition,[1] four elements that are often present in empowerment projects, namely (Narayan-Parker 2002):

- Access to information: informed citizens are better prepared to seize opportunities, access services, exercise their rights and negotiate effectively.
- Inclusion and participation: it is necessary to create appropriate spaces for people to discuss the issues that affect them, and to participate in the decision-making on such issues (setting priorities, determining budgets, defining services, etc.).
- Accountability: it should be possible to demand that both public and private actors justify and explain their decisions and actions.
- Local organisational ability: it refers to the ability of people to work together, organise themselves and mobilise resources to solve problems of common interest.

[1]This is a concept from political science which is defined as "the set of rules, both formal and informal, to which the different actors try to adjust individually and collectively (…) Institutions define the position of each actor in their mutual relations, how to access these positions, what resources and activities are available and which ones are not, etc." (Vallés 2010: 171, 172).

In this field, it is worth pointing out the work performed by the United Nations (2012) in the context of poverty reduction, social integration and work for everyone. The group of experts convened by this institution to address these issues carried out an extensive review of the literature and the progress made in promoting the empowerment of individuals and groups. On the basis of this work, the group defined empowerment as an iterative process that requires an enabling environment that allows and encourages the participation of any person throughout their life, individually or collectively, in decision-making on issues that affect their lives from the economic, social and political point of view. This includes the necessary access to knowledge and information, for which information and communication technologies play a key role. In this regard, the studies used by the United Nations suggest that the ability to perform problem analysis is a critical factor for people to feel capable of influencing government decisions.

On the basis of the previous contributions, we can set the elements that we think should be integrated in current empowerment dynamics in the context of a developed society, as well as identify the connection with outsourcing projects based on the use of ICTs. In short, we find the following elements of the empowerment framework:

1. Awareness of both individual and collective capacities, as well as of the current situation of the economic, social and political environment.
2. Acquisition and development of competences[2] that allow active participation, either individually or in group, in decision-making processes on issues deemed important.
3. Development of an enabling environment that establishes both formal and informal institutions, ensures access to information, and sets accountability procedures in order to facilitate participation in decision-making processes at a local, national and even international level.

Among the elements identified, a dynamic and mutually influential relationship exists. That is, we believe that a greater awareness of the reality in which people develop their lives allows them to identify the abilities that would enable them to transform them and, in the absence of such abilities, to activate learning processes in order to reverse this situation. From this point on, a more prepared society can contribute significantly to the development of institutions, be more demanding in their requests for information and exercise actively their right to accountability. All this restarts the process and contributes to a greater individual and collective awareness with a better understanding of reality.

In the following section, we address the definition of crowdsourcing, establish the characteristics of this type of projects and analyse how they can promote citizen empowerment according to the framework we have just defined.

[2]We believe that this acquisition of competences is achieved through a process that facilitates the integration of knowledge, skill acquisition and the development of specific capabilities.

6.3 Definition of Crowdsourcing

The term crowdsourcing first appeared in 2006 in Wired magazine, where journalist Jeff Howe described it as the act of a company or institution outsourcing a function normally performed by an employee or undefined group of people (usually a large one) through an open call. This outsourcing may be peer-production when the work is done collaboratively, or it can be performed individually.

Since then, there have been many new definitions that reflect the evolution of the different types of crowdsourcing that have appeared in recent years. For example, Brabham (2009) argues that crowdsourcing is a strategic model to attract an interested, motivated crowd of individuals capable of providing solutions superior in quality and quantity to those that even traditional forms of business can. For her part, Kazai (2011) focuses on the retribution or satisfaction received by participants and defines it as "an open call for contributions from members of the crowd to solve a problem or carry out human intelligent tasks, often in exchange for micro-payments, social recognition or entertainment".

In this sense, it is worth highlighting the definition by Estellés and González (2012b: 9) in the article "Towards an integrated crowdsourcing definition", which accurately integrates most of the numerous definitions of crowdsourcing:

> Crowdsourcing is a type of 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. The user will receive the satisfaction of a given type of need, be it economic, social recognition, self-esteem, or the development of individual skills, while the crowdsourcer will obtain and utilize to their advantage that what the user has brought to the venture, whose form will depend on the type of activity undertaken.

On the other hand, crowdsourcing receives input from other concepts such as open innovation (Chesbrough 2003) and collective intelligence (Schenk and Guittard 2009) developed in the Internet through Web 2.0 tools.[3] The characteristics of this type of tools allow us to extend crowdsourcing to various areas by performing modular tasks executed in parallel by multiple users. This evolution has given rise to many different types of crowdsourcing projects in which countless users perform remotely different sets of tasks.

[3]The development of collective outsourcing defined in crowdsourcing would be impossible without the interaction characteristics that define the Web 2.0. The development of tools and contents 2.0 that allow a two-way communication between the users and those responsible for the websites has encouraged the necessary participation and interaction among the users in order to conduct crowdsourcing processes.

6.4 Types of Crowdsourcing Projects

In recent years, various attempts have been made to classify crowdsourcing projects based on different criteria. Among all the proposals, it is worth noting the one made by Geiger et al. (2011) from the perspective of both the organisation and the mechanisms of the process, or that given by Estellés and González (2012a) based on the type of task to be performed and which integrates previous classifications suggested by Howe (2008), Brabham (2008), Geerts (2009), Reichwald and Piller (2006), and Burger-Helmchen and Pénin (2010).

With the aim of bringing the concept of crowdsourcing closer through actual practice, we have compiled the classifications proposed by these authors with illustrative examples of projects that have achieved widespread impact. The categories included are given as follows:

- **Crowdcasting**: it includes those initiatives where the participant who first or better solves the challenge posed receives a reward. An example of this type of project can be found in the challenge issued by the company SunNight Solar in the *Innocentive* platform. The company challenged users to develop a dual-purpose solar light that would function as a lamp and a flashlight to be used in African villages and other areas of the world without electricity. Two months after, the challenge was posted, an electrical engineer from New Zealand solved the challenge and was awarded $20,000 in March 2008.[4]
- **Crowdcollaboration**: it includes projects in which participants bring their knowledge to solve problems or raise ideas collaboratively, usually without reward. The promoting company remains outside the communication between individuals. The following subtypes fall under this category:
  - **Crowdstorming**: it includes initiatives for which online brainstorming sessions are held, solutions are proposed and the crowd participates with their comments and votes. This group includes the session held by Citibank's Global Transaction Services at the IBM platform *Jam Events*.[5] The session was opened to 25,000 people in 88 countries and more than 6000 employees registered for the 55-h event. The purpose was looking to tap into the knowledge of individuals in the field to validate its future strategy and identify growth opportunities (Lesser et al. 2012). Another example is the session held by the toy company LEGO Group, which allowed customers to submit ideas for new products, and even to share the future revenues derived from those ideas (Antorini et al. 2012).
  - **Crowdsupport**: projects that allow customers themselves to solve the questions or problems of others, without resorting to the technical support or customer after-sales service. The company Hootsuite provides an example

[4]Further information on Innocentive website: https://www.innocentive.com/innocentive-solvers-make-difference-rural-africa-and-india. Accessed 6 October 2014.

[5]Website of the platform https://www.collaborationjam.com. Accessed 6 October 2014.

through the *GetSatisfaction* platform[6] with over 2600 community members and 1769 topics posted in the community.

- **Crowdcontent**: it differs from *crowdcasting* in that it is not a competition on a single task to be performed, but a final compilation of the work of all participants (not only the fastest or the best). The following subtypes fall under this category:
  - **Crowdproduction**: they are the projects through which content is created by collaborating with other people or performing tasks of varying difficulty like, for instance, writing articles in *Wikipedia*,[7] or microtasks that humans can perform more efficiently than computers, such as translating short fragments or labelling images of projects published on *Amazon Mechanical Turk*[8] platform.
  - **Crowdsearching**: in this type of projects, the participants seek content available online for a particular purpose. The project *Peer to Patent Peer* by the United States Patent and Trademark Office (USPTO) that opens the patent examination process to public participation is a widely referenced initiative. Peer to Patent is an online system that aims to improve the quality of issued patents by enabling the public to supply the USPTO with information relevant to assessing the claims of pending patent applications.[9]
  - **Crowdanalysing**: similar to the above subtype but in this case the search is performed in text or multimedia documents such as images or videos. A representative example is the American company *BlueServo*, which allows participants to locate illegal immigrants in the United States–Mexico border with by means of the images taken by the cameras placed on the border. The participants can communicate their findings anonymously to the United States Border Patrol so that they can be arrested.[10]
- **Crowdfunding**: it includes projects seeking to be funded by the crowd in return for a reward. There are numerous platforms which can be general or specialised by sectors or cultural areas. The platform *Kikstarter* is a representative example that has room for creative projects seeking collective funding for the development of products or services.[11]
- **Crowdopinion**: it includes projects aimed at getting feedback from users on a particular topic or product, for which the participants contribute their opinion or evaluation. If this is carried out by voting, it is called *crowdvoting*. One of the

[6]Website of the platform http://www.getsatisfaction.com. Accessed 6 October 2014.

[7]Website of the Wikipedia http://www.wikipedia.org. Accessed 6 October 2014.

[8]Website of the Amazon Mechanical Turk platform: https://www.mturk.com. Accessed 6 October 2014.

[9]Website of the Peer to Patent Peer project: http://www.peertopatent.org. Accessed 6 October 2014.

[10]Website of the *BlueServo* initiative: http://www.blueservo.net. Accessed 6 October 2014.

[11]Website of the Kickstarter platform: http://www.kickstarter.com. Accessed 6 October 2014.

most representative international projects is *Tripadvisor*,[12] the world's largest travel site, which contains over 170 million of reviews and opinions[13] of travellers on more than four million lodgings, restaurants, activities and attractions that allow other visitors of the website to plan their trips.

To get a precise approach to the concept of crowdsourcing, it is important to consider the evolution experienced by the sector in recent years. A review of current outlook shows the development of new crowdsourcing projects focused on social interests and away from commercial interests. In this case, their classification requires the introduction of criteria related to the nature of the promoter.

In recent years, several governments around the world have applied crowdsourcing as a way to involve citizens in the political process from the paradigm of Open Government.[14] In line with this approach, Ortiz de Zárate (2012) proposes to use crowdsourcing as a tool for co-creation in the participatory design of policies. For this author, the same way some companies put in value the concept of openness for enriching the design of their services and products, the Administration can enrich the design of public policies thanks to the intelligence of the people. Aitamurto (2012) agrees on how governments use crowdsourcing to achieve a final purpose like producing of a budget, preparing strategies or drafting a law.

One of the characteristics of this type of crowdsourcing projects is that the participation is non-profit. That is, the participants do not receive any compensation for the tasks. Ortiz de Zárate (2012: 15) reminds us that this fact moves the emphasis from the number of participants in these initiatives of political collaboration to the "fact of diversity; that is, we must ensure the participation of agents from all the sectors with an interest in the matter. In other words, we need to engage those who know (epistemological legitimacy), and those with an interest (stakeholders)".

But we cannot talk only about citizens as participants in institutional crowdsourcing projects for Open Government development. Citizens and civil society organisations can create their own platforms or collaborative initiatives intended to improve their environment, contribute ideas, denounce certain situations, or provide further and better transparency and clarity to the information that may be of social interest. Such projects favour the generation of new citizen organisations which, in the words of Gutiérrez-Rubí and Freire (2012), transform lifestyles and the governance of society with proposals.

At another level and more uncommon, there are private initiatives that are developing crowdsourcing projects to encourage critical thinking, solidarity and cooperation in solving common problems. In these cases, the ultimate indirect goal

[12]Tripadvisor website: http://www.tripadvisor.com. Accessed 6 October 2014.

[13]According to its web http://www.tripadvisor.co.uk/PressCenter-c4-Fact_Sheet.html. Accessed 6 October 2014.

[14]New form of governance based on the principles of transparency, collaboration and accountability. Further information http://www.opengovstandards.org. Accessed 7 October 2014.

of the company is usually to improve their brand image or to increase product sales or visits to a particular website.

The above considerations allow us to establish a new classification based on the criterion of the promoter that activates and energises the crowdsourcing projects. According to this criterion, we define the following categories:

- **Crowdsourcing initiatives promoted by public institutions**: These are collaborative projects promoted by the government, administrations or agencies. This group offers different examples at both international and national levels. The first group includes projects such as "*Be A Martian*", conducted by *NASA* in 2009,[15] the constitutional reform in Iceland in 2010 and 2011,[16] the participatory budgeting in Chicago (USA) in 2011,[17] the public consultation on Transparency Act, access to public information and good governance made by the government of Spain in 2012[18] or the process launched by the FBI in 2013 to collect videos and photographs that could help to investigate the Boston Marathon bombing.[19]
- **Crowdsourcing initiatives promoted by citizenship**: they include projects promoted by citizens or NGOs who are ahead of public institutions and generate their own crowdsourcing applications using sometimes open data from the administration and, usually, free open-source software. Some significant examples are: the *Ziudad* project launched in 2009[20] as a website of citizen collaboration, and a way to help solve urban problems, the initiative "*Adopt an MP*" promoted in 2012 by the organisation *What do MPs do*,[21] which asked for the cooperation of the citizens to complete and standardise a spreadsheet with the properties of the MPs, or the collective creation of free geographic databases promoted in recent years by *OpenStreetMap*.[22]
- **Crowdsourcing initiatives promoted by companies**: initiatives undertaken by private entities seeking public participation in solving problems of social interest. This category includes the project carried out by the British newspaper *The Guardian* in 2011[23] for the readers to contribute to the analysis of information about MPs expenses. The information generated was subsequently published openly, which made politicians accountable for their activities, with

[15]Website of the project: http://beamartian.jpl.nasa.gov/welcome. Accessed 24 September 2014.

[16]Website: http://stjornlagarad.is. Accessed 22 September 2014.

[17]Crowdsourcing platform used: http://askchicago.org. Accessed 22 September 2014.

[18]Website: http://www.leydetransparencia.gob.es/index.htm. Accessed 22 September 2014.

[19]Website: https://bostonmarathontips.fbi.gov. The website currently redirects to https://tips.fbi.gov which shows a general form of collaboration with the FBI. Accessed 24 September 2014.

[20]Website: http://ziudad.es. Accessed 24 September 2014.

[21]Website: http://blog.quehacenlosdiputados.net/adopta-a-un-diputado-y-vuelca-su-patrimonio-a-formato-reutilizable. Accessed 22 September 2014.

[22]Website: http://openstreetmap.org. Accessed 24 September 2014.

[23]Website: http://www.theguardian.com/news/datablog/2009/jun/18/mps-expenses-houseofcommons. Accessed 22 September 2014.

some of them even resigning over scandal. A second and more recent example is the initiative *Tomnod* by the company *DigitalGlobe*.[24] Through this platform, people can participate in the analysis of satellite images to locate, for instance, the wreckage of *Malaysia Airlines plane MH370*, disappeared on 8 March 2014 or the search for the *Tunante* sailboat wrecked on the Brazilian coast in September of that year.

6.5 Definition of Empowerment-oriented Crowdsourcing

The analysis of the initiatives set out shows a mixed picture with diffuse boundaries between the different established categories. In fact, the classification of a particular project as a particular type of crowdsourcing can sometimes be obvious; however, some of them can be placed in several categories. Despite this fact, it is possible to identify and define the elements that are integrated into the crowdsourcing projects, namely:

- **Promoter**: it refers to the characteristics of the organisations, both public and private, that implement this type of projects.
- **Objective**: it refers to the type of problems to be solved, whose solution can be addressed by the concurrent performance of individual tasks, and the expected outcomes.
- **People involved**: the selection criteria and the characteristics of the people for whom the participation is open in order to solve the problem.
- **Working method**: it defines the nature of tasks, the rules of the process and the mechanisms that articulate the participation.
- **Tools**: it refers to the set of ICT 2.0 tools that materialise the project and define the working environment.
- **Benefits**: it indicates the results obtained and the satisfaction of the participants during and after the project.

On the basis of these elements, it is possible to establish the relationship between crowdsourcing projects and the empowerment framework described in the previous point. Thus, we see how such projects cover the two dimensions of empowerment: the individual one (related to the awareness that occurs with the decision to participate and with the performance of tasks) and the collective one (related to the collaborative framework that is established in order to address the problem). On the other hand, the benefits obtained by performing tasks include the acquisition of useful skills and abilities for the active participation in the new environment of deliberation and online decision, some of them related to the use of ICT. In addition, the solution reached can also increase the knowledge about the current situation and activate the awareness of the problem addressed.

[24]Website: http://www.tomnod.com. Accessed 24 September 2014.

Furthermore, a closer synergistic relationship between the two dynamics is generated in projects of information analysis. These crowdsourcing projects allow the analysis of complex information, in many cases accessible thanks to the empowerment processes that promote the transformation of the environment. And as a result of these projects, knowledge about reality increases, which facilitates citizen awareness who, in turn, demand more information.

However, despite the potential described, most crowdsourcing projects do not cover the whole process of empowerment. Both dynamics share the need of an environment that, among other things, provides adequate formal and informal institutions or ensure accountability processes that promote the control by citizens.

On the basis of the above reasoning, we propose a definition of what we call empowerment-oriented crowdsourcing, which could set out as follows:

> Online collaborative and non-profit process open to the participation of diverse citizenry in order to perform tasks whose final result brings social benefits to the political, social, economic and/or environmental field, in which the knowledge generated can be accessed, shared and reused freely.

The approaches included in the definition have been implemented by the authors of this chapter through the website analizo.info.[25] It is a crowdsourcing non-profit initiative open to all public, which facilitates the active participation of citizens in the process of analysis of different types of information,[26] which are aimed at the improvement of society in the political, social, economic and/or environmental fields. The initiative maintains a threefold profile: first, it acts as a technology platform[27] for non-profit organisations wishing to set crowdsourcing projects based on the analysis of information[28]; second, it is configured as a community of analysts in order to foster collaboration and a sense of belonging to a group; finally, as a non-profit entity responsible for providing advice and ensuring that the principles set in its code of ethics are respected.[29]

[25]Website of the initiative http://www.analizo.info. Accessed 7 October 2014.

[26]Website of information analysis projects http://proyectos.analizo.info. Accessed 7 October 2014.

[27]The analysis platform is developed using the open-source solution for social data analysis PyBossa. Website: http://pybossa.com. Accessed 7 October 2014.

[28]There are currently published projects of text analysis in election programs, description of media news related to development cooperation and identification of green spaces in the city of Valencia (Spain).

[29]The code of ethics of analizo.info is available at http://proyectos.analizo.info/codigo-ethical. Accessed 7 October 2014.

6.6 Conclusions

Throughout the chapter we have addressed the relationship that can be established between the processes of empowerment and crowdsourcing projects. The contributions support the conclusion that both dynamics share elements that can make crowdsourcing a tool at the disposal of citizen empowerment. However, this conclusion can not be expanded to all the crowdsourcing projects which have been materialised in recent years.

The definition we have specified for the empowerment-oriented crowdsourcing, despite its introductory nature, can serve as a framework for determining which projects can be considered as such. Similarly, not all the projects with established features contribute in equal measure to empowerment. Despite the empowering potential of such projects, it is necessary to consider their limitations. In this sense, mechanisms for evaluating the extent of empowerment must be established, both individually and collectively. Moreover, the participants should take part in it.

Finally, we would like to mention the central element in any empowerment-oriented crowdsourcing process: the participants. Our experience in the different projects published in analizo.info has shown the difficulty of achieving citizen participation. Despite the awakened interest by the media and having become widespread, the number of people involved, with some exceptions, has been considerably low. We believe it is necessary to reflect on the factors that contribute to motivate and mobilise the citizens to participate in such processes. Beyond the dependent relationship that exists between these processes and the characteristics of the environment in which they are developed, it is essential to go more deeply in the elements and characteristics that define this type of processes.

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Chapter 7
Crowdsourcing in Higher Education

Roberto Llorente and Maria Morant

Abstract Pervasive application of crowdsourcing techniques in Higher Education institutions improves the students' performance by using collaborative projects to enhance each student's skills, optimizes the lecturing process effectively sharing and pooling study materials, and also improves alumni financial situation by supporting tuition crowdfunding. In this chapter, we describe four key areas where the application of crowdsourcing techniques plays an important role in the performance of the alumni in Higher Education institutions. The proposed "crowdteaching" technique optimizes lecturing enabling sharing and exchanging of lecture notes following the different curricula of Higher Education studies. With "crowdlearning," the students learn by execution on collaborative projects where different students share (effectively teaching each other under lecturer supervision), learn the required skills required to carry out the targets of the project and solve the proposed problem. In relation to obtaining funding, with "crowdtuition" the students' tuition fees can be funded via crowdsourcing methods and also "crowdfunding" can be used to obtain laboratory and classroom material or students' learning stays abroad. Using these crowdsourcing methods, the students can find help to pay the university taxes and also interact with other students for a deeper learning process. Applying crowdsourcing to education enables the optimization of the institutions' budget and a more efficient use of time for learning which in the end leads to student's better results.

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7.1 Introduction

A single individual cannot hold all available knowledge, not even a small group of people can. Superior knowledge is achieved when a large number minds are connected (i.e., networked), via ad hoc tools and methods. Colleges and universities can use crowdsourcing methods to enable superior knowledge building processes and to optimize lecturing and administrative processes, which ultimately permits an efficient use of time resources for high-quality teaching and a reduction of the alumni expenses, thus enabling more students to attend university (which is of great social benefit).

Crowdsourcing techniques can be a natural framework for learning although by itself it cannot offer the best educational experience. But applying the appropriate methods, it can offer improved education increasing the efficiency of workflows and optimizing the personalized curricula (Weld et al. 2012).

The introduction of crowdsourcing techniques in Higher Education (i.e., university and college), finds application in two key aspects that can dramatically improve alumni performance. On one hand, crowdsourced knowledge building opens up the possibility of collaborative projects where both the professors and the students can interact and exchange information. For instance, professors can share learning resources so a repository of high-quality materials can improve the quality of the lessons and save a lot of time in preparing the lectures. Also students' interaction in crowdlearning proposes to bring different skills to a common project to solve a given problem. And on the other hand, Crowdsourced Grant Schemes (or external crowdfunding) can be applied to student fees. Students with high ranks or excellent performance can take advantage of their skills by crowdfounding their tuition or obtaining funding for stays abroad.

These two applications require university-wide crowdsourcing software tools and platforms (Web-based, by example) which are reviewed in this chapter.

7.2 Crowdsourcing State of the Art

"Crowdsourcing" comes from the combination of words "crowd" and "outsourcing " and defines the distribution of a task among a group of people. Although the concept "crowdsourcing" first appeared in 2006 in Wired Magazine (Howe 2006), several events before that date contributed to the concept of "outsource work to a group of people." One of the most relevant and worldwide-known events was the creation of Wikipedia, a free-access and free-content Internet encyclopedia, launched in 2001 and that at present receive over 500 million visits every month. But several years before, in 1714, the British government offered a monetary prize (know nowadays as the Longitude Prize) to whomever came up with the best solution to measure a ship's longitude (Dawson and Bynghall 2012). This was the starting of crowdsourcing communities working together to solve a given problem.

In the nature of the concept, crowdsourcing does not require online resources, but the truth is that using the Internet makes crowdsourcing much easier and provides access to a wider amount of people around the world in less time and at a reduced cost.

The rise of crowdsourcing was possible thanks to the evolution of the Internet and of the social media technologies which enabled the communities to come together more quickly and to collaborate and exchange information (Isman et al. 2012). The idea of working in the same collaborative project with people located at the other side of the world would be unthinkable and require a huge cost if we could not use the Internet.

In recent years, crowdsourcing have been used in the market to perform a high variety of tasks that are difficult for computers, yet solvable, like in the case of Amazon Mechanical Turk (mturk.com). The ability to attract a crowd enables massive parallel processing which can lead to high throughput on tasks such as image labeling, audio transcription, and product categorization (Zhang et al. 2011). And with the growth of these online parallel solving platforms, crowdsourcing appears as a valid option available to anyone with a task or project in mind. Platforms like Wikipedia provide the clear evidence that coordinating a crowd for complex tasks is possible. Besides Wikipedia, there is a wide range of crowdsourcing community examples, especially in the field of language learning, as we will depict later in this chapter.

The concept of task parallelization based on simple partitioning and distribution of the process evolved to more sophisticated problem-solving procedures. With the correct coordination of the problem-solving crowd, it is possible to complete complex activities, e.g., programming tasks. For example, Little et al. (2009) developed a crowdsourcing platform called Turkit that enables the requesters to write programs executed by human workers on Mechanical Turk. In this case, the crowdsourcing strategy is based on dividing the proposed problem into small pieces that will be programmed by different workers. In fact, one of the main advantages of crowdsourcing is that it enables the possibility of iterative contributions of different people (Zhang et al. 2011).

One of the most common application scenarios of crowdsourcing platforms is gathering ideas about a given topic and vote on the most popular option. Crowdsourcing platforms can be implemented as an open and transparent site where everybody can access to the information and read and exchange opinions, but also the platform can include protection of the ideas where only authorized users can access to the information. In these cases, the proposed challenge is usually sponsored by an organization or industrial company which offers a prize to the best solution of the proposed task (Isman et al. 2012). Using this kind of competition platforms allows, especially for medium and small companies, to access to a wide range of ideas that would not be available in their usual environment or would require a considerable investment with the consulting a single or several external providers (Dawson and Bynghall 2012). For the industry, the main attraction for using a crowdsourcing competition platform is that, in most of the cases, this option is significantly less expensive than contracting a traditional company, e.g., a design agency to prepare a given product logo design or a marketing expert for the proposal of an advertising campaign.

In this chapter, we will overview the advantages of crowdsourcing applied to Higher Education activities.

7.3 Crowdsourcing Methods in Higher Education

Recent studies and first applications at colleges and universities have shown that applying crowdsourcing to education can be fruitful for both students and professors. Students would like to receive personalized education according to their abilities and learning style (Weld et al. 2012) and the recreation of the same lessons over and over is a waste of professors' time. With the proper use of crowdsourcing in Higher Education, professors can prepare high-quality lessons and provide useful instructions in class, and students are able to access to the best learning material and can improve their learning efficiency.

Evaluation techniques oriented to crowdsourcing have been used before in Higher Education at a smaller scale, for example peer-evaluation where the professor asks the students to evaluate each other's work. Early studies have pointed out that crowdsourced peer-grading can lead to more accurate assessments of the student's performance by combining different opinions with diverse perspectives and expertise (Page 2008).

In the last decade, with the emergence of Web technologies, online learning has evolved significantly using adaptive online environments that facilitate social learning (Corneli and Mikroyannidis 2012). For example, in the recent years, online tutoring systems have made considerable progress in Higher Education (Weld et al. 2012). There are four key areas where applied crowdsourcing techniques play an important role in the performance of the alumni in Higher Education institutions:

- Crowdteaching: In this approach, the lecturing staff share and put together lecturing material following the university curricula.
- Crowdlearning: This crowdsourcing technique is based on the "learning by project lecturing scheme." This scheme has been successfully applied in American and European universities. In the crowdlearning approach, the knowledge building process is based on collaborative projects where different students share, effectively teaching each other, and learn jointly the skills that are necessary to carry out the targets of the project.
- Crowdtuition: Crowdsourcing has an important impact for the social benefit. Crowdtuition techniques allow the best performing students' tuition fees to be funded via crowdsourcing methods. Different early experiences have been developed in the last years, including Universitat Politècnica de València (UPV) from Spain.
- Crowdfunding: Lecturing requirements in Higher Education, especially in Engineering Studies, require important investments in laboratory and classroom material. Whether classroom materials are usually funded by Government in the case of public institutions, laboratory inventory material is more difficult to be

obtained. Crowdfunding lecturing laboratories is an interesting technique that permits these laboratories to address specific techniques—to be lectured—for the social benefit, e.g., cancer research.

In this chapter, we describe in detail the different crowdsourcing methods that could be relevant to Higher Education institutions.

7.3.1 Crowdteaching and Educational Resources

One of the most common ways of using crowdsourcing in colleges and universities is sharing educational content. Professors seek for educational material with high-quality contents that could teach effectively the topics of a given curricula. But extreme attention should be paid in order to use trusted material, coming from sources with reputation behind it. This is also a problem that the students face when searching information in the Internet, as in some cases they rely in non-trusted sources which leads to misunderstanding and interferes with the learning objectives. In this scenario, UClass application (http://www.uclass.io) can be used as Common Core content repository, where university and college professors can share their resources with other professors in their same district. Using crowdsourcing planning, professors can access to the best curriculum across their district and drive higher student outcomes in their classroom. One of the main objectives of UClass repository is to exchange high-quality learning content with the aim to save professors' time in the preparation of their lessons. Also, UClass offers collaborative features for students to work together in different parts of the world.

In 2011, the Latin American Open Textbook Initiative was created with the main objective of dissemination of cooperative open textbooks aimed for Higher Education (customized per region) in order to avoid the high cost of textbooks in Latin America (Ochoa et al. 2011). This is an example, together with Wikibooks and Connexions platforms, between others, that have been found to reduce significantly (up to an 80 %) the cost of textbooks for the students.

7.3.2 Crowdlearning and Suitable Platforms

Crowdlearning appeared with the creation of educational platforms such as Skillshare (http://www.skillshare.com). Skillshare is an online learning community created to master real-world skills through project-based classes. So, "crowdlearning" can be defined as learning through real-case projects with the participation of several students ("crowd"). The advantage of this technique is based on each student to propose skills that already have—that can be useful to reach the final goal of the project—, in order to gather together different aptitudes.

When developing the project, the students share information and skills that automatically are learned when developing the project activities. It is important then to have a platform to effectively propose these skills that should match the competences established in the lecturing curricula. In this way, a categorization of competences should be implemented in the crowdlearning management tool.

After developing the project via crowdlearning, all students have shared their skills and competences, effectively learning other's competences.

Several online platforms are available for the creation of joint projects. Also, the crowdlearning platforms provide online courses that the students can follow at their own pace. Nowadays, it is clear that offering an online course can attract a crowd of hundreds of thousands students or even more. A clear example is Duolingo, a free science-based language education platform with over 38 million users. In only two years, Duolingo has become the most popular way to learn languages online and it was recently selected by TechCrunch as Best Education Startup and application of the year 2013 for iPhone and Android. According to an independent study conducted by the City University of New York and the University of South Carolina, an average of 34 h of Duolingo is equivalent to a full university semester of language education (Vesselinov and Grego 2012). Since one semester university course usually takes more than 34 h of work, this study suggests that Duolingo is more effective than an average university course.

Proper analysis can highlight the student tracking and detect confusion in given topics. For example, Coursera analyzes the student traces to determine which videos are watched again and also in what order, which helps optimizing the curriculum and the question routing. Nowadays, the curriculum design of online courses, e.g., Khan Academy, Coursera and Udacity, is normally centralized, but the great success of Wikipedia indicates that the action of a whole community can create incredible resources. For example, an increasing number of universities are offering nowadays, massive open online courses (MOOCs) dealing with topics requested by their students. Open educational resources (OER) had limited impact and attraction to the students in most of the cases due to the lack of coherence of the curriculum design (Mitros and Sun 2014). In contrast, MOOCs use a centralized approach where the institution (basically colleges and universities) designs a complete and more coherent course. Those courses are used in blended classrooms across many campuses. The main attractive of MOOCs is that typically they are taught by top professors and usually include research-based pedagogies such as active learning, constructive learning, and mastery-learning (Mitros et al. 2013). The centralization of the design and preparation of the MOOCs enables using more and higher quality resources per course than traditional courses. Previous studies suggest that well-designed MOOCs can lead to high-quality students' learning and high satisfaction levels (Lewin 2013).

In addition to these online learning platforms, YouTube's capacity to reach a different audience has made it one of the major media for innovative educational programming. Clear examples of this are the YouTube online channels "Crash

Course" and "SciShow" developed by Green brothers. Crash Course was one of the 100 initial channels of YouTube's $100 million original channel initiative. This initiative was a 100 million dollar program funded by Google to bring original content onto YouTube. The original channel initiative was also meant to kick start Google TV. For example, "Crash courses" is an educational YouTube channel for online teaching world history, biology, literature, ecology, and chemistry. As of December 2014, the "Crash Course" YouTube channel has earned over 2.4 million subscribers and over 160 million video views. The widespread acceptance of online educational videos has attracted the attention of television media contents. As a recent example, in November 2014, a partnership of Crash Courses with PBS Digital Studios was announced to expand the channel.

7.3.3 Crowdtuition

College tuitions increase the financial pressure on the students' families (Mitros and Sun 2014). The global economic turndown in the recent years has limited the number of alumni capable of fulfilling the tuition expenses. For instance in Spain, the university taxes were raised to 60 % in the last two years (Universia 2014) which made even more difficult for the students to access to a Higher Education study degree.

A crowdtuition program can be implemented by the university services, in which a loan is publically offered. The loan is intended to cover tuition expenses of a relevant pupil. This program is similar to the return-grant programs that are dedicated to guarantee that the knowledge and skills acquired at a university or institution are transferred back to that institution by recruiting alumni after finishing their PhD or after their postdoc research. This kind of return-grants is usual in Marie Curie postdoctoral programs and is also available in universities in Europe like by example the international center for genetic engineering and biotechnology of Italy (ICGEB 2014). But in this case what it is proposed in crowdtuition is that the tuition expenses of a given student are supported by an external company.

Crowdtuition proposes a social loan of brilliant students, which will return the loan after graduating when developing his career. These programs can support only brilliant alumni, as the loan was to be paid back after finishing the studies. This implies that a successful career is expected from the student when leaving the university once completed their Higher Education degree.

Early successful implementation of this approach was proposed in 2012 in the Universitat Politècnica de Valencia, Spain, where Comunitae.com offered 12,000 students the possibility of a student loan up to 2,000 euros with an 8 % interest at one year return (ABC 2012).

7.3.4 Crowdfunding Educational Infrastructures

A supplementary application of crowdsourcing can be also applied to raise funding to support a given cause. This concept is also known as "crowdfunding." Educational fund-raising is also possible and currently there are several online crowdsourced funding landscapes that provide educational support. The important investments required to purchase and update the material in laboratories and Higher Education classrooms can also take profit of crowdfunding. Usually, the Government covers the cost of the classroom materials of public institutions, but funding for the technical equipment or laboratory inventory material is more difficult to obtain. Crowdfunding lecturing laboratories is an interesting option that permits improving the research at Higher Education centers.

Crowdfunding can be also applied to support students' stays abroad. As student travel scholarships or educational travel grants are difficult to find, several crowdsourcing Web sites have appeared as a good option to seek for funding. An example of crowdfunding platforms is IndieGoGo where anyone over 13 years old can use the application and where, for instance, an educational summer abroad program is accepted for funding and also small donations that could help the student's travel.

7.4 Conclusion

This chapter provides a comprehensive approach to the advances that the application of crowdsourcing techniques can bring to universities and Higher Education institutions. Four key aspects are identified where crowdsourcing can play a key role: First "crowdteaching" is proposed to optimize lecturing by sharing and exchange of lecturing material. Crowdteaching requires ad hoc platforms supporting share and exchange of lecturing material following the different curricula of the Higher Education studies.

"Crowdlearning" is based on learning by execution principle developed in collaborative projects. Each student provides different skills that are needed to solve the proposed problem as a whole. The students share ideas and teach each other, which improves their preparation for their career.

By "crowdtuition," the students' tuition fees can be publically funded, which is an effective method for high–ranking alumni. Finally, "crowdfunding" is proposed to support laboratory and classroom material or students' expenses.

Applying the appropriate crowdsourcing techniques in Higher Education can increase the efficiency of the learning workflows and optimize the curricula which lead to student's better results.

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Chapter 8
Crowdsourcing with University Students: Exam Questions

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Abstract Incorporation into the European Higher Education Area (EHEA) has demanded the deployment of major changes in the teaching culture of University academic institutions. The utilization of educational strategies, based on the use of active methodologies that encourage students' active role, the importance of "learning to learn," and the ability to work together as a core competence are essential in change. Thus, active learning has become a priority in the development of curricula, and the center of gravity of the process should move toward methodologies that help students develop their professional skills, interpersonal relationships, and abilities to solve conflicts to apply theory to practice. The authors of the present article decided to do a crowdsourcing experiment with students from course 4 in the Faculty of Business Administration and Management who were studying the Production Management and Logistics (PML) subject. This subject used the PoliformaT platform. The crowdteaching technique optimizes lecturing by enabling the sharing and exchange of lecturing material following subject curricula. With crowdlearning, students learn by execution in collaborative projects. This article intends to demonstrate that students obtained better results when these techniques were applied.

Keywords Collaborative projects · Crowdsourcing · Crowdteaching · Methodologies actives · Generic skills

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8.1 Introduction

Crowdsourcing is a problem solving and task performance model that is being increasingly used. The term "crowdsourcing" was first coined in 2006 by Howe (2006), who defined it as "the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and general large) network of people in the form of an open call. This can take the form of peer-production (when the job is performed collaborative), but is also often undertaken by sole individual." Crowdsourcing allows a person, institution, or company to benefit from the work, ideas, or wisdom of the Internet crowd.

"Crowdsourcing is a type of participative online activity in which an individual, an institution, a non-profit organization, or a company proposes to a group of individuals of varying knowledge, heterogeneity, and number the voluntary undertaking of a task via a flexible open call. The undertaking of the task, of variable complexity and modularity, in which the crowd should participate by bringing their work, money, knowledge, and/or experience, always entails mutual benefit. The user will receive satisfaction of a given type of need, be it economic, social recognition, self-esteem, or the development of individual skills, while the crowdsourcer will obtain and utilize to what the user has brought to the venture to their advantage, whose form will depend on the type of activity undertaken" (Estellés-Arolas and González-Ladrón-de-Guevara 2012).

The emergence of crowdsourcing has been made possible thanks to the evolution of the Internet and social media technologies that have enabled communities to come together more quickly, and to collaborate and exchange information (Isman et al. 2012). It is the intersection of the "Crowd," "Social Web," and "Outsourcing" elements (Saxton et al. 2013). One of the main advantages of crowdsourcing is that it enables the possibility of iterative contributions of different people (Zhang et al. 2011).

By applying this definition to teaching, crowdsourcing techniques can become a natural framework for learning. However, crowdsourcing itself cannot offer the best educational experience. But by applying appropriate methods, it offers improved education by increasing the efficiency of workflows and optimizing personalized curricula (Weld et al. 2012) without disconnecting the basic "Crowd," "Social Web," and "Outsourcing" elements of the term crowdsourcing.

8.2 Crowdsourcing Techniques in Higher Education

The introduction of crowdsourcing techniques into higher education finds applications in aspects that can improve alumni performance. Crowdsourced knowledge building offers the possibility of collaborative projects where both teachers and students can interact and exchange information. For instance, teachers can share learning resources as a repository of high-quality materials, which can improve the quality of lessons and save time in preparing lectures. Students' interaction in crowdlearning also implies bringing different skills to a common project to help

solve a given problem. Students would like to receive personalized education according to their abilities and learning style (Weld et al. 2012). This learning form allows contacts to be made between the teachers and students interested in accurate specialized training. Students acquire practical knowledge that adapts to their demands.

Teachers need to change the dynamics of traditional education based on rote learning to one whereby students play an active role and take responsibility for their own learning (Whitehead 2008). Active learning methodologies emphasize student participation (Braxton et al. 2000 and Huber 2008). Students should play a responsible active role in both learning planning and interacting with teachers and peers to boost intrinsic motivation based on interest and curiosity (Cannon and Newble 2000). Teachers are no longer the main source of knowledge and inquiry, but assume the role of facilitator and guide by accompanying and guiding students through their learning process (Álvarez 2005). With the emergence of web technologies in the last decade, online learning has evolved significantly by using adaptive online environments that facilitate social learning (Corneli and Mikroyannidis 2012). In this chapter, we use these techniques:

CROWDTEACHING: In this approach, the lecturing staff shares and puts together lecturing material following the subject curricula. Crowdteaching as an evolving movement in which thousands upon thousands of educators from all around the world are uploading high-quality educational content online—all free of charge (DeWitt 2012).

CROWDLEARNING: Literally defined as the learning of crowds. This crowdsourcing technique is based on the "learning by project lecturing scheme." Crowdlearning can be defined as learning through real-case projects with the participation of several students ("crowd"). Broadly speaking, the method consists in contacts being made between teachers or experts in specific matters and an alumnus who seeks specialized practical training. The key lies in anyone being able to offer anything to others, and everyone has something to learn.

Finally, it is noteworthy that one of the main reasons for using active teaching methods is to provide students with a deeper understanding of the subject.

8.3 Experiment

It is worth indicating that since teaching is given in a Polytechnic University, the use of new technologies is widespread, and both attitude and teacher training facilitate their implementation to a great extent (Paredes and Estebanell 2005). Therefore, practically since the intranet was set up in the university, the means by which notes, support materials, scientific articles, problems, etc. have been made available to students has been the web. So our situation is enviable when compared to other faculties (Marin et al. 2011). During the 2002/2003 course at the Polytechnic University of Valencia (UPV), an educational platform was set up on

the web which facilitates and stimulates the use of new working strategies through forums, chats, as were new evaluation forms. The introduction of this platform and its use, as a result of new technologies, has been a turning point which has led us to consider the present study.

The practical character of this matter is suitable for implementing crowdlearning and crowdteaching.

8.3.1 Context and Sample

Educational innovation forms part of the PML subject taught in course 4 of the Business Administration and Management degree at the UPV. This subject is a core subject that consists in 9 credits. In recent years, 200 and 300 students have registered every year on average. This subject has not been taught since the last course because new study plans have appeared and old ones have terminated. Traditionally, this subject has generated a high percentage of failed exams and, therefore, many students resit exams and take the course again, which meant subsequent failure in incorporating proposed competences. This situation has led the teachers of this subject to often reconsider the approach that is to be applied to teaching it in order to improve the teaching–learning process and to, therefore, increase students' academic results. Finally, 183 students registered for the 2013/2014 course.

8.3.2 Description of the Experiment

As this subject is not being taught in the present course, the following actions have been taken:

All the documents required for the subject (notes, slides, recorded classes, solved problems, questions, etc.) have been uploaded on the intranet platform (PoliformaT).

A teaching guide has informed students about the way the subject is evaluated.

An open platform has been set up on which students can pose problems, solve their own problems or those considered by other students, and can correct problems solved by other students. Students can begin to pose a problem and other students should finish solving it if only the description is published. In this case, a score is given to the group.

Those problems posed by other students will be evaluated on a Likert-type scale from 1 to 5 to evaluate the originality, difficulty, comprehension, and the relation of contents. Based on this evaluation, 10 awards of 2 points can be obtained, which can be awarded to only one person or to the group of people who pose and solve the problem.

Those students who find errors in problems solved by other students will also obtain additional points (from 0.5 to 1.5) depending on the errors found and the number of problems corrected.

8.3.3 *Objectives of the Experiment*

The following objectives are considered:

Encouraging students' autonomy, reflexive and critical thinking, teamwork, professional skills, and their capacity to evaluate tasks performed by others.
Acquiring and developing the capacity to identify, pose, and solve problems relating to practical subject contents.
Continuous evaluation so that the questions and problems posed by students are corrected while they are worked on and so that students learn from their own mistakes.
Helping students improve their marks and scores.
Arousing interest in the subject so that posing problems involves assimilating knowledge and tools.

8.4 Results

At the end of the experiment, a survey was sent to students and the following results were obtained.

Figure 8.1 shows that of the 183 who registered for the subject, 119 participated in the experiment. In Fig. 8.2 we can seen that 107 of these 119 participants considered that the experiment helped them better learn the subject.

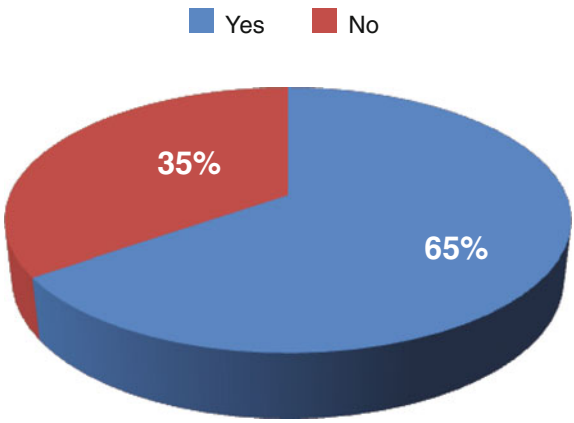

Fig. 8.1 Participation in the experiment. *Source* Own

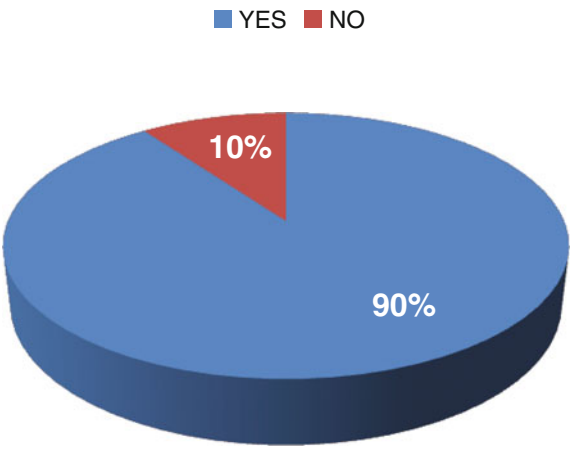

Fig. 8.2 Participants who believe that the experiment was positive for their learning. *Source* Own

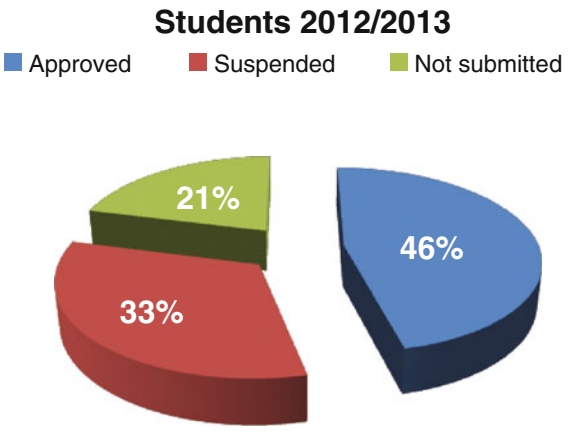

Fig. 8.3 Students 2012/2013. *Source* Own

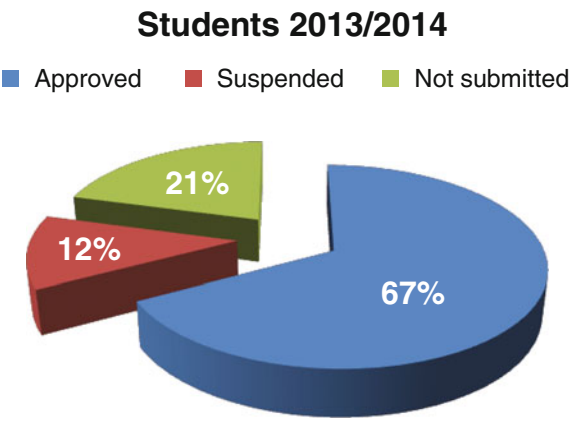

Fig. 8.4 Students 2013/2014. *Source* Own

8.5 Conclusions

This chapter provides a comprehensive approach to the application of crowdsourcing techniques that can be applied to Higher Education institutions. We must highlight the excellent perception that students stated they had about using this tool. This methodology helped clarify the general framework of the work performed and centered students' conversation with their peers.

Each student provides the different skills needed to solve the posed problem as a whole. Students share ideas and teach each other, which improves their preparation (Bloom 1979).

As regards the capacities developed while the subject was underway, in their opinion, students indicated teamwork in particular, along with communication skills (listening, considering other alternatives to solve problems, arguing one's own viewpoints, etc.), as well as organization and coordination skills. Apart from doing much more work than they personally thought they would do at the start of the process, when the experiment was underway, they began to understand that they could do more things than they initially believed they would. Moreover, when they saw other students' examples, they understood that they too were capable of participating and adopting new approaches which, in turn, would encourage other classmates and motivate them to continue on the path that had opened up among them all. All this enabled the collection of solved problems to grow as a repository, and with much more imagination than if considered by one person alone. Students also considered that the concerns of the problems posed by classmates were more like their own.

As demonstrated in Figs. 8.3 and 8.4, the number of pass marks increased since fewer students failed exams. However, the number of students who did not sit exams remained constant. Although data have not been collected, the number of outstanding and excellent marks rose, and the number of passing grades lowered. So we can state that applying crowdsourcing to university teaching is able to improve marks, students become more involved and they perceive a greater sense of belonging.

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Chapter 9
Humanizing Internal Crowdsourcing Best Practices

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Abstract In its short life, the concept of crowdsourcing has been applied in practice to attain various outcomes, such as business goals, innovation processes, social justice, democratic participation and environmental activism. One of its value-adding applications in the business area involves recruiting organizational members to participate in problem-solving activities. However, because this situation could be perceived as a new job parcel involving complex human relationships governed by a values loophole, the need to improve understanding on how to manage this practice optimally remains. By focusing on how value is created through social aspects and how such practice can be optimally managed, this chapter identifies crowdsourcing as a new type of organizational value created through human relationships inside business organizations. More importantly, this chapter uses the case of IBM to explore how this online relationship can be adequately articulated to avoid counterproductive behaviours by internal crowd participants. A proposal of best-practice principles for corporations interested in addressing this business practice in a more humanizing way concludes the chapter.

9.1 Introduction

During the past two decades, the broad generalization of the Internet and the mass adoption of new media technologies have completely redesigned the relationships among employees, suppliers and other stakeholders in corporations (Surowiecki

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2004). The Internet has fostered and cultivated the creation of a participatory culture that provides ways for business managers to leverage the collective intelligence of emerging online communities (Lebraty and Lebraty 2013). That is, top managers are interested in identifying, measuring, using and maintaining the energy of this collective community intelligence to improve key business processes intimately linked to the achievement of business goals. For example, employee participation in governance mechanisms could be fostered, products could be (re)designed, and various and complex organizational and operational problems could be solved (Howe 2008).

Therefore, crowdsourcing can be characterized as a deliberate blend of bottom-up, open, creative processes and top-down organizational goals (Brabham 2013). Organizations are using the Internet to outsource work to individuals. That is, they are taking functions once performed by employees and outsourcing them to (un) defined networks of people in the form of open calls (Howe 2006). This process can take the form of peer production (when the job is performed collaboratively for employees in a workgroup), but it can also be undertaken by isolated individuals working under specific guidelines (Villarroel and Reis 2010).

Research on crowdsourcing has appeared in a variety of academic disciplines, each of which has approached the topic from a different angle. According to Brabham (2013), this concept is dominated by four significant research areas:

1. Computing research, which centres on the design and technical aspects of crowdsourcing systems and is supported by big corporate Internet technology research firms, such as IBM and HP laboratories. These companies are interested in solving problems in a distributed, collective and crowdsourced pattern.
2. Business management, in which researchers are interested in crowdsourcing applications in terms of innovation, profitability and business efficiency, as well as the strategic and managerial dimensions of integrating business operations.
3. Social science research, which focuses on the human dimension of crowdsourcing, which mainly involves finding answers about the motivation to participate in crowdsourcing, as well as other issues such as labour exploitation and ethics.
4. Applied professionally oriented disciplines, which focus on specific industries, such as urban planning, medicine, journalism and national security, among others.

However, the confusing and conflicting results generated by these four large research streams are beginning to disappear. This is because some research questions have merged to provide a more holistic perspective of the important matters in crowdsourcing research. The goal of this chapter is to facilitate the merging of these different lines of research. To do so, the chapter uses IBM as a case study to explain how the firm distributes a problem through small tasks to computer scientists in an open-source culture of sharing a code of values or guidelines. This chapter also analyses the value creation process through a strategic lens that promotes innovation and problem-solving by focusing on open innovation and lead-user innovation. Finally, this chapter takes a social science approach to propose best-practice

principles for use in crowdsourcing, so that this practice can be humanized by stimulating ethical behaviours of the crowd.

9.2 Crowdsourcing and Social Networks as Generators of Internal Organizational Value

Crowdsourcing is principally a process for partitioning tedious work and obtaining needed services, ideas or valuable content from an online community (Brabham 2013). Despite the great array of definitions of the concept, Estellés-Arolas and González-Ladrón-de-Guevara (2012: 197) developed a new and integrated definition that synthetizes the core facts included in the concept: "*Crowdsourcing is a type of 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. The user will receive the satisfaction of a given type of need, be it economic, social recognition, self-esteem, or the development of individual skills, while the crowdsourcer will obtain and utilize to their advantage that what the user has brought to the venture, whose form will depend on the type of activity undertaken*".

Thus, the crowd's use of the Internet to pursue a certain prefixed goal is strongly emphasized in crowdsourcing, as is the idea that this goal is attained by realizing a defined small task in which the crowdsourcer engages. In crowdsourcing, strong attention is also paid to the extrinsic or intrinsic rewards that crowd participants usually receive for their participation in the process. Finally, in fulfilling the widespread norm in the business strategy area that business organizations should create value through various activities (Grant 2010), the crowdsourcing practice is conceptualized to achieve such undertaking. For example, business value is achieved when an organization outsources an activity for less cost than what it would have cost to perform internally (Williamson 1985). Value is also created when the organization focuses on exploiting its core, valuable, rare and difficult-to-imitate resources and outsources other (the rest of) activities (Barney 1991). Thus, organizations can clearly benefit from crowdsourcing practices in these two situations (Howe 2008). However, there is a need to identify more clearly what value specifically is created by crowdsourcing (Huberman et al. 2009), especially considering that, in measuring internal value, a wide range of tangible and intangible outputs can be involved (e.g. competitiveness, financial performance, profitability, efficiency, effectiveness, satisfaction, perceived success) and that value creation depends on what participants judge to be important (Moran and Ghoshal 1997).

A review of the literature shows that crowdsourcing activities are oriented to co-create business value through the specificity of electronic connections based on four

interconnected value dimensions (Amit and Zott 2001): efficiency, complementarity, community lock-in and novelty. Efficiency value is obtained by controlling costs and outsourcing routine, non-strategic activities and complementary value derives from synergies obtained through more creative crowd opinions and collective knowledge. In contrast, community lock-in value is created by the positive externalities network that is created through usual crowdsourcing operations, which is easily manifested by making the crowdsourcing site more attractive in parallel with the number of Internet users who frequent it. Finally, novelty value comes from the great creative potential of the crowd to propose more and better innovations. Thus, value can be created through the electronic relationships at the heart of every crowdsourcing operation inside an organization (Amit and Zott 2001). As such, a major task for organizations is to implement the crucial instruments to capture the value created by a crowd of virtual relationships (Howe 2008).

Lebraty and Lebraty (2013) identify three probable main sources of value creation: cost reduction, development of innovations and authenticity. Indeed, crowdsourcing is always less costly than a traditional outsourcing operation, though there are some limitations and situations in which crowdsourcing is not applicable. It is clear that crowdsourcers are motivated primarily by benefits gained, including the ability to gather large numbers of solutions and information at a relatively inexpensive cost (Lebraty and Lebraty 2013).

Crowdsourcing also allows for the development of innovations that not only help the organization gain a competitive advantage over competitors but also contribute to value creation, either incrementally or radically, depending on the type of innovation. Finally, this practice favours authenticity, which refers to an organization's improved understanding of its particular environment, market and clients through the adaptation of products and services. However, while cost reduction is a constant in crowdsourcing, it is necessary to choose between innovation and authenticity, because these two objectives cannot coexist in a single crowdsourcing operation (Lebraty and Lebraty 2013). Thus, to be able to choose the objective (innovation vs. authenticity) for the launch of crowdsourcing activities, organizations must be cognizant of the factors that motivate the crowd to participate.

Crowdsourcing may generate solutions coming from a variety of participants, whether amateurs and volunteers working in their spare time (Brabham 2013) or part-time/full-time workers. In large companies, sometimes this process combines the efforts of numerous self-identified volunteers or part-time workers, such that each contributor, by his or her own initiative, adds a small portion to the greater result (Howe 2006). This is why users might be motivated to contribute by obtaining either intrinsic inputs, such as social contacts and intellectual stimulation, or extrinsic inputs, such as financial gains (Howe 2008). Indeed, in some cases, contributors are compensated monetarily, with prizes, promotions or recognition, while in other cases, the only reward received is intellectual satisfaction or just passion for a task well done (Howe 2008).

Lebraty and Lebraty (2013) identify three types of crowd communities that determine the two extremes (intrinsic and extrinsic) of motivation and the centre of a continuum (hybrid or intermediate) for value creation through crowdsourcing.

The first type of community is driven by intrinsic motivation that stems from passion and fervent attention to the brand product or service and to the company. Community members' motivation derives from an individual desire for improvement and self-realization because they are typically not paid for their participation. In this case, it is the task itself (not the task as a means to an end) that motivates this community. Members usually have a clearly defined sense of belonging and might be motivated by the attractiveness of the objectives being pursued for the sake of their community (e.g. sustainable development, ecology, ethics, social welfare, elimination of poverty). In all likelihood, motivation to participate is strengthened by the simple consideration or use of their ideas. The strong sentiment of "*shared paternity*" of the product, along with the feeling of belonging to a community or network, is another important reason for their involvement.

The second type of crowd community is mainly based on extrinsic motivation factors because member satisfaction mainly depends on the financial remuneration received. In this case, it is the external environment of the task that motivates people to participate in this type of activity. The community assembles and then unites around the business model proposed by the organization holding the crowdsourcing operation. This community is attracted by the exploitation of intellectual property rights and discoverer monetary remuneration, which are usually provided to creators. Here, companies must reinforce behaviour and participation by designing credible and trustworthy business models based on rewards.

Finally, the third type of community motivated to participate in crowdsourcing activities—that is the hybrid or intermediate model—includes people who have an average skill level and a limited passion for the task. This includes employees who do not participate in crowdsourcing operations just for the passion and employees who are not solely driven by financial remuneration. This type of crowd can be highly volatile and its contributions extremely variable. Crowd members can be linked initially to financial remuneration, but throughout the course of their participation, motivations could evolve from belonging to a community and the opportunities that come with it. This case is characterized by internalized extrinsic motivations. Members participate with the goal of possibly finding better employment in future or simply of flattering the crowd's ego.

Beyond the different motivations found among crowd participants, distinct interests might also arise. Even when crowdsourcing is planned for internal workers, who are under the umbrella of one business culture, their various and distinct interests may conflict with one another and sometimes also with organizational interests. If so, these situations might give rise to bad ethical and dehumanized behaviours by crowd participants. Internal workers might think of performing these new tasks in a "values loophole", which might lead them to behave in ways that exclusively meet their own interests.

Previous research has deemed this negative (self-interested) use of discretion in crowdsourcing activities as a potential danger to this business practice (Franke et al. 2013). Because such use might induce people to commit behaviours against organizational interests, the positive climate might be hampered and the achievement of the intended objectives of the crowdsourcing activity even undermined.

Thus, organizations must realize that it is likely not enough to simply launch a crowdsourcing activity to solve corporate problems or develop innovative projects. Rather, increasingly often, and given the relatively novelty of this practice in business, organizations must establish a set of behavioural guidelines and provide them to crowd participants in an effort to control operational dysfunction and enhance its humanization. Indeed, under the umbrella of a framework of values consciously established for this unique activity, crowd participants could be guided more effectively in their tasks and persuaded to avoid potential dehumanizing behaviours.

9.3 Internal Crowdsourcing Best Practices

The internal generation of value through crowdsourcing and social networks can be visualized with a real example. In this section, we highlight the existence of "internal crowdsourcing" oriented to current organizational members—that is internal organizational interactions based not on mass communications but on masses of communicators—and we review their best-practice methodology. With this in mind, we selected the case of IBM and the IBM Social Computing Guidelines (hereinafter ISCG).[1] We chose IBM because it has a systematized code of conduct around crowdsourcing and social networks and also because IBM interprets this as an opportunity to build trust between the different crowd participants and the organization. We begin by analysing IBM's evolution.

In 1997, when many companies were looking for ways to restrict their employees' Internet access, IBM was actively recommending that they use the Internet. Later on, in 2003, IBM made a strategic decision to embrace the blogosphere and encouraged IBMers to participate. Instead of treating all these changes as threats, the firm considered them facilitators of the interaction among IBM's members and, more importantly, as a chance to build trust between them and IBM as an organization.

In the spring of 2005, IBM created guidelines for the use of wikis. At that time, IBMers used wikis to create a set of guidelines for all IBMers who wanted to blog. The firm repeated this call in 2008 and again in 2010 when it asked organizational members to re-examine the guidelines in light of ever-evolving technologies and online social tools.

In other words, IBM aroused an "internal crowdsourcing" conception by encouraging organizational members—its "internal crowds"—to regulate the way all IBMers should blog. By doing so, the same users provided helpful and practical advice to protect both IBM bloggers and IBM. Whether they knew it or not, they created an auto-regulation structure based on an "internal crowdsourcing" conception capable of generating value in two ways. First, IBM's own organizational

[1]See http://www.ibm.com/blogs/zz/en/guidelines.html.

members could internally contribute to the generation of their own guidelines, contributing to reinforce their sense of belonging. Second, this was a way to ensure that IBM's senior personnel remained current to the needs of lower level employees.

This internal crowdsourcing approach is a new relationship model founded on individual interactions based on masses of communicators and not on mass communications. As with any crowdsourcing approach, it has external and visual consequences but also internal consequences, which are singular.

With regard to the external consequences, this model of interactions allows IBM to share with clients, shareholders and the communities in which it operates its greatest asset—that is the expertise of its employees—thus accomplishing four main objectives: describing, learning, contributing and applying. In terms of describing, the ISCG state the following: "To empower IBMers as global professionals, innovators and citizens through online social computing". The firm promotes learning because "[s]social computing is an important arena for organizational and individual development opening an exchange for learning between IBM and its clients, and among the many constituents of the emerging business and societal ecosystem" (ISCG). IBM also contributes by sharing "with the world the exciting things IBM is learning and doing" (ISCG). Finally, IBM applies forms of online publishing and discussion, such as blogs, wikis, file-sharing, user-generated videos and audio, virtual worlds, social networks and so on.

The innovative part of the "internal crowdsourcing" conception is IBM's capacity to generate internal value through the detached effort of its members, and its conception is based on trust and personal responsibility as the two core values underlying all relationships. Because of these values, IBM can manage freedom among IBMers and support an open dialogue and exchange of ideas in different scenarios: between IBMers and their partner clients, among members of the many communities in which they participate and among the general public.

IBM regulates its internal crowdsourcing relationships, which are voluntary relationships, through its official ISCG, which are based on 12 guidelines (see Annex I). It is important to understand that as voluntary relationships, internal crowdsourcing cannot be imposed. Rather, because these are voluntary relationships, ethics, as the discipline that conceptualizes actions in terms of its goodness or badness for human beings (Hoffman et al. 2014), must be present in the relationships. The ISCG aid us in elucidating a series of ethical values and principles for internal crowdsourcing practice, providing a humanizing framework to prevent and solve conflicts and to inspire an ordered free will.

9.4 Humanizing the Crowdsourcing Best Practices

By reviewing and analysing the current official 12 guidelines of the ISCG (see Annex I), we can extract an underlying internal logic. The type of guidance these guidelines aim to provide to relate to a common subject can be easily discerned—

that is, the ISCG are geared towards building a strong battery of principles around the concept of responsibility. But responsibility with regard to what?

Again, a review of the ISCG enables us to extract the core elements of guidance IBM aims to provide. The ISCG are about responsibility with regard to the following: G.1: respect of general rules; G.2: own generated content; G.3: personal brand; G.4: corporate brand; G.5: mandatory elements (copyright and legal and financial aspects); G.6: confidentiality, or loyalty to corporate confidentiality; G.7: confidentiality, or loyalty to client confidentiality; G.8: general audience; G.9: other organizational members; G.10: others and their opinions; G.11: crowdsourcing purposes (value addition); and G.12: corporate image.

These 12 topics around responsibility can be further aggregated into four groups focused on responsibility: responsibility in general—in the generation of added value (G.11); responsibility with regard to consequences on the corporation—dealing with the corporate brand (G.4) and the corporate image (G.12); responsibility to its organizational members—to own content (G.2), the personal brand (G.3), corporate confidentiality (G.6), clients' confidentiality (G.7), the general audience (G.8), organizational members (G.9), and other agents and their opinions (G.10); and mandatory responsibility—to respect guidelines (G.1) and the law (G.5).

This analysis helps us outline two functionalities of the ISCG instrument regarding the actions of crowd participants: (1) the ISCG instrument restricts crowd participants' actions and (2) the ISCG instrument provides the conditions for crowd participants' actions. On the one hand, the negative approach used to restrict participant actions is intended to avoid the arbitrariness in the interactions of the crowd in the internal crowdsourcing. On the other hand, establishment of the conditions aims to provide a solid framework to create a concrete discretionary space of interaction. In other words, the generation of guidelines is an instrument to delimit the discretionary behavioural framework of the crowd (hereinafter DBFC).

DBFC is a useful and necessary tool for internal crowdsourcing behaviours, but according to its nature, it is also insufficient. As we noted previously, internal crowdsourcing is a relationship rooted in volunteerism and, as such, cannot be based on regulation and control. These limitations lead to serious problems when the crowd interacts in areas not accounted for by the DBFC. In these cases, what must the crowd do? If the DBFC is considered insufficient, how can firms guide the crowd?

Certainly, the answer is complex because, on the one hand, there is a need to regulate this (voluntary) relationship and, on the other hand, there is a strong limitation established by its own nature (volunteerism) that requires the respect of the individual freedoms of crowd participants. Thus, it is necessary to extract a series of ethical values (or goods to be pursued; McGhee and Grant 2008), to guide the decisions and actions of crowd participants in an unrestricted and open manner. According to Argandoña (2003: 16), values are "central desires or beliefs regarding final states or desirable conducts that transcend specific situations, guide the choice and evaluation of our decisions and, therefore, of our conducts, becoming an integral part of our way of being and acting to the point of shaping our character". Furthermore, when these values are ethically based, they are worth having because they contribute to the perfection of the individual as a human being and resemble

the objective moral goods of the person (McGhee and Grant 2008). Therefore, with the enumeration of a series of ethical values (goods) to commit and pursue, human relationships that form from the crowdsourcing practice can be humanized. In addition, crowd participants' respective individual freedoms can be simultaneously preserved.

Table 9.1 'Internal crowdsourcing' values and principle proposition

	Value	Principle
	Trust	Promote an open dialogue and the exchange of ideas based on trust
General	Justice	Add value to others
		Add value without forgetting your day job
		Add value recognizing your own mistakes
		Add value with rigour
	Prudence	Add value using your best judgement
Knowledge	Justice	(*Intra*-organizational) know the organization (business conduct guidelines)
	Prudence	(*Extra*-organizational) respect copyright and fair use laws
Corporation	Responsibility	Speak in the first person
		Use a disclaimer
	Temperance and prudence	Understand the potential dangers of publishing personal thoughts (especially if you are a manager or an executive)
	Prudence	Be cautions in the use of the corporate brand
Organizational members	Coherence	Be thoughtful about how you present yourself in online social networks
	Consistency	Be consistent about how you present yourself and your professional activity
	Dignity	Respect others' dignity
	Honesty	Be clear on who you are
		Be the first to point it out
		Be who you are
	Prudence	Be careful and judicious in disclosing personal details
		Protect confidential and proprietary information
		Organizational business performance and other sensitive "inside information"
	Respect	Protect the organization's clients, business partners and suppliers
		Respect your audience
		Respect your co-workers
	Transparency	Use your real name

Source Own elaboration

Based on the four groups of responsibilities extracted previously from the IBM DBFC, a series of ethical values and principles can be proposed as "best-practice" guidelines for other corporations interested in launching internal crowdsourcing activities in their strategic plans. The major value to attain is trust because trust promotes an open dialogue and the exchange of ideas. Other values, such as coherence, consistency, dignity, honesty, justice, prudence, respect, responsibility, temperance and transparency (see Table 9.1), are also applicable according to the scope of the action affected. For example, with regard to responsibility in general, actions involved in this business practice should serve to reach justice and prudence goods (e.g. adding value without forgetting the daily job or using the best judgment). These same values, justice and prudence, should be applicable to the knowledge about the mandatory responsibilities that any party should have (e.g. respecting copyright and fair use laws). Responsibility, temperance and prudence are also values to be committed, so as not to damage the corporation (e.g. speaking in first person, being cautious in the use of the corporate brand, using a disclaimer). Finally, with regard to organizational members, ethical values such as coherence, consistency, dignity, honesty, prudence and respect all help crowd participants take humanizing actions (e.g. being thoughtful about how they present themselves in online social networks, respecting others' dignity, being careful in disclosing personal details). In summary, the application of these values in action, together with their corresponding principles, can serve as a proposal for internal crowdsourcing activities, one that contributes to building a humanizing framework of guidance for this type of crowd participant.

9.5 Conclusions

This chapter provides valuable contributions to the literature by specifying a series of operational and ethical values and principles in response to the need to humanize the internal crowdsourcing practice. In particular, we addressed the issue of value addition that goes along with the launching of this business practice to better understand how to manage the human relationships involved, with regard to one major firm's stakeholders: organizational members.

Although a great deal of attention has been paid to this emerging crowdsourcing concept in the recent past (Zhao and Zhu 2014), scant research has provided cues for practitioners on how to manage and guide actions of those who want to participate in new tasks. This is an aspect that merits consideration by managers. Otherwise, the positive and innovative results expected from the launching of a collaborative project might fall by the wayside, if the crowdsourcing work climate becomes permeated with dehumanizing acts and decisions.

The crowdsourcing practice constitutes new working situations in which connection and collaboration with others are the norm in achieving the newest and greatest products. As a result, the temptation might arise to act in this scenario outside the umbrella of current values established by the corporation. Crowd

participants might be motivated to participate in the crowdsourcing activities because of reasons that both differ and are opposite to those of the corporation. As we described in this chapter, each internal crowd participant might become involved in new tasks for myriad motives (i.e. intrinsic, extrinsic and intermediate) and, as a result, act in ways that might conflict with one another.

With this in mind, and with the need to avoid dehumanized behaviours by giving exclusive importance to the production of newer and greater things, in this chapter, we drew on the case of IBM and, specifically, its ISCG (see Annex I) to design a series of best-practice principles to address internal crowdsourcing on a humanizing basis. While the design of a series of sanctioning regulations might be useful in many different contexts, it is not wholly compatible with the crowdsourcing practice. By its very nature, internal corporate crowdsourcing involves people, societies and organizations' desire to collaborate in projects in a voluntary manner. It is clear that considering the freedom of crowds in the logic of human relationships is a risky challenge. In doing so, management would be basing the proper functioning of these relationships on the goodwill of each party. Thus, management needs to rethink ways to interrelate with others beyond paradigms based on regulation and control; in turn, these ways must be in accord with the voluntary nature of crowdsourcing.

This proposal should merit management consideration to build a humanizing framework to guide internal crowd participants in their firms. However, the successful implementation of this code for internal crowdsourcing participants will be useless if employees fail to recognize that the values underlying these guidelines should become a reality in aspects that directly affect their working lives. Indeed, several limitations that could interfere with the proper influence of these guidelines on internal crowd participants must be taken into account around crowdsourcing. For example, because large companies may conceive of crowdsourcing as an easy path to fast, cheap, high-quality labour, they could try to benefit from the work of crowds without offering the kinds of monetary rewards that are the norm in traditional work arrangements (Brabham 2013). This lack of rewards could be perceived as unfair and dishonest and thus infringe on the ethical values underlying the best-practice guidelines in crowdsourcing. This perception is not uncommon, and crowdsourcing is sometimes called "digital slavery" and "crowdsploitation" (Brabham 2013), meaning that management's self-interests permeate the real purposes for launching certain business activities. However, the perception of a dishonest or unfair situation would strongly influence the likelihood of future participation beyond considerations of self-interest (Franke et al. 2013).

The IBM case has greatly helped us in elucidating a series of practical and ethical values and principles to guide participants in internal corporate crowdsourcing, but more efforts should be undertaken to collect information from other companies that also issue open calls for people to get involved in temporary problem-solving activities—that is crowdsourcing activities. In addition, the focus in this chapter was on one specific type of crowdsourcing activity—involving internal personnel. However, many other stakeholders (e.g. consumers, local communities, Internet users, suppliers, non-governmental organization activists)

could be involved in these activities to help the firm. By adopting the methodology used here (i.e. case study), research could analyse the different modalities of crowdsourcing according to the stakeholders involved to extract the best-practice principles to operate optimally in such cases. Finally, further work on our proposal is necessary to clarify how managers can humanize their internal corporate crowdsourcing operations from an ethical standpoint. For example, perhaps virtues would be a logical next step to consider.

Annex I: Current and Official IBM's Social Computing Guidelines

1. Know and follow IBM's Business Conduct Guidelines.
2. IBMers are personally responsible for the content they publish on-line, whether in a blog, social computing site or any other form of user-generated media. Be mindful that what you publish will be public for a long time-protect your privacy and take care to understand a site's terms of service.
3. Identify yourself-name and, when relevant, role at IBM—when you discuss IBM-related matters such as IBM products or services. You must make it clear that you are speaking for yourself and not on behalf of IBM.
4. If you publish content online relevant to IBM in your personal capacity it is best to use a disclaimer such as this: "The postings on this site are my own and don't necessarily represent IBM's positions, strategies or opinions."
5. Respect copyright, fair use and financial disclosure laws.
6. Don't provide IBM's or a client's, partner's or supplier's confidential or other proprietary information and never discuss IBM business performance or other sensitive matters about business results or plans publicly.
7. Don't cite or reference clients, partners or suppliers on business-related matters without their approval. When you do make a reference, link back to the source and do not publish content that might allow inferences to be drawn which could damage a client relationship with IBM.
8. Respect your audience. Don't use ethnic slurs, discriminatory remarks, personal insults, obscenity, or engage in any similar conduct that would not be appropriate or acceptable in IBM's workplace. You should also show proper consideration for others' privacy.
9. Be aware of your association with IBM in online social networks. If you identify yourself as an IBMer, ensure your profile and related content is consistent with how you wish to present yourself with colleagues and clients.
10. Spirited and passionate discussions and debates are fine, but you should be respectful of others and their opinions. Be the first to correct your own mistakes.

11. Try to add value. Provide worthwhile information and perspective. IBM's brand is best represented by its people and what you publish may reflect on IBM's brand.
12. Don't misuse IBM logos or trademarks and only use them if you have the authority to do so. For example, you shouldn't use IBM in your screen name or other social media ID.

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Chapter 10
Using Crowdsourcing to Overcome Barriers to Women Entrepreneurship

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Abstract This chapter presents crowdsourcing as a novel way of overcoming barriers facing women entrepreneurs, offering alternatives to conventional solutions. The study analyzes three barriers to women entrepreneurship: access to financing, access to specific management knowledge, and access to information and communication technologies (ICTs). For each barrier, a different form of crowdsourcing is proposed: crowdfunding, crowd wisdom, and crowdfunded media, respectively. Using these crowdsourcing tools, women entrepreneurs can overcome major difficulties when starting businesses.

Keywords Business angels · Crowfunding · Crowdsourcing · Crowd wisdom · Entrepreneurship · Women entrepreneurs

10.1 Introduction

Crowdsourcing means using the "crowd" to obtain ideas, information, and solutions to succeed in business. Crowdsourcing covers both intellectual and financial resources. The term "crowdfunding" applies to financial resources, whereas crowd wisdom refers to intellectual resources (Fig. 10.1).

Crowdsourcing is a mechanism that can improve organizations. It can also be used to solve problems and perform simple and complex tasks (Brabham 2008a, b). According to Schuurman et al. (2012), crowdsourcing can be used in two ways: first, as "integrative sourcing without remuneration," which includes free user-generated content (YouTube, Wikipedia comments, tags, etc.), and second, as

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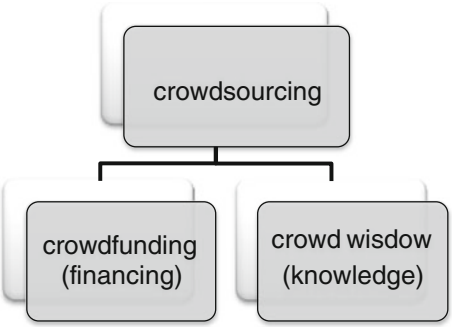

Fig. 10.1 Crowdsourcing's components

"selective crowdsourcing without evaluation," which refers to crowdsourcing whereby people with knowledge in a given subject evaluate information on that subject. In crowdsourcing, businesses and the crowd cooperate via information and communication technologies (ICTs) to pursue the common good (Howe 2008).

Crowdfunding, on the other hand, refers to the practice whereby diverse groups collaborate to raise money (Ordanini et al. 2011), creatively solving financial problems through social networks. Crowdfunding's mission consists of using the "crowd" to solve small challenges or raise capital for projects unable to secure financing by traditional means. Crowdfunding uses online platforms to allow initiators and contributors to exchange resources and thereby make their ideas a reality (Gerber et al. 2012), and is often associated with community experiences whereby participants create "benefits for the community" (Belleflamme et al. 2014). Sport, music, video games, and education are some of the main areas where crowdfunding offers solutions. Participants make crowdfunding transactions on online platforms where several crowdfunding actions occur concurrently (Lawton and Marom 2010). Crowdfunding initiatives provide great support to entrepreneurs who lack financial resources—the principal crowdfunding users.

Finally, crowd wisdom arises from the need to spread knowledge through Web sites that allow groups of people with outstanding intelligence to solve problems. Diversity of opinion, participants' geographic decentralization, and the power of the crowd mean that crowd wisdom is becoming more widely used to solve business problems (Surowiecki 2004).

Building on this foundation, this chapter presents three difficulties women entrepreneurs must overcome to succeed in business. We first examine women entrepreneurs' difficulties in accessing financing. We then discuss how crowdfunding can provide women entrepreneurs with the necessary resources to start businesses. Next, we investigate how women entrepreneurs can access greater specific business knowledge through crowd wisdom. Finally, we analyze technological sectors, discussing how these sectors can foster business creation through crowdsourcing.

10.2 Using Crowdsourcing to Overcome Barriers to Women Entrepreneurship

When starting a business, women entrepreneurs may encounter financial, management, and administrative difficulties (Akehurst et al. 2012). Crowdsourcing represents an attractive solution to overcome all three barriers.

10.2.1 Access to Financing

The scarcity of early-stage capital creates a significant barrier to entrepreneurship (Cosh et al. 2009). Numerous studies have addressed women entrepreneurs' disadvantage with respect to men regarding access to financial resources. Coleman (2000) reported that women encounter greater difficulties in accessing financing and pay higher interest rates than men. Relations between women entrepreneurs and financial institutions are subject to widespread stereotypes and discrimination (Carter and Storey 1994).

The scarcer resources invested by women when starting a business may indicate greater problems and obstacles in obtaining financial resources necessary to undertake a business venture. Thus, numerous studies (Orhan and Scott 2001; Verheul and Thurik 2001) have concluded that women encounter greater difficulties in accessing the necessary early-stage capital and that financial institutions may doubt women entrepreneurs' credibility. After analyzing findings from numerous empirical studies, authors have concluded that women perceive that banks discriminate against them and that barriers to accessing early-stage capital are greater for women than for men (Stoner et al. 1990; Brush 1992; Akehurst et al. 2012).

Entrepreneurs must identify which resources they lack and which they already possess. A shortage of early-stage capital can negatively affect a business in the long term. Similarly, less early-stage capital affects entrepreneurs' chances of securing bank financing (Storey 1994). Gundry and Welsch (2001) showed that women often start and run their businesses with less capital and scarcer financial resources. This lack of financial resources affects women entrepreneurs' future performance.

Without bank financing, women business owners must seek more costly forms of raising capital (Hayes 2000), which is perhaps why women perceive that traditional financing instruments fail to suit women-led businesses. This need to seek more costly forms of raising capital could also explain why some authors have claimed women entrepreneurs prefer to finance businesses with their own personal savings or family loans (Petersen and Rajan 1994). This preference leads to lower initial investment by women. Women business owners seem to lack awareness of available financing options, which may prevent women from seeking alternative financing sources such as crowdfunding.

10.2.1.1 Alternative: Crowdfunding

Crowdfunding helps women entrepreneurs raise capital to crystallize new ideas, especially when resources are scarce (Greenberg and Gerber 2012; Lambert and Schwienbacher 2010). Crowdfunding projects vary greatly, from small artistic projects to large entrepreneurial projects hoping to raise millions of dollars in seed capital as an alternative to traditional financing (Schwienbacher and Larralde 2010).

Crowdfunding platforms can be open source, whereby resources belong to the community and can be exploited individually (with no restriction on who may use them), or generically, whereby the entity seeking crowdfunding owns and exploits the resources. Crowdfunding begins with an open call, normally on an online platform, requesting donations in exchange for future products or some reward for supporting the initiative (Belleflamme et al. 2014). These platforms are currently having enormous effects (Greenberget al. 2013).

Through crowdfunding, project initiators aim to raise capital via online social networks. Instead of raising capital from a small group of sophisticated investors, crowdfunding projects obtain money from large audiences (the "crowd"), where many individuals contribute a small sum (Kuppuswamy and Bayus 2013; Mollick 2014). Therefore, when raising financial resources to start a business, crowdfunding may offer an attractive alternative for women who, as previously discussed, encounter serious problems in accessing traditional financing. If the crowdfunding project meets its goals, the money passes to the entrepreneur. Although the entrepreneur has no legal obligation to carry out the project, in practice, all projects are carried out (Mollick 2013).

Thus, given the difficulties faced by new businesses in attracting financing from "business angels," banks, and venture capitalists, entrepreneurs in general, and women entrepreneurs particularly, can take advantage of these large online communities of consumers/investors (Cumming 2012). Furthermore, because it is often anonymous, crowdfunding benefits women entrepreneurs, who need not reveal their sex when presenting a project.

Women entrepreneurs' family economy is important because women entrepreneurs often rely on seed capital from family and friends to start new business projects (Cumming and Johan 2009). Since entrepreneurial projects often rely on family and friends for funding, crowdfunding can favor women especially (Parker 2009). The motives that drive women to start businesses are primarily empathy, sympathy, happiness, and identification with the entrepreneurial project. All these factors directly affect the quantity donated (Gerber et al. 2012).

Crowdfunding has been successful because it eliminates economic and geographic barriers, and because virtual platforms facilitate donations from contributors (Schwienbacher and Larralde 2010). Furthermore, the current financial crisis has forced entrepreneurs to seek alternatives to finance their projects. Currently, policymakers are working toward a regulatory framework that will mitigate serious fraud risk and alleviate restrictions.

To conclude, although women entrepreneurs have increased their access to financial resources, accessing financing remains a barrier to women entrepreneurship. Crowdfunding may thereby help women create and develop businesses.

10.2.2 Knowledge Transfer

Knowledge transfer has undergone considerable changes in two areas. Once conceived as a one-way (offer/demand) relationship, knowledge transfer is now understood as an interactive two-way relationship in which the transfer agent and recipient both actively participate. The "long tail" thesis posits that users can select an increasing amount of information, contents, knowledge, products, and services in numerous ways besides traditional communication media. This range of options encourages consumer choice (Anderson 2006). Furthermore, knowledge transfer is no longer limited to engineering or medicine, but now also includes other knowledge areas such as social sciences and humanities (D'Este et al. 2014).

On average, women entrepreneurs boast fewer years' work experience than men, and the kind of experience differs. Less work experience and specific training in business-related areas prevents women from developing their own skills to drive business growth or obtain financial resources to start a business. Hence, differences in work experience affect business size.

According to the "long tail" theory, knowledge transfer lets society access information more easily. Nevertheless, women entrepreneurs still struggle to access the training they need to acquire skills to create and develop businesses. Crowd wisdom, a new crowdsourcing form, offers a plausible alternative to reduce these problems.

10.2.2.1 Alternative: Crowd Wisdom

In recent years, women have enjoyed greater training in the management skills necessary to start a business and participate more in a historically male-dominated activity. Nevertheless, opportunities are unequal because the culture in many countries impedes women's professional development. We therefore propose crowd wisdom as an alternative for women to access the necessary knowledge to create businesses and develop the skills required for entrepreneurship. Outsourcing innovation combined with "the knowledge of the crowd" creates crowd wisdom, a term coined by Howe (2008).

Similarly, the concept of collective intelligence (i.e., intelligent decisions by individuals who combine their knowledge) has arisen. Through social interaction, the crowd shares, corrects, opens, processes, enriches, and evaluates intellectual knowledge (Lévy 1994).

Crowd wisdom arises from the need for groups of people with outstanding knowledge to spread their knowledge through virtual platforms and solve problems

(Surowiecki 2004). Therefore, this specific business knowledge transfer could prove useful for women entrepreneurs who lack the necessary intellectual resources. Thus, these relations could contribute to two-way knowledge flows between actors with complementary competencies. Specific contributions from each user could help women entrepreneurs achieve innovative results. In addition, crowd wisdom could help form stable social networks and generate relationships of trust between actors. Such trust would create favorable conditions so that people with complementary knowledge could share sensitive information and learn to solve complex problems.

Knowledge transfer through media such as the Internet contributes to resolving business problems on an international level. Web sites increase diversity of opinion and, consequently, diverse solutions to the same problem, thanks to independence and decentralization of opinions (Goldfarb and Tucker 2010). Thus, in crowd wisdom, open innovation with users transcends merely identifying user needs—an approach associated with classic research—and implies developing solutions to generic market needs.

Web sites encourage innovation through new technologies (Terranova 2004), while creators of interactive platforms and projects learn new ways of addressing new knowledge forms (Gerber et al. 2012). Crowd wisdom lets participants learn through responses to calls for financing, Web analysis, qualitative feedback, and tutorials about how to seek financing, fill orders, and so forth (Terranova 2004). People thus learn through participation and obtain information through regular, public interaction (Kolonder et al. 1998). Thanks to the Internet, people with outstanding knowledge (e.g., university researchers) can help businesses in general, and women-led businesses in particular, by providing advice on optimally managing resources and maximizing present and future financial profits.

In many cases, although women entrepreneurs obtain the financing they need, without the necessary knowledge, their businesses may fail. Therefore, crowd wisdom offers an alternative to provide women with the knowledge they need to succeed in business.

10.2.3 Access to Technological Sectors

Women enjoy greater managerial presence in certain economic sectors (Blum et al. 1994; Huarng et al. 2012). Nevertheless, numerous authors (Brush 1990; Romero 1990; ENSR 1996; Akehurst et al. 2012) have concluded that women-led businesses tend to proliferate in the services sector, especially in activities where women have traditionally played a prominent role: retail, hospitality, personal assistance services, and education. Scholars have proposed several reasons to explain women's business orientation toward services. For instance, service and retail businesses require low up-front investment and less technical training. These requirements help women entrepreneurs nullify their disadvantage with respect to men regarding obtaining financial resources and specific business skills (Blake 2006).

In contrast, women entrepreneurs are underrepresented in sectors such as manufacturing and ICTs (Du Rietz and Henrekson 2000). Accordingly, some research (Loscocco and Robinson 1991; Anna et al. 1999) has shown that women are less likely to own businesses in technology-intensive sectors. Yet, ICTs supply knowledge to innovative societies and enhance people's knowledge and creativity. Therefore, women entrepreneurs' access to the ICT sector should be fostered, not only so that women can work in all sectors, but also because access to ICTs can help businesses in other sectors develop.

Digital platforms can help reduce grazes stemming from geographic distances between markets. In addition, ICTs have increased access to the global market, accelerated information transmission, and reduced costs. Therefore, as previously mentioned, ICTs facilitate women entrepreneurship not only in the ICT sector, but also in other sectors (Haliburton et al. 1998).

10.2.3.1 Alternative: Crowdfunded Media

Through crowdfunding, particularly crowdfunded media, women entrepreneurs can build a basis to access the ICT sector and use this technology to develop their businesses.

Crowdfunded media link resources in a novel way (Sanfiel 2008) so that users can access technological knowledge. Therefore, these media give women entrepreneurs access to the ICT knowledge necessary to develop their businesses.

Through global digital platforms, ICTs drive entrepreneurs' knowledge and creativity. By lowering the costs of access to services, knowledge, and information, ICTs have contributed to reducing transaction costs in developed countries. Women entrepreneurs can develop capabilities and skills by using ICTs (Huyer and Sikoska 2003). The potential of crowdsourcing, driven by ICTs, encourages businesses to create interdependencies and synergies and thereby operate with greater ease in global markets.

The idea of combining traditional business skills with business activity in innovation, technology, and information constitutes a relatively new concept (Sahlfeld 2007). ICT use is important for business competitiveness. Thanks to the Internet and its applications, new and quicker ways of communicating and transmitting information have partially substituted more conventional communication methods (Sahlfeld 2007). Nevertheless, as already shown, women lack access to this new technology. They lack both the necessary resources for external access and the necessary technical training.

New platforms with highly diverse contents (e.g., blogs and social networks) have gradually been emerging. These contents often give individuals the knowledge they need to correctly implement ICTs in entrepreneurship. In short, ICTs help women develop their potential and realize their business projects. With a global reach, ICTs can increase the chances that women access the help they need. In addition, ICTs can help women learn to manage and develop their businesses.

10.3 Conclusions

This chapter shows the importance of the "crowd" for women to achieve not only financing but also the necessary knowledge to start and develop businesses. Each section begins by presenting a different barrier to women entrepreneurship and then introduces an alternative solution: crowdsourcing.

Thus, by offering women equal access to financing, knowledge, and ICTs, global virtual platforms, the basis of crowdsourcing, can help create gender equality in business creation.

By giving women entrepreneurs greater access to the resources necessary to create businesses, these online platforms mean that initiatives can have global repercussions. First, women entrepreneurs can use crowdfunding to access basic financial resources for entrepreneurial projects. Second, crowd wisdom grants women entrepreneurs access to specific entrepreneurial knowledge to create and develop their businesses. Third, through crowd funded media, women entrepreneurs can access ICTs, so that, in addition to operating in this historically male-dominated sector, women can also use ICTs to develop their businesses.

Empirically analyzing crowdsourcing's effect in Spain would enhance this study. In addition, further research should explore different branches of crowdsourcing such as crowsdvertising, which allows entrepreneurs to market their ideas through advertising financed by public participation.

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Chapter 11
Gamification for Crowdsourcing Marketing Practices: Applications and Benefits in Tourism

Marianna Sigala

Abstract The use of gamification for directing and motivating customers' behaviour and supporting crowdsourcing practices in marketing is increasingly spreading. This chapter reviews the literature for identifying the game principles and elements that can lead to effective gamification, and it then demonstrates the applicability and implications of this theory by discussing various gamification applications developed for supporting crowdsourcing marketing practices in tourism. The examples demonstrate that gamification can be used for crowdsourcing any marketing practice and influencing customer behaviour at any stage of the consumer behaviour process. Implications for future research are also provided.

Keywords Gamification · Game mechanics · Funware · Motivation · Tourism · Marketing · Applications · Benefits · Crowdsourcing

11.1 Introduction

Crowdsourcing (defined as the process of obtaining needed services, ideas, or content by soliciting contributions from a large group of people, and especially from online communities, rather than from traditional employees or suppliers) is increasingly being used in marketing. Specifically in the tourism sector, firms heavily use crowdsourcing for exploiting travellers as marketers and actively involving them into their marketing strategies, because the user-generated content and communications amongst travellers are perceived as more effective, authentic and reliable content for promoting the intangible tourism experiences (Sigala et al. 2012). However, as with all crowdsourcing practices, the success of crowdsourced marketing heavily depends on the motivation and willingness of people to engage and contribute in activities (Brabham 2012).

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In this vein, gamification is increasingly integrated within marketing strategies (Zichermann and Cunningham 2011; Witt et al. 2011) in order to increase the customers' engagement, participation, learning and motivation by directing their behaviour (i.e. increased activity, social interaction, consumption and purchasing actions) through the design and affordances of positive and intrinsically motivating gameful experiences (Hamari 2013; Conejo 2014; Sigala 2015). Moreover, well-implemented gamification does not only motivate consumers to show desired behaviours (Zichermann and Linder 2010; Conejo 2014), but it can also make the marketing practices more interesting by adding motivational incentives that enhance the enjoyment of consumers (Sigala 2015).

However, although firm's spending in gamification is increasing (i.e. more than 50 % of the organisations will gamify aspects of their business by 2015, Gartner 2012), many of the gamified applications for marketing will also fail to meet business objectives due to weak gamification designs (Gartner 2012). Furthermore, despite the great potential of gamification in tourism marketing (e.g. Cramer et al. 2011), studies examining the gamification's effectiveness in tourism are also scant (Sigala 2015; Xu et al. 2013). Consequently, it is urgent to examine how firms can design effective gamification applications that can increase the business results and provide added value to their customers.

Thus, the aim of this chapter is twofold: (a) to review the literature in order to identify and summarise the principles and issues that need to be considered for designing effective gamification applications in marketing that can enhance the customers' participation and outcomes and (b) to analyse various examples of gamified marketing applications in tourism. To that end, the book chapter first discusses the concept and implementation of gamification in marketing, and then, it shows the applicability and the implications of the gamification theory by discussing the funware design and the aims of various gamification examples from the tourism industry. Finally, as there is limited knowledge about the effectiveness of gamification on influencing consumer behaviour in a marketing context (Hamari et al. 2014), the chapter concludes by discussing directions for future research that can advance our insight into this topic.

11.2 Gamification in Marketing: Concept, Aims, Applications and Benefits

Gamification is widely known as the use of game-play mechanics for non-game applications (Deterding et al. 2011a, b). Thus, "gamified" applications only need to incorporate some (and not all) of the game design elements, and this differentiates them from "serious games" (the design of full-fledged games for educational purposes). Although there are various definitions of gamification, all of them highlight its aim to create a gameful experience by including two elements (Sigala 2015): a systemic component defining how the game is constructed/designed and an experiential component describing the human involvement within the game. Overall, the

major aim of gamification is to effectively motivate and direct the users' behaviour and to increase the users' engagement with the "play" tasks (Lee and Hammer 2011; Shneiderman 2004) by using game-like techniques (e.g. scoreboards, points and personalised fast feedback) that make people feel more ownership, flow and purpose when engaging with the "play" tasks (Pavlus 2010).

Two types of gamification applications are found in the marketing literature (Terlutter and Capella 2013): 1) advergames, which are full computer games specifically designed and created to promote goods or ideas, where the entertainment content mimics traditional game forms; and 2) marketing practices with gameful designs that are only partially based on elements of digital games. Advergames and gamified marketing practices are usually less complex than a "real" game (e.g. no complex rules, short playing time), and so, they can be easily distributed on different platforms (e.g. websites and smart phones) and so, easily played quite repeatedly, (e.g. during short breaks in the day, such as waiting times or travelling). Moreover, their interactive context increases the users' "situational" involvement (i.e. user active control and two-way communication), which in turn enables users to experience flow (Csikszentmihalyi 1990). Flow is characterised as an enjoyable experience that leads to feelings of immersion in a task, accompanied by a sense of control over the situation, and it also leads to increased learning and exploratory and participatory behaviour. In the state of flow, the individual is focused on the flow-eliciting interaction, with irrelevant thoughts and stimuli being screened out, and sense of time being distorted.

Thus, gamified marketing applications create pleasurable experiences that can lead to numerous marketing benefits, because they attract the attention of their users to the interactive content and engage users into cognitively learning (Sigala 2015). Indeed, gamification can lead to positive users' behavioural (i.e. task involvement and task performance) and psychological (e.g. flow, enjoyment) outcomes (Sigala 2015; Hamari et al. 2014), which in turn can significantly increase the performance outcomes of marketing practices, such as enhanced customers' brand recall and awareness as well as positive attitudes, purchase intentions and actual sales (Cauberghe and De Pelsmacker 2010; Terutter and Capella 2013).

11.3 Implementing Gamification: Elements and Principles of Funware Design

Implementing gamification requires the design of funwares, which is the use of game mechanics to encourage desired user actions and to generate customer loyalty (Zichermann and Linder 2010). Game mechanics are rule-based systems/simulations that facilitate and encourage a user to explore and learn the properties of their space by generating intrinsic (i.e. motivation that comes from within) and extrinsic (when one is motivated to do something for its expected outcome) motivational affordances (Hamari et al. 2014; Deci and Ryan 1985). There are numerous game

mechanics that are usually grouped into three categories (Yee 2006): behavioural (e.g. discovery/exploration, ownership, community collaboration, lottery, virality, status, story/theme); feedback (e.g. bonuses, countdown, reward schedules); and progress (e.g. achievements/badges, levels, (redeemable or social) points, progress bar, challenge).

Different types of game mechanics can afford the generation of different types of motivation. Intrinsic motivation in games results when one is motivated to do something for its own satisfaction (e.g. for fun/joy, interest, self-expression, curiosity, challenge, altruism, competition, cooperation, sense of belonging, love or aggression) and it can be triggered by the following game mechanics (Wood et al. 2004): avatar (virtual alter ego), role-playing, content (storyline), interaction (feedback/motivation), level of control (freedom of choices), possibility of losing points, amount of choices and feeling connected. In sum, role-playing in games can trigger the following five primary intrinsic motivations (Companion and Sambrook 2008; Crawford 1982): choice, control, collaboration, challenge and achievement. Extrinsic motivation in games happens when users are encouraged to engage in play tasks for achieving performance and obtaining rewards, and it is generated by game mechanics such as, pressure, classifications, levels, points, badges, awards, missions (Deterding et al. 2011a, b)

Points, badges and leaderboards (PBL) are clearly the most commonly used mechanics for triggering the users' motivation and raising their engagement with play tasks by giving them information about their achievements, progress and high scores. (Hamari and Eranti 2011). However, PBLs are not enough to make gamification successful (Chorney 2012), while their exclusive use is also found to diminish the users' intrinsic motivation (Benabou and Tirole 2005), creativity (Toubia 2006) and behavioural involvement (Deci et al. 1999). This is because when the games offer the player extrinsic incentives for something the player already intrinsically enjoys, there is the danger that extrinsic incentives may diminish the intrinsic motivation of consumers (Benabou and Tirole 2005). Moreover, once gamification is used to provide external motivation, the user's internal motivation decreases: e.g. if the organisation starts using gamification based upon the provision of external rewards and then it decides to stop these rewards, the organisation will be worse off than when it started, as the users will be less likely to return to the behaviour without the external reward (Deci et al. 1999). Funware designs should also avoid the superficial "pointsification", as they miss the elements of playfulness and experiences (triggers of intrinsic motivation), which are central to what makes a game effective (Robertson 2010).

Hence, some researchers (e.g. Deterding et al. 2011a, b; Kim 2010) emphasise the need to design an effective player's experience with intrinsic rewards preferred over extrinsic rewards, because extrinsic rewards may lead to short-term activity increase, but reduction in long-range interest and use of a product/service (Lazzaro 2011); and intrinsic motivation more significantly leads users to experience flow, a state of energised focus that can generate greater user involvement and enjoyment (Deci and Ryan 1985; Csíkszentmihályi 1990). On the other hand, others (Sigala 2015; Hamari et al. 2014) stress the need to combine extrinsic and intrinsic

motivation by using a mixture of game mechanics, because the use of extrinsic incentives can further enhance the users' intrinsic motivation, specifically when the aim is to develop a sense of competence and mastery in the user/consumer. This sense of competence can be supported by the presence of extrinsic game elements, such as bonuses or rewards that may help establish intrinsic motivation.

However, instead of considering the two motivations as independently, research recognises the systematic interactions between intrinsic and extrinsic motivations referred to as the crowding theory (Frey 1997) or motivational synergy (Amabile 1993) suggesting that the externally imposed rewards (e.g. extrinsic motivation) may undermine (crowd-out/non-synergetic effects) or in other cases, magnify (crowd-in/synergetic effects) intrinsic motivation (e.g. Frey and Jegen 2001). Crowd-out effects are observed where the provision of monetary rewards and fines indicates a shift in the locus of control, and so, they lessen the autonomy and the possibility of the user to act in a personally driven and meaningful way, or when the users perceive the quantification of contribution as changing a task from relational (internally driven) to transactional (reward driven). Crowd-in effects happen when a user perceive external rewards as supportive and congruent with their motivational preference such as, when the external interventions (game mechanics) provide feedback, recognise and confirm quality of performance, and help the users improve their competences. Hence, the psychological conditions under which the crowding effects occur are the following: game mechanics crowd-out intrinsic motivation if they are perceived as controlling; and game mechanics crowd-in intrinsic motivation if they are perceived as supportive.

The crowding theory and its implications for funware design are also explained and justified by the following theories. Self-determination theory (SDT) advocates that when external motivations are integrated with the underlying activity into someone's own sense-of-self, then he better understands the importance of the activity to himself and internalises its regulation, which in turn self-motivates him to also perform the activity (Zichermann and Cunningham 2011). Situational relevance also argues that when someone else creates goals for a user, the user perceives an external judge deciding what is relevant to him, and this in turn creates a negative feeling demotivating the user to engage with the activity (Nicholson 2012). So, external rewards unrelated to the user's needs (e.g. badges, points) are the least likely to be integrated by the user, as the perception is that someone else is controlling his behaviour. This is because, rewards based upon gaining or losing status that tap into the user's ego create an introjected regulation of behaviour, and while this can be intrinsically accepted, the controlling aspect of these rewards causes the loss of internal motivation. On the contrary, allowing the user to self-identify with goals or groups that are meaningful to him is much more likely to produce autonomous, internalised behaviours, because in this way, the user is able to connect these goals to other values that he already holds. Finally, games using role-playing in their funware can generate significant motivational affordances, because they provide users with control upon the selection of game mechanics. Specifically, role-playing allows the users to affirm their self-identity (Bartle 2007) and to interact with the gaming world and the other players by using and controlling the behaviour of avatars, which are user customisable agents (Chan and Vorderer 2006).

Overall, the literature recognises that in order for the game mechanics to generate motivational affordances, they should (Yee 2006; Deterding et al. 2011a, b) work towards personally meaningful goals and match the user's profile (i.e. his/her needs, values and interests). The latter is also very important, because several studies (Hamari et al. 2014; Yee 2006; Bartle 1996; Kim 2010) have found that there are various types of gamification users, whose motivation to get engaged in gamified tasks is driven and influenced by different needs and goals, e.g. socialising, enhancing personal ego, interacting with the game environment. Thus, in summarising the literature on effective funware design, Sigala (2015) identified the following major principles when selecting game mechanics for designing effective gamification applications:

- The use of a variety of game mechanics for generating the mix of extrinsic and intrinsic motivation and appealing and meeting the various objectives, motivational needs and personality types of the various gamification users. Table 11.1 provides more details about the match of game mechanics, gamers' motivation and types.
- The empowerment of the users to select (i.e. choice and control) and customise the game mechanics to their own motivational needs so that they can self-identify the game goals with their own values, create meaningful game elements and goals, and internalise the game activities.
- The integration of game mechanics with social network and media features, because by incorporating network friends into the game play, the funwares can magnify intrinsic motivation (due to the increased interactions amongst friends and the empowerment of the user to customise/control game mechanics to his/her goals and context) and escalate the promotion and wider adoption of the gamified application due to the viral marketing and intensified exchanges taking place within the network.

Finally, recent research provides the additional suggestions for designing effective gamification marketing applications. According to marketing theory, consumers' responses to marketing stimuli follow two stages (Cauberghe and De Pelsmacker 2010). The first stage is a "wear-in", or learning, phase, whereby the consumer gets familiar with the advertising message, leading to an increase in recall rates: after a first level of message repetition, the initial hostility and uncertainty towards the message declines and positive habituation increases, and more positive brand responses also develop. The second stage is "wear-out", or tedium, phase, advertising effectiveness declines with continuing repetition due to boredom, irritation and/or consumer reactance towards the message. Moreover, according to the persuasion knowledge model (PKM), the more knowledge people possess about the persuasion intentions of marketing stimuli, the more negative brand attitudes they generate. Because of these (Tertutter and Capella 2013), in situations of intensive processing, consumers are more likely to rely on negative thoughts about the marketing goals, while repetitive exposure to simple stimuli speeds up and accelerates the wear-in and wear-out phases of marketing campaigns.

Table 11.1 Matching game mechanics with gamers' types and their motivations

Motivation of users of online games and gamification applications (e.g. Yee 2006; Kim 2010; Hamari et al. 2014)	Gamers' types in game contexts (Bartle 1996)	Game mechanics (e.g. Xu 2011; Hamari et al. 2014)
Autonomy: Autonomy refers to the sense of will when performing a task	Achievers	Profiles, avatars, macros, configurable interface, alternative activities, privacy control, notification control
Competence *Advancement*—The desire to gain power, progress rapidly and accumulate in game symbols of wealth or status *Mechanics*—Having an interest in analysing the underlying rules and system in order to optimise character performance *Competition*—The desire to challenge and compete with others	Status seekers, achievers, killers	Positive feedback, optimal challenge, progressive information, intuitive controls, points, levels, leader boards, status, badges, levels
Relatedness/social component: Relatedness is experienced when a person feels connected to others *Socialising*—Having an interest in helping and chatting with other players *Relationship*—The desire to form long-term meaningful relationships with others *Teamwork*—Deriving satisfaction from being part of a group effort	Socialisers, Harmonisers	Groups, messages, blogs, connection to social networks, chat, gifting items to other users
Immersion Component *Discovery*—Finding and knowing things that most other players do not know about *Role-playing*—Creating a persona with a background story and interacting with other players to create an improvised story *Customisation*—an interest in customising the appearance of their character *Escapism*—Using online environment to avoid thinking about real-life problems	Explorers, lurkers	Avatars Gifting items for discovery for use of the gamified application Areas/levels unlock only when inviting others to play

In this vein, the characteristics of (adver) gaming environments (simple design, repeat usage, interactive nature, flow experience) increases the users' focused attention and the likability of the experience, leading to a high motivation and

ability to process the interactive content. In turn, the intensive processing of gamified marketing campaigns can significantly accelerate their wear-in and wear-out phases (Conejo 2014). Moreover, the repetition of the gamified tasks not only increases users' knowledge and understanding, but it also frees up cognitive resources, which based on PKM can also make the users to more likely rely on negative thoughts about the persuasive goals of advertisers (Tertutter and Capella 2013). Therefore, it can be expected that the wear-out phase of gamified marketing practices is achieved relatively quickly, leading to no further increase in brand recall and to the development of negative brand attitudes even after low levels of exposure. Thus, playing the game several times may have no positive influence on brand recall as well as negative impacts on brand attitudes. Consequently, advertisers should avoid situations where the consumer repeatedly plays the same game (i.e. use games only for short periods), while they also need to build in variations in the gamified applications (specifically those that are played for longer periods) by changing the game scenario, challenge, context or other design elements.

11.4 Gamification Application in Marketing

As marketing has always been about persuasion, motivation and manipulation, the affordances and the potential of gamification in marketing are enormous (Zichermann and Linder 2010). Indeed, following the success of Foursquare in using points and badges to motivate users' activity and retention, the interest of firms on using gamification for revolutionalising the human–computer interaction and the user experience has mushroomed. For example, in consumer-oriented websites and mobile applications, firms use gamification for encouraging people to use the e-commerce applications, for driving and enhancing customer loyalty, brand awareness and effective marketing engagement (Deterding et al. 2011a, b; Daniels 2010). Theoretically, any marketing practice can be gamified for influencing consumer behaviour and motivating the customers' engagement into the marketing tasks. The latter is critically important specifically when firms aim to crowdsource marketing activities to customers. In this vein, this section analyses various gamified marketing applications in tourism (including advergames and gamified practices) in order to show how the previously discussed theory on gamification design is applied for developing and exploiting gamification in order to motivate travellers to participate and support the marketing activities and goals of the firms. Although the gamification examples influence all the stages of consumer behaviour, they are grouped into three categories based on which is the major stage of consumer behaviour that they aim to influence, before, during and after the purchase/consumption tourism experience.

11.4.1 Before the Purchase/Consumption of the Tourism Experience

This is the stage whereby the travellers' interest and willingness to take a trip are triggered and formulated, and so, travel information provision is essential for helping travellers: specifying their travel needs; considering, evaluating and selecting various travel suppliers/products. Hence, at this stage, the tourism firms aim to provide information to the travellers in order to influence and trigger their travel needs, curiosity and preferences, and make them aware of their products/services so that they are included into the customers' search/consideration set.

Lufthansa created an interactive edutainment online game (www.snapshot-traveller.gr) enabling its users to virtually experience three destinations (Canada, Thailand and Brazil). While navigating the virtual words and interacting with their content and objects, users are asked to search for and photograph any animals they find. By interacting with the virtual words, the users explore and learn about the destinations' tourist resources and attractions as well as of the available travel experiences and options. The following game mechanics are incorporated into the funware for engaging users' engagement with the play tasks: rewards for performance achievement (i.e. points for photographing animals, and badges of "destination expert") and the opportunity of "destination experts" to enter a competition for winning several Lufthansa's travel awards. Apart from extrinsic motivation, other game elements are also incorporated for generating users' motivation and flow experiences. The advergames is played individually, but its funware is linked with social media (Facebook and Twitter) so that its users can share their game activity and performance with their network friends. In this way, the funware:

- enhances the users' intrinsic motivation and game involvement by providing social–relatedness motivational affordances (i.e. one does not feel that he plays the game alone, as his performance is visible to others); this virtual presence can in turn enhance the user's self-image, ego and social profile, while by sharing and commenting play task content/performance with others, the users can more effectively enter and experience a flow and fun state;
- exploits the users' social networks to diffuse and promote the game and its content to all their friends and connections. These viral marketing effects enable Lufthansa to exploit the social networks for crowdsourcing: the online game promotion for attracting more users; the generation and online diffusion of game related content for booming consumers' awareness of Lufthansa's destinations/travel products and triggering their travel interest; and the creation of intrinsic users' motivation (social–relatedness, competition) by incorporating game mechanics that enable the users to relate and control their play tasks to their known personal network and goals (i.e. interact with known friends and compete with them for achieving knowledge, points and social recognition). The use of social networks for empowering the users to create such personal meaningful game experience can lead to crowd-in synergetic motivation effects.

This advergames is part of the Lufthansa's campaign to launch these three flight destinations in the Greek market by making the game users' aware of the travel experiences and products of these destinations and triggering theirs and their friends' interest to undertake a trip. The Lufthansa brand and products do not get a prominent promotion place within the advergames (i.e. placed only on the background information of the game content), but the game scenario is directly linked to the Lufthansa's product. The game was available online for six months, and the users had the opportunity to "play" it and try to enter the award competition as many times as they wished. The six-month period of the advergames was considered as a good period to exploit its marketing impacts before its marketing effects wear-out.

Advergames are also used for creating destination awareness and promotion. The destination management organisation of Melbourne (Australia) used the following game elements for stimulating the interest and travel motivation of potential travellers to its destination: (real) avatars, social networks, a real destination as the game context and a scenario similar to reality shows as a game story. The advergames is called Remote Control Tourist (http://remotecontroltourist.com and http://www.visitvictoria.com/rct) and represents a real-life gaming application, because four real people wore helmet-mounted cameras and received information and guidelines on what to explore in Melbourne by others via Twitter and Facebook. The game allowed people from around the world to experience Melbourne in real time via live video feeds—their eyes and ears—as the virtual tourists visited the city and chatted with locals. The ability of the online users to control the play tasks and experiences (i.e. how to explore Victoria and what to learn/interact with) via a real person triggered the users' interests, game involvement and flow experience, as well as their willingness to create and spread electronic word of mouth. Over the five days of the game, the remote control tourists received 8,700 requests, visited 321 firms and attractions, travelled over 109 km by bike or foot, while people from over 158 countries and 3888 cities checked out the website, attracting more than 103,000 hits and over 150,000 views of YouTube videos. Thus, the advergames was proved as a good example on how destinations can exploit gamification for supporting their crowdsourcing practices for instilling destination awareness and promotion, creating users' interest to visit the destination and generating and diffusing destination content online.

The European Travel Commission (ETC) has launched "Roll the Dice" (https://rollthedicegame.com/auth, https://www.youtube.com/watch?v=NFNitZA8cdY), an interactive online advergames campaign aimed to educate, motivate and engage users to discover Europe as the most diverse travel destinations worldwide. "Roll the Dice" is an online board game developed as a multiplatform application with strong focus on social media. Game players can create the perfect itinerary by answering quiz questions about European destinations in a very entertaining way and share their travel experience with friends by sending funny postcards via different social media channels. The quiz questions (game scenario) support the edutainment element of the game, while a competition (a board game developed for the EuroShorts Film Competition) is also provided for increasing the users'

participation. Moreover, the integration of the funware with the social media aims to exploit crowdsourcing by motivating players to create and share pan-European routes for inspiring others players and viewers of the game and so driving them to real action in Europe.

11.4.2 During the Purchase/Consumption of the Tourism Experience

At the stage of the service consumption/purchase, the aim of the firms is to motivate the customers to increase the level of their consumption and the use of the firm/product, while also generate enjoyable and memorable nice experiences. Gamification can also be applied at this stage for instilling and motivating crowdsourcing effects in such marketing practices.

Gamification is used for motivating the increased use of travel websites and generating greater user awareness and interaction with the website content and tasks.

iXiGO.com created a destination gaming app (Yo! India, http://www.ixigo.com/yoindia) that tests a player's knowledge of Indian destinations by asking them to keep guessing places in India from their pictures and giving players points for answering correctly in a short period of time. By browsing through hundreds of destination photographs, the players learn and explore the destination, win badges and share their scores and achievements on Facebook, with the ultimate objective of becoming the "Travel God" of Yo! India by topping the scoreboard. Seven levels of achievements (starting as a "Beginner", moving up to the level of "Scout" and the final destination of becoming a "Travel God") are build into the game, in order to balance challenge with users' skills and enable the creation of flow (i.e. avoidance of boredom but also anxiety and stress). Hence, the funware design aims to create and trigger edutainment experiences and flow (i.e. allow the users to sharpen their knowledge of destinations and discover new interesting places) by combining fun, intellectual curiosity and performance achievement. The game can be played also through smart phones, enabling repeated/continuous use, so that the players can be updated about their score and the performance of others, while also fill in time periods with edutainment activities. To avoid fast wear-out, the company frequently updates its curating and challenges by creating new content. Game content and players' performance/scores are shared on Facebook. This integration aims to exploit social networks for generating greater intrinsic user motivation (i.e. competition and self-esteem/ego affordances), while also supporting and fuelling crowdsourcing effects for increasing website content, popularity, traffic/visitation, user engagement with website tasks as well as triggering the users travel interest for designing and purchasing travel itineraries and services. For example, the photograph puzzles of the game became so popular over time that the iXiGO fan page's popularity sky-rocketed from 20,000 fans to a whopping 235,000+ fans within two years, with over 36,000 fans liking, sharing and commenting daily, which boomed users' engagement.

MountVacation.com (an online holidays shopping website) has also gamified its website design for instilling the users' interest and use of the website tasks as well as exploiting crowdsourcing for enriching its website with user-generated content (travel reviews and ideas for travelling), for attracting website traffic and supporting users to conduct online purchases by reducing their risk (i.e. which resort is best to buy). To achieve that an application called *SkiBook* (and available only to Facebook users) allows its users to rate ski resorts/firms (e.g. criteria include ski, Snow Park, hiking trails, cross-country tracks, free style, family-friendly, apres-ski entertainment), review their skiing experience (complete with appraisals, scores and stats) about the European ski resorts that they have visited, relate it with and share it amongst their Facebook friends and connections. Users can compete against their friends and other connected skiers as to how many European ski resorts or skiing areas they have already visited and they are able to compare their rankings. All the reviews and stats are aggregated, thus allowing all users to find and preview the ski resorts other Facebook users have been to. With all that data at hand, MountVacation.com actively interacted with the targeted audience from whom all the data are extracted in order to help skiers and snowboarders make an educated choice when selecting their holidays in the mountain. Thus, the SkiBook is a gamified application that enables the website to generate and motivate crowdsourcing marketing practices for providing value to both types of their clients: helping tourists to select holidays and ski firms by providing reviews and stats; and assisting firms to improve their performance and services by comparing them against their competitors.

Sigala (2015) analysed how TripAdvisor has also applied gamification for supporting crowdsourcing and motivating its users to generate website content (i.e. travel reviews), interact with others, that in turn make the TripAdvisor website more appealing, useful and popular amongst travellers but also tourism suppliers alike. TripAdvisor is a website whose success depends on the provision of travel reviews. To motivate travellers to upload many and good quality reviews, game mechanics are used for gamifying various website tasks. For example, users get points when uploading reviews and interacting with others on forums for providing suggestions; get social points and achieve badges (i.e. travel experts) when others evaluate the travellers' reviews of good quality. To avoid crowd-out effects and further support the crowdsourcing effects of gamification, the TripAdvisor has also created a gamified application (by integrating its website design with the Facebook social graph) that allows its users to control and personalise the game mechanics and play tasks to their own interests, goals and other co-players/context so that the users can create more meaningful and engaging gameful experiences for themselves. The application allows the users to log into the TripAdvisor website in order to add travel content to their profile and receive points to enhance their scorecard performance; filter website content to reviews provided by their known friends; identify friends that have been to destinations/firms and interact with them online for getting personal advise; share and compare their travel performance (i.e. destinations visited, reviews and points) with their known Facebook friends. Specifically, the Facebook enabled gamified application allows the users to self-identify with the goals of the "play" tasks, because:

- The users are motivated to add content on the TripAdvisor website, because by doing so, they can create their own personalised travel map, their personalised wish travel list and/or their travel profile and expertise that enhances their ego and prestige; and
- The TripAdvisor users can customise the TripAdvisor's website to filter and show content contributed only by their Facebook friends; by doing so, the TripAdvisor users have access to travel content that they find more reliable, authentic and trustful (since it is contributed by people they know and belong to their Facebook network), and can identify themselves with their Facebook friends for sharing and discussing content as well as comparing their travel profile and scorecard performance with that of their friends (i.e. the gamification app incorporates and supports a type of a multi-player online game and competition that can drive and motivate user engagement).

Thus, the Facebook-gamified app aims to boom the crowdsourcing effects by enabling the users to easier and better internalise the play tasks to their activity.

Gamification is also used for motivating the travellers to explore destinations and increase their visitation and experience on destination places and geographies. For example, the city of Pafos has created a gamified destination application (Pafos Treasure Hunt) for informing and motivating visitors to explore and learn the destination in an edutainment way. Visitors download the application on their smart phone, and they can use a map for identifying their location and creating itineraries; identifying nearby attractions and tourism firms and reading content about them (e.g. interpretation, guides); and writing and sharing their reviews; getting points for checking in places and firms and receiving special prices, points and competition awards. The application allows treasure hunters to also share their progress and scorecard with friends and family via social networking sites—Facebook and Twitter, and so, by sharing their "hunt" and its "treasures", crowdsourcing is used for promoting the destination, creating wider awareness as well as help others to select itineraries and suppliers by reading others' reviews. Thus, the funware generate and reinforce both extrinsic and intrinsic motivational affordances that provide both functional value (travel content and services) as well as emotional/social value by enabling travellers to connect with others and experience and learn destinations in a more edutainment way. The application has enabled destinations to attract greater visitation, persuade visitors to spend more time and money at places, while it helps suppliers generate useful travel demand content (e.g. tourists' preferences, feedback and visitation paths and spending behaviour).

A similar application is created by Stockholm in order to educate the visitors and motivate them to experience and promote the city in an entertainment and educational way. The application uses the story theme of sounds as a challenging/game scenario for triggering users' interest and involvement with play tasks. Stockholm Sounds (http://www.swedavia.com/about-swedavia/news/discover-stockholm-with-the-stockholm-sounds-app/) challenge tourists to discover Stockholm through game missions, interactive experiences and visits to exciting places based on the sounds and music of the city. The application is available on smart phones and features a

city map, so visitors can use it; while they explore the city, users have to answer questions related to music elements they find in various location throughout the city in order to learn about the destination, gain points and receive awards. Visitors can also share their experiences from different game activities with social network friends, which creates opportunities for viral marketing and crowdsourcing effects.

11.4.3 After the Purchase/Consumption of the Tourism Experience

At this stage, firms aim to create positive post-purchase intentions to their customers, increase their loyalty and develop/enrich customer relations. Gamified applications aiming to help the firms to exploit the crowdsourcing effects for building a customer database and enhancing customers' loyalty include the following.

JetBlue uses gamification for converting its loyalty programme (TrueBlue) to a social loyalty programme by exploiting crowdsourcing in order to enhance customers' loyalty and engagement with the company as well as exploit their word of mouth for building its customer database. Its funware include the following game elements and motivational affordances: Trueblue members register on the JetBlue's Facebook page and when they check in at a JetBlue airport location with their mobile device, they earn 25 TrueBlue points; Travellers earn JetBlue badges when they tag a travelling companion; a location-based social media application (called Go Places) also allows users to gain loyalty points that can be exchanged for free services/upgrades and status privileges by checking into JetBlue places as well as by contributing content on the JetBlue Facebook page. In this vein, the gamified social loyalty programme generates and exploits crowdsourcing amongst the loyalty members for collecting website content (user-generated content), increasing customer loyalty and generating traffic and usage of its Facebook page (i.e. increase the online promotion and readership of its content).

Lufthansa has also created a gamified location-based social media application for rewarding customers for their repeat usage and purchase of Lufthansa flights as well as for exploiting them and generating crowdsourcing effects in promoting its firm and services to the online audience. The app (Blue Legends) connects frequent flyers by inviting them to virtually check in (to airports, lounges and Lufthansa flights through Foursquare flights) for getting points and badges. For example, passengers are rewarded with ranks and badges for regularly checking in virtually to Lufthansa sites. For example, users can become "Expert Pilots" on the routes they fly most frequently. Early risers who check in before 6 a.m. are awarded the "Early Bird" badge. Anyone who racks up more than 388,000 km with Lufthansa receives the "To the Moon" badge, travellers who check in most frequently to Lufthansa sites can become true "legends of the skies". Users can also share their journey/flight information and travel performance/scorecard with others via social networks. The combination of extrinsic rewards with social networks (that generate intrinsic motivation affordances)

supports positive crowd-in effects and provides the crowdsourcing of a great marketing exposure, brand awareness and repeat purchases.

11.5 Conclusion

The use of gamification for directing and motivating customers' behaviour and supporting crowdsourcing practices in marketing is increasingly spreading. This chapter reviewed the literature about gamification design for identifying the principles and elements that can lead to effective gamification and it then applied these principles by discussing various gamification applications developed for supporting tourism crowdsourcing marketing practices. It was shown that gamification can be used for crowdsourcing any marketing practice and influencing customer behaviour at any stage of the consumer behaviour process. However, as the literature does not provide any conclusive results regarding the impact of the various gamification design elements on marketing outcomes (e.g. brand recall, awareness and consumer attitudes and purchase intentions) (Terlutter and Capella 2013), further research is required in order to answer numerous questions such as What type of gamification design is most appropriate for which type of marketing practice and goal? What is the impact of the various gamification elements (such as playing frequency, congruity between brand and game design social interaction with peers, the rhetoric of the game) on the users' (conative, affective and cognitive) outcomes towards the brand and the game? What variable mediate the relation between game design elements and users' outcomes (e.g. users' cognitive capabilities, personality, game familiarity/experience, persuasion knowledge and susceptibility to advertising). Overall, to maximise the marketing effectiveness of gamification applications, more research is required in order to get more understanding on how to better match gamification design with the users' characteristics, marketing goals and gaming context.

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Chapter 12
Crowdsourcing: An Application of Promotional Marketing

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Abstract Groups are more creative than individuals; therefore, they also contain more knowledge, and this assumption represents the central principle of crowdsourcing. The term "crowdsourcing" is a contraction of the words crowd (a large number of people) and outsourcing (the use of external assistance or help). The crowdsourcing concept was popularized and clearly defined in a Wired Magazine article published by the American journalist Jeff Howe in 2006, and since then, it has been implemented in a wide range of industries. Nowadays, with the proliferation of the crowdsourcing practices, it has become necessary to clearly define what crowdsourcing really is and what its specific limits are. So, while there is not one unique way to categorize the crowdsourcing landscape, the most popular classifications done by experts and researchers on the subject classify crowdsourcing performances according to the task or labour performed, the features of the crowd or even the problem or task being solved. All in all, before launching any crowdsourcing initiative, it is important to determine what your ultimate goal is, and the answer to that question will help you decide which crowdsourcing model can maximize strengths and minimize weaknesses. Any crowdsourcing project turns into a promotion and marketing campaign, since the diffusion performed for the campaign, in order to be successful, should be managed in the same way as any marketing action would be.

Keywords Crowd · Knowledge · Marketing · Open innovation · Community · Market research · Problem-solving

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12.1 Crowdsourcing, the Power of the Crowd

The term "crowdsourcing" is a contraction of the words crowd (a large number of people) and outsourcing (the use of external assistance or help). Crowdsourcing (the process of using the help of a large number of people to get something done) is a word that was popularized and clearly defined in a Wired Magazine article published by the American journalist Jeff Howe in 2006, but the first crowdsourcing practices were applied as early as in the eighteenth century.

At that time, it was referred to as "the longitude problem". In 1714, the British Government was trying to find a solution for the difficulties in sailing that seamen were experiencing, with more than one thousand deaths per year. In the search for a solution, the British Government offered £20,000 as a prize for the person who could solve the problem. The contest was won by the son of a carpenter, who invented the marine chronometer, a striking fact for the aristocracy, but it represented a great example on how innovation and creativity can arise anywhere around us.

12.1.1 Definition

The official crowdsourcing definition was introduced by Jeff Howe and Mark Robinson in their article published in Wired Magazine in 2006. Howe proposed the following definition: "Simply defined, crowdsourcing represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call. This can take the form of peer-production (when the job is performed collaboratively), but it is also often undertaken by sole individuals. The crucial prerequisite is the use of the open call format and the wide network of potential labourers" (Howe 2006b). From the definition given above, it is clear that crowdsourcing activities are strongly linked to the development of the new technologies, especially to explore the opportunities offered by Web 2.0 technologies, which simplifies the communication and connection between large groups of dispersed individuals.

Three years later, Howe offered an updated definition in his new book "Why the power of the crowd is driving the future of business" (2009): "Crowdsourcing is 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".

Several other authors have also tried so far to develop a complete crowdsourcing definition; Brabham (2013) asserts that crowdsourcing is an online, distributed problem-solving and production model that leverages the collective intelligence of online communities to serve specific organizational goals. Taking other point of

views, some authors focus on the use of it as a way to outsource tasks (Oliveira et al. 2009) and others as a problem-solving process (Vukovic 2009) or even as a specific manifestation of open innovation (Sloane 2011). But the conclusion emanating from this type of actions always involves two parts: the person or company organizing the challenge and the crowd or group of people trying to solve it (see Appendix 1—Crowdsourcing concept definitions).

Let us consider how the theoretical crowdsourcing framework can be put into practice. A random company selects a task that it is currently being carried out by its own employees. Rather than continuously being performed by the employees, the company decides to outsource it to a crowd. This crowd is invited to perform this activity on behalf of the firm for a previously established reward or prize. An open call is launched, and anyone who is interested in developing the task is invited to complete it. However, some limitations can be established by the company regarding the characteristics or knowledge of the participants, depending on the objectives of requirements of the task. Then, the members of the crowd accept to undertake the task in a specific time allowance also previously given by the company. When the task is completed, it should be submitted to the firm through the platform established for that purpose. Many variations in the following steps exist. Sometimes, a group of experts evaluate the quality of the work done by the participants or it can also be only checked by the company and then released to the social networks where the participants themselves will evaluate its quality. Finally, the prize or reward will be given to the member or members who come up with the best solution to the task.

Therefore, crowdsourcing is a way of outsourcing not directed to other companies but to the crowd through an open call, commonly by the use of an Internet platform. As Whitla (2010) asserts, crowdsourcing defines a process of organizing labour, where firms parcel out work to some form of (generally online) community, offering payment for anyone within the "crowd" who completes the task the firm has set. Through outsourcing to a crowd rather than performing operations in-house, firms can gain access to a very large community of potential workers who have a diverse range of skills and expertise and who are willing and able to complete activities within a short time frame and often at a much reduced cost as compared to performing the task in-house (Howe 2006a).

12.2 Crowdsourcing Types

With the proliferation of the crowdsourcing practices, it has become necessary to clearly define what crowdsourcing really is and which its specific limits are. So, while there probably is no unique way to categorize the crowdsourcing scenery, the most popular classifications done by experts and researchers on the subject classify crowdsourcing performances according to the following four aspects.

12.2.1 Based on the Type of Task that Is Crowdsourced

The most popular classification categorizes crowdsourcing based on the type of task that is crowdsourced. Howe (2009) presented this approach in his book in order to classify crowdsourcing in the following four categories:

Crowdwisdom: The first type assumes that the crowd contains more knowledge than the individual. This type of practices uses people's knowledge in order to solve problems or predict future changes and help directly the company's development. Howe states that "Given the right set of conditions the crowd will almost always outperform any number of employees—a fact that many companies are increasingly attempting to exploit. The key lies in creating the conditions in which they will express their knowledge". Three subtypes of crowdwisdom practices can be distinguished:

- Crowdcasting: A complex challenge is raised and those who solve it are rewarded, such as those raised at the Innocentive platform.
- Crowdstorming: Online brainstorming sessions: the crowd is involved with reviews and votes as in the case of the Idea Jam platform by IBM.
- Market predictions: a community of private investors vote for several different alternatives according to the descriptive information provided, as in the case of Iowa Electronic Markets.

Crowdproduction: The second type and, perhaps, the best-known forms of crowdsourcing are "production" activities such as asking individuals to film TV advertisements or even performing language translation. In this case, the promoter of the initiative (crowdsourcer) outsources activities that require creativity effort from the employees in order to develop new products or services (a database or any user-generated content). Wikipedia or iStock is the most remarkable example of this type of practices.

Crowdvoting: The third type represents basically a free market research. Through the public's votes and feedback on any product or idea, companies can take advantage of the comments and improve their business. A typical example of this type of practices is Threadless.com, a T-shirt manufacturer that uses crowdvoting to decide which designs are finally sold on their Website. The key of this specific crowdsourcing practice relies on being able to organize vast quantities of information and transform it into useful data for strategic decisions.

Crowdfunding: This fourth type refers to the public's disposition to finance projects they believe in: funding independent films, microfinancing projects, etc. A certain amount of money is requested in exchange for a reward; MyFootballClub is a football club which, in return for an annual fee, investors decide on the selection of the players or the price of tickets. Being transparent about where money is really going is one of the most important tasks in this type of crowdsourcing activities.

12.2.2 Based on the Type of Labour Performed

The economic analyst Nicholas Carr (2010) categorized the crowdsourcing practices based on the type of labour performed by the crowd and how the members of the crowd collaborate between them. This categorization provides a better understanding of the different aptitudes possessed by the crowds and how they can be managed in order to perform a certain task. The following four types of crowds represent four alternatives on how the communities can work together.

- **Averaging crowds**: It basically works as a survey group, providing an average judgment about some complex questions that, in many cases, is more precise than the judgment of an individual. Some examples are the crowds behind prediction markets such as the Iowa Electronic Markets.
- **Datamine crowds**: A large group of people (usually without any knowledge about its members) produce a set of behavioural data that can be collected and analysed in order to gain insight into behavioural or market patterns. A good example is the crowd that feeds Google's search algorithm or Amazon's recommendation system.
- **Networking crowds**: A community that shares information through a communication system such as the phone network or Facebook.
- **Social production crowds**: A large group of individuals offer their individual talents to the development of some type of product or platform. Wikipedia or Linux is feed by social production crowds.
- **Transactional crowds**: A group of people coordinated mainly around point-to-point transactions. A representative example is eBay.

12.2.3 Based on the Problems that Crowdsourcing Is Trying to Solve

According to Brabham (2013), a precise segmentation of crowdsourcing practices should be focused on the kind of problem an organization wants to solve when it turns to a crowd. His segmentation is in fact based on the type of problems that crowdsourcing is best suitable to solve:

- **Knowledge detection and management**: A crowd is asked to gather information, organizing it in a standard format and reporting problems, for example Peer-to-Patent or SeeClickFix.
- **Distributed human intelligence tasking**: Suitable for data processing, large data packages are decomposed into small tasks requiring human intelligence, and individuals in the crowd are compensated for processing pieces of data. It requires monetary compensation as a motivator; Amazon Mechanical Turk is the perfect example.

- **Broadcast search**: A crowd is asked to solve experiential problems. It is suitable for scientific challenges such as the Innocentive platform.
- **Peer-vetted creative production**: The organization asks the crowd to create and develop creative ideas. The Doritos contest represents a great example of peer-vetted productions.

12.2.4 Based on the Motivation to Participate

Finally, Martineau (2012) proposes a crowdsourcing categorization based on the motivations that drive the crowds to participate in crowdsourcing initiatives. According to his proposal, four types of crowd members can be established:

- **Communals**: Members of this first group incorporate the crowdsourcing community's group-based identity into their social self. Furthermore, they develop cultural and social capital through presumption.
- **Utilizers**: Members of the second group, utilizers, improve their skills through participation and, consequently, creating cultural capital.
- **Aspirers**: Members of the third group, aspirers, do not create content, but rather participate in the selection of the content. They aspire to be perceived as a "stereotypical" member of the first two groups.
- **Lurkers**: The ones who simply observe. This group is composed of individuals who participate in crowdsourcing solely by browsing.

According to the above different classifications, it is important to remark that when it comes to select the most suitable crowdsourcing solution, a holistic approach should be adopted in order to take into consideration all the key factors.

12.3 Basic Crowdsourcing Principles

Before launching any crowdsourcing initiative, it is important to determine what your ultimate goal is. The answer to that question will help you decide which crowdsourcing model can maximize strengths and minimize weaknesses. Crowdsourcing provides opportunities for emerging talents that otherwise would be impossible to access. Any crowdsourcing project turns into a promotion and marketing campaign, since the diffusion performed for the campaign, in order to be successful, should be managed in the same way as any marketing action would be. Therefore, some of the key issues when implementing any crowdsourcing initiative are as follows:

- **Choosing the right crowd**:
  Choosing the appropriate crowd size is a decisive step when designing a crowdsourcing initiative. On the one hand, if the size of crowd is too big, the

amount of obtained data could also be disproportionate, making it too difficult to organize and process it with the available resources. Spending too much time reviewing the proposals would affect the daily organization routine. On the other hand, if the crowd is too small, the results could be poor and unsatisfactory, so that the essence of crowdsourcing would be lost.

But it also needs to be the right people; this task is also related to choosing the right crowdsourcing model. If you are creating a service in which sports teams can tap the best performance for their aggregated wisdom, a crowd of ten thousand scientist will not be much good (Howe 2009).

- **Offering the correct incentives**:
  The project participants (crowdworkers) can get a zero reward when a single individual of the crowd gets the reward or a much reduced reward if all individuals get a reward (Amazon Mechanical Turk). However, getting people involved requires understanding what motivates them to contribute. People might freely donate their knowledge and labour to a NGO, but feel far more hesitated about spending that energy or money to benefit a start-up. The crowd is really smart, and if it thinks you are trying to take advantage of its effort, it will never come back.
- **Keeping it simple**:
  The need to keep procedures simple is not because people are senseless, but because they are quite busy. Keeping the nature of tasks simple ensures meeting the basic standard of quality for a diverse crowd. Through clearness and simplicity, the probability of getting the crowd involved in your initiative increases considerably.
- **Thinking about the crowd**:
  Crowdsourcing works best when an individual or company gives the crowd something it wants (Howe 2009). People participate in this kind of initiative because some psychological, social or emotional need is being met. And when the need is not met, they stop participating. If iStockphoto had approached community by trying to create a low-paid workforce of amateur photographers, it would have failed. Instead, they created a place where photography enthusiasts could share and critique one another's work.

  Finally, there is no real guarantee that the resulting creation meets the expected quality. In 2010, a BP oil crowdsourcing initiative launched immediately after the dramatic episode in the Gulf of Mexico in order to find possible solutions to eliminate the effects of the oil spill on the environment, never reached any effective solution. More than 120,000 contributions were received through the online platform. At first, it seemed good news to get as many ideas as possible, but only 30 of them were finally implemented and unfortunately no one succeeded in achieving their goal. A successful crowdsourcing project requires time, effort and extensive planning in order to obtain the maximum benefit from the information provided by the crowd.

12.4 Crowdsourcing Success Stories: An Implementation of Promotional Marketing

12.4.1 Lay's

Lay's is a snack food brand founded in 1938 in Nashville (Tennessee), owned by PepsiCo Inc., the world's second largest food and beverage company. In Spain, the brand operates through PepsiCo Iberia and more specifically through PepsiCo Spain Foods business division, selling chips, potato and cereal snacks, gazpacho, juice and nuts under such iconic brands as Lay's, Matutano, Cheetos, Ruffles, Doritos, Sunbites, Alvalle or Tropicana Pure Premium.

In 2011, Lay's launched in Spain its successful campaign "Casting of Flavours" ("Do us a flavor" in USA), an innovative campaign that represented a turning point for the fast-moving consumer goods (FMCG) market and its relationship with consumers. The purpose of the brand was to create the foundations for a revolution in the snack food market, making a significant change in the media, on the supermarket shelves and through the network and sales in order to enhance and strengthen the relationship with consumers (PepsiCo 2011).

The campaign was based on a contest in which the person who proposed the most original flavour could win 20,000 euros and 1 % of the sales of that snack flavour for a year in Spain. It was a new flavour created by and for the Spanish public. The promotion was accessed through the following links: www.facebook.com/CastingdeSaboresLays and www.lays.es (Fig. 12.1).

The "Casting of Flavours" campaign started in April 2011 and concluded in December of that year. The contest consisted of three phases: the first phase was the call for flavour proposals from the Spanish public; the second one involved the

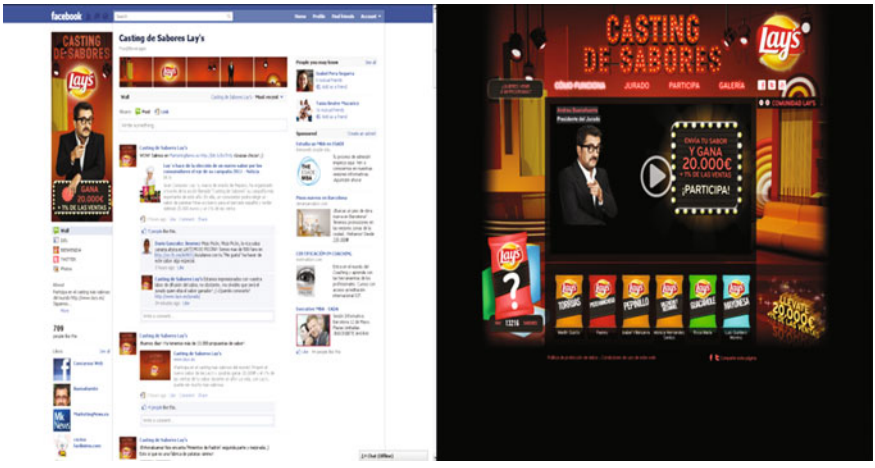

Fig. 12.1 Lay's promotion. *Source* lays.es

Fig. 12.2 Casting of Flavours. *Source* PepsiCo (2012)

selection of the three finalist flavours by a multidisciplinary jury; and finally, the third one included the vote on the winning flavour by the general public. It is worth noting that in just 10 days, 14,600 flavour proposals were uploaded on the Website of the company, achieving over 1000 new fans on Twitter. In addition, there were over 30,000 views of the uploaded videos on the YouTube channel (PepsiCo 2011).

The successful "Casting of Flavours" campaign concluded with the announcement of the winning flavour: Garlic Prawn Lay's, the new and innovative Lay's flavour in Spain during 2012. Garlic Prawn Lay's were chosen from over 350,000 proposals received by the company and they were sold in limited edition along with Bravas and Kebab Lay's, the other two finalist flavours (PepsiCo 2012) (Fig. 12.2).

As a result of the "Casting of Flavours" campaign, Lay's gave voice to the consumers through an innovative participation format, an exceptionally talented demonstration where it was the public who proposed and decided the new Lay's flavour in Spain. Lay's moved all the attention to its consumers, and at the same time, an innovative communication channel was created.

12.4.2 Doritos

The Doritos brand, also owned by PepsiCo Inc., employs crowdsourcing techniques through inviting their fans to design the brand's advertisements. Each year, the participants, each in its own distinctive style, are asked to create a 30 s advertisement as original and attractive as possible showing their love for Doritos.

For the ninth consecutive year, Doritos has launched the contest that captures the attention of half of the world before and during the Super Bowl. After selecting the ten finalist ads, two of them are released during the Super Bowl: one is chosen by consumers worldwide who vote via the Doritos' Website (www.doritos.com) and the other is chosen by the Doritos brand. The creator of the final advertisement with

Fig. 12.3 Crash the Super Bowl. *Source* Doritos.com

the highest number of total votes receives the impressive prize of one million dollars and he or she also has the "opportunity of a lifetime" of working at Universal Pictures, where he or she could be working first hand with writers, directors and producers of the actual entertainment industry that forms Hollywood's core. Working at Universal Pictures, the winner could experience the daily working routine of this remarkable film studio and also having the significant the opportunity of learning sharing creative talents for a wide variety of projects (Fig. 12.3).

In 2013, Doritos broke down all barriers with the campaign "Crash the Super Bowl" allowing not only US citizens to participate in the contest but also participants from Canada, Australia, Denmark, Israel, South Africa, Mexico or China, among many other countries. Therefore, the annual competition was opened to participants from the 46 countries in which these snacks are sold, allowing the brand to obtain higher-quality and more diverse proposals. A total of 5400 new entrants from 30 countries participated in 2013 after opening the competition to fans from the participating worldwide countries.

Viewers and followers can participate not only in creating advertisements but also in voting for their favourite spots, allowing the best ones to reach the top of the list of the most popular ads (Marketingdirecto 2011a, b).

Since the "Crash the Super Bowl" campaign was first introduced, the Doritos brand has received over 27,000 advertisements created by its consumers, and the winning ads are constantly ranked among the most memorable and notorious Super Bowl advertisements. Through "Crash the Super Bowl", Doritos is offering an unprecedented opportunity to his fans from all over the world to share their talent and creativity in one of the largest and most important advertising platforms in the world (PepsiCo 2013).

12.4.3 LEGO CUUSOO

LEGO is an emotional brand, a "lovemark" for many people; consumers are emotionally engaged to LEGO as it is related and reminds them of their childhood (ICEMD 2012). The brand has created so strong intergenerational links that influence purchasing behaviour: people want their children to experience the most pleasurable play experiences they remember from their own childhoods.

In 2003, faced with the prospect of closing due to the excessive loss of money, LEGO decided to start developing its digital transformation: they redesigned their future prospects, they simplified their plastic bricks production tasks, and they also focused their strategies on people. For a number of years now, LEGO is considering consumers as the fundamental pillar for innovation in their brand (Vila 2013).

Until January 2012, LEGO maintained the Lego Design ByMe initiative, a program where users were able to design their model on the computer and then buy it with its own LEGO box. That initiative allowed the reinvention of a traditional offline brand into a virtual brand, as the product was computer-designed and it was also now adapted to the digital stage (ICEMD 2012).

From 2008 until 2011 in Japan exclusively, and from April 2011 worldwide, LEGO launched the campaign LEGO CUUSOO (in Japanese means "desire") (the union of CUUSOO Systems and LEGO Group), a crowdsourcing platform that enables users to propose their ideas and to develop potential products (Fig. 12.4).

On the platform, users create their own page to highlight their ideas and share them with the aim of achieving the maximum possible support. A form should be filled attaching the images of the idea proposed and it can be a photograph of a building that has been made with plastic blocks, a design made with LEGO software, or a descriptive sketch of the idea. The description and the labels should also be included. During the voting process, fans also set the price they are willing to pay for the product.

Fig. 12.4 LEGO CUUSOO. *Source* Gustafsson (2014)

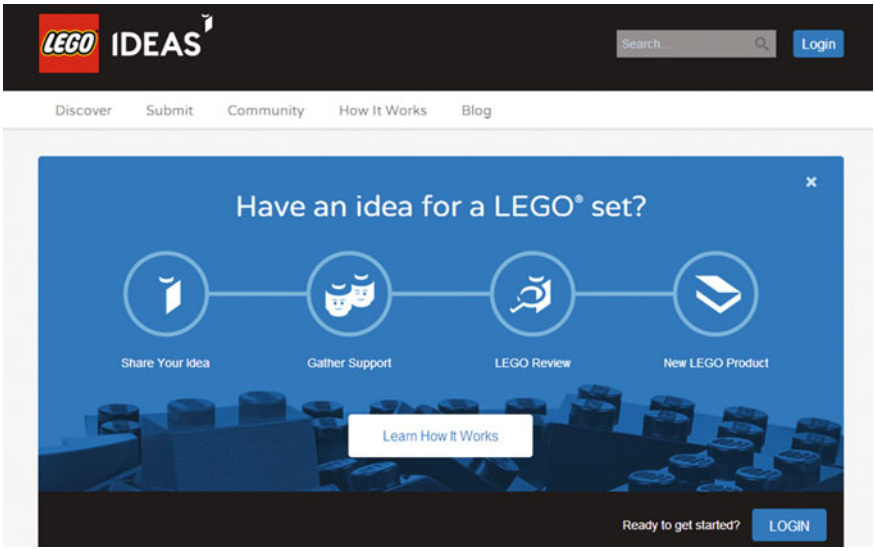

Fig. 12.5 LEGO Ideas: *Source* Lego Ideas (2014)

Every project must have the support and vote of 10,000 followers (pass mark) in order to be considered by LEGO in its quarterly review to examine whether it becomes an official LEGO product. If the project is selected, the design goes into production as part of the countless family of LEGO products. The creator of the design gets 1 % of net sales of the product (ICEMD 2012).

Lego is a pioneer company in developing open innovation techniques. In late 2013, the company already had about 5500 proposals in LEGO CUUSOO, from which many varied and successful projects have been developed (Vila 2013). As a consequence of the success, the company decided to integrate more closely the concept CUUSOO in the LEGO experience, and they created what is now known as LEGO Ideas (Lego 2014). LEGO therefore concentrated its efforts on its consumers, with an initiative that goes beyond collaboration and empowerment of users (Fig. 12.5).

12.5 Conclusions

Nowadays, it is fundamental for companies to be open to methodologies or techniques based on open innovation, as through consumer collaboration initiatives, a positive effect on businesses' evolution and success is ensured.

This relevant change involves moving from a traditional model where ideas come from within the company, to another one in which crowdsourcing represents the central pillar providing countless advantages. Among them, we should point out

brand update, improving the performance of innovation processes, increasing creativity in the organization, offering a more personalized offer, more satisfied and loyal customers or easier identification of new talents, among many others.

Therefore, crowdsourcing represents how the knowledge of a community can be decisive to achieve feats that were before the responsibility of a few specialized ones. The crowd is talented and creative, and this emerging phenomenon can be used for the completion of marketing-related tasks, concentrating the efforts on product development, advertising, promotion and market research.

When planning any crowdsourcing initiative, it is essential to clearly define its main objective. A precise description of its context and the expected results will allow the company to select the most suitable crowdsourcing model according to its needs, ensuring at the same time meeting the basic expected standard.

Crowdworkers are now decisive agents for brand development, having great impact on companies worldwide. Therefore, businesses must reverse the thinking that normally goes into employee relationships. Keeping always in mind that if they think you are trying to take advantage of their effort, they will never come back.

Appendix 1 Crowdsourcing Concept Definitions

Author	Definition
Howe (2006a, b)	"Simply defined, crowdsourcing represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call"
Howe (2009)	"Crowdsourcing is 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"
Brabham (2013)	"Crowdsourcing is an online, distributed problem-solving and production model that leverages the collective intelligence of online communities to serve specific organizational goals"
Oliveira et al. (2009)	"A way of outsourcing to the crowd tasks of intellectual assets creation, often collaboratively, with the aim of having easier access to a wide variety of skills and experience"
Vukovic (2009)	"A new on-line distributed problem solving and production model in which networked people collaborate to complete a task"
Sloane (2011)	"One particular manifestation of open innovation. It is the act of outsourcing a task to a large group of people outside your organization, often by making a public call for response. It is based on the open source philosophy, which used a large 'crowd' of developers to build the Linux operating system"
Whitla (2010)	"Crowdsourcing defines a process of organising labour, where firms parcel out work to some form of (normally online) community, offering payment for anyone within the 'crowd' who completes the task the firm has set"

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Chapter 13
Advances in Crowdsourcing: Surveys, Social Media and Geospatial Analysis: Towards a Big Data Toolkit

Steven Gray, Richard Milton and Andrew Hudson-Smith

Abstract The collection, mining and analysis of social media are arguably one of the core examples of "big data" sets for the social sciences. The dynamic nature of the media makes it a new and emerging base for the analysis of human behaviour and brings new opportunities to understand groups, movements and society. Analysing the results of billions of conversations has already revolutionised marketing and advertising. However, these datasets, by their very nature, are complex, time-consuming and computationally difficult to analyse. We put in place a series of examples to utilise such datasets with a view of exploring non-complex workflows via the use of new toolkits, linking into data collection via the crowd and opening up systems for analysis.

Keywords Crowdsourcing · Geospatial · Toolkit · MYSQL · Mapping · Geographic · SurveyMapper · MapTube · Tweet-o-Meter

13.1 Introduction

A key method to process large datasets is to outsource basic analysis to human volunteers and, in some cases, large groups, to help process this data by manually identifying patterns, features or interesting events within the datasets. This process has been called "Crowdsourcing", first coined in the article "The Rise of Crowdsourcing" (Howe 2006b).

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"Simply defined, crowdsourcing represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call. This can take the form of peer-production (when the job is performed collaboratively), but is also often undertaken by sole individuals. The crucial prerequisite is the use of the open call format and the large network of potential laborers" (Howe 2006a).

Crowdsourcing in the realm of a read/write Web (known as Web 2.0) is the process of collecting individual actions that can be aggregated together to create a collective result (Hudson-Smith et al. 2009). Projects such as Galaxy Zoo (Sloan Digital Sky Survey 2010) have had notable success with this process for astronomical datasets from sensors collecting data from sunspots to radar images from distant galaxies. Members of the public have successfully identified candidate galaxies in different solar systems through these highly specialised, custom-built systems by splitting up huge datasets into small pieces, a process that would take traditional forms of research a number of years to analyse. These crowdsourced systems have proven to be extremely important as the amount of data collected has increased due to the rise of real-time sensors and live streams of situational data that make up the deluge of data available today (Demarest 2011).

However, many crowdsourced projects suffer from a lack of users or simply not enough members of the public willing to help through other means, such as lack of exposure or a poorly designed interface. Good exposure of a project is vital to getting users to contribute data and, more importantly, getting users to join the community. Crowdsourced projects need a crowd—so that new data are being generated, processed and outcomes obtained.

Services such as Amazon's Mechanical Turk (Amazon 2011) and those such as Solar Stormwatch (Zooniverse 2009) use volunteers who are either interested in the subject matter or offer some sort of financial reward to entice users to use these services. Users in the Mechanical Turk ecosystem offer a price per action, a Human Intelligence Task or HIT, for a worker, to carry out an action such as categorising an image or translating a passage from one language to another (Ross et al. 2011). If the worker is qualified to carry out the HIT, then after completion, their associated Amazon account will be credited by an amount from $0.02 for a simple task up to $20 for a more complicated task. This is one way to get users to carry out tasks, but puts up barriers to research, as many projects cannot afford to provide monetary compensation to users.

Researchers have explored these rich datasets of social information available through the open APIs as a by-product of the rise in popularity of social media services. Twitter officially released an interface to the data for the service 6 months after their initial launch due to the number of third-party developers creating applications from Twitter data by automatically "scraping" pages of data rather than using a machine readable API (Stone 2006).

In this chapter, we will document the various experiments and toolkits created at the Centre for Advanced Spatial Analysis (CASA) for crowdsourcing data and look to the future of crowdsourcing using modern computing techniques to automate collection. The first such example we explore is SurveyMapper.

13.2 SurveyMapper

Collecting data on a global scale require outreach beyond the traditional methods. Traditionally, services are built from the ground up to support the collection of data for specific needs rather than a general need for many users. In late 2009, CASA was approached by the BBC to carry out a real-time survey for broadcast exploring the anti-social behaviour around the BBC Look East region (Norfolk, Suffolk, Essex, Cambridgeshire, Northamptonshire, Bedfordshire, Hertfordshire and Northern Buckinghamshire, UK) using the popular MapTube platform, allowing the visualisation of both survey and geographical data. At that time, few, if any, technologies existed for collecting real-time crowdsourced data in this fashion and so a bespoke application built on top of MapTube was created that allowed a single survey to be carried out with the results updated every 30 min. This survey resulted in 6902 responses overall with an average of 1340 results generated after broadcast over 3 evenings. MapTube was developed as part of the Generative e-Social Science project (GeNESIS). It provides a dynamic API (called MapTubeD) to render data into raster tiles and the ability to create and clear tiles on request. As a user provides a response to a survey, the system updates a database of responses and alerts the MapTubeD system to fetch a new datafile. When the map is next requested on the page load, the new raster files are downloaded from MapTubeD and placed on top of the survey map. These requests appear transparent, and the complexity is abstracted away from the user who only sees an updated map of responses in real time. It became apparent after the BBC survey that there was a need for this type of generalised platform and this bespoke project became the genesis of SurveyMapper.

The application, defined as “SurveyMapper”, is a platform, which allows users to set up their own surveys and collect geographical locations from participants along with their views on the survey (Fig. 13.1). It was specifically created to tap into the crowd and visualise the results not only geographically but also in near real time. To set up a survey, users are asked to provide some metadata about the survey such as a title, description, keywords for searching, and start and end date along with the questions they want to ask participants. What makes SurveyMapper different to other platforms, such as Survey Monkey, is that a survey is tied to geographical boundary areas and visualised as a choropleth map of responses to a particular question. There are seven possible geographical types a user can select to visualise data: countries, US zip codes, UK postcodes, EU countries, US states, UK counties, London boroughs or London electoral wards. In addition to these geographical areas, there are 2 point-based visualisations that users can select to provide locations to responses: a latitude/longitude marker that is placed on the map and a heat map visualisation. Tens of thousands of inputs can be collected quickly, providing a near real-time view of research questions, instead of the 30-min delay of the original MapTube system. The data and subsequent visualisation are updated immediately. Data can be exported later for more rigorous analysis or integration with existing datasets.

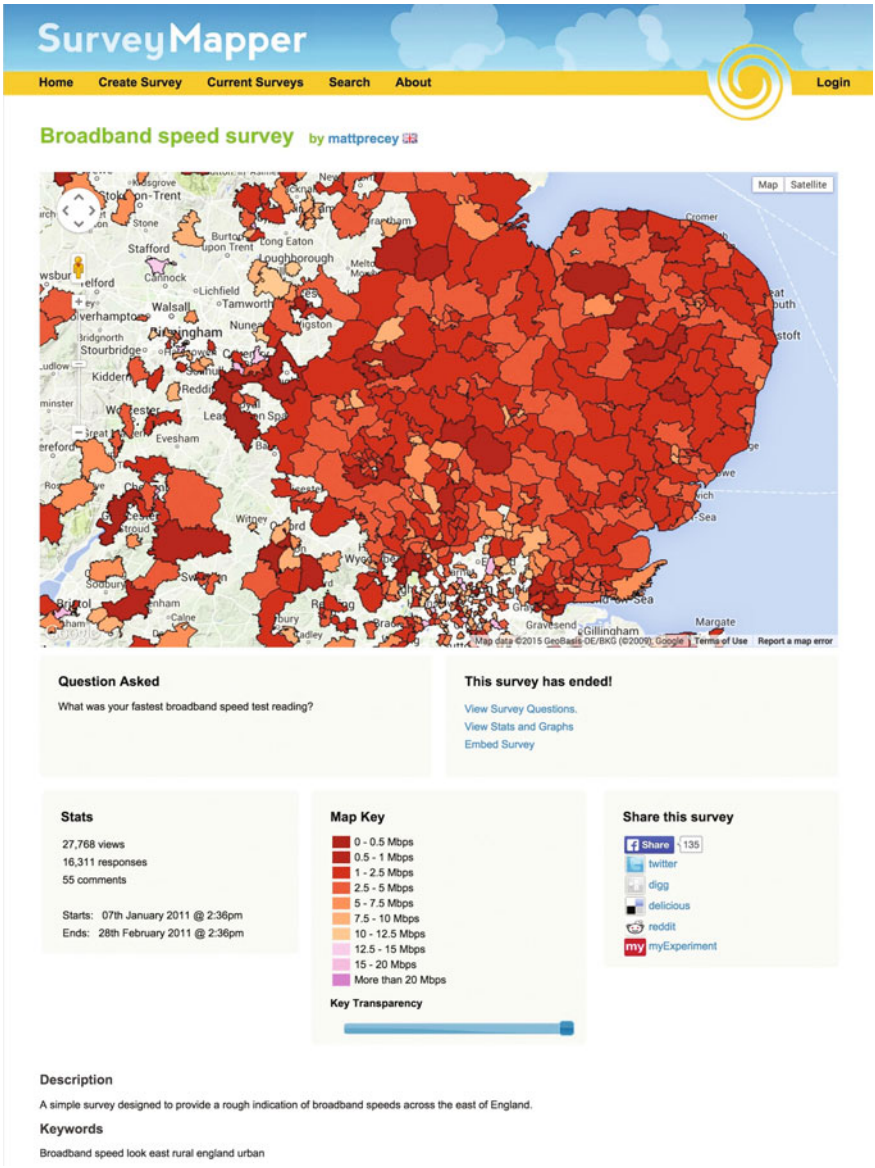

Fig. 13.1 SurveyMapper Survey-Broadband Speed Test January 2011. *Source* own

SurveyMapper can also be extended to provide custom visualisations for surveys that need specific and specialised information capture. The Greater London Authority approached the SurveyMapper team to help carry out a safety survey of parks around London. They wanted to ask users of the park, "How satisfied or dissatisfied are you with the quality of your local parks and green spaces?" through

12 questions that probed citizens' views on their local park. The issue with this type of survey is that citizens do not necessarily know the name of the local park, which is held by the GLA. By adding a London park dataset, sourced from green spaces data on OpenStreetMap to the MapTube rendering system, we were able to customise the experience of SurveyMapper to allow users to select their local park by dragging a pin around the Greater London area and dropping the pin on a parkland area. When the pin was dropped on the map, the name of the park was populated automatically and submitted to the database with the remainder of responses. At the end of the survey, the GLA downloaded the individual and aggregated data of responses and were able to integrate the data with their own internal datasets.

SurveyMapper was built with 2 specific purposes: to provide social scientists with a series of online tools to collect and visualise data in near real time allowing the creation of "mood maps" linked to a backend geographic information system, and to remove the traditional academic look to scientific software services. SurveyMapper achieves the latter by "skinning" the application and focuses on usability by removing the complexity and the science of the software from the user. Throughout the Web application, users are presented with a fun and bright design (Fig. 13.2), which incorporates the mascot "Roger the Giraffe", named after Roger

Fig. 13.2 SurveyMapper home page—non-academic branding, Roger the Giraffe mascot. *Source* own

Tomlinson who is commonly acknowledged as the "father of GIS" (Greiner 2007). This design decision was taken early on in the process of creating SurveyMapper to give the system a look and feel more akin of a Web 2.0 project rather than a scientific academic project.

As users set up a survey, they are encouraged to share the survey on social media platforms as we have found the most successful surveys on the platform use social media to reach participants. The system provides short URLs and custom links too as well as links that allow users to embed surveys on personal Websites and share with social networks such as Facebook and Twitter. The system also allows users to comment about individual surveys and to promote discussion on the platform about results of surveys. Collecting this data allows research into and users of the application to flag up interesting results within the dataset. To date, more than 500 surveys have been created with a combined total of 152,310 responses and 210,000 views in the first 5 years of SurveyMapper being available to the public.

During October to December 2008, CASA ran a survey to gauge the public response to the proposed congestion charge in Greater Manchester. This asked the question:

If you have an interest in how the £2.7 billion plan to reshape Manchester's transport system will affect your neighbourhood then here's your chance to add what you think to an interactive map of the region. This online collaboration between BBC Manchester and experts at the University of Manchester will give a unique picture of how well the proposals are going down across the northwest. Simply select one of the options listed below, enter your postcode and click on the submit button.

MapTube will include your answer in the next new map.

"If a congestion charge was brought in would you:

Drive and pay the charge?
Drive at different times?
Use public transport/motorbike/bicycle?
Work or shop elsewhere?
Not Affected?"

This resulted in a total of 15,902 responses during the three-month period with the final data are represented in Fig. 13.3.

Due to the politically sensitive nature of the issue and the fact that there were a number of pressure groups who opposed the congestion charge, the 45 % of people responding "Work or shop elsewhere" is perhaps not that surprising. This also highlighted the major problem with crowdsourced surveys, because certain members of the general public were deliberately submitting large numbers of responses in an attempt to manipulate the survey. This was something that was expected and is relatively simple to filter out the data.

By selecting and counting duplicate IP addresses and then mapping the data by postcode sector, the map (Fig. 13.4) clearly shows "OL8" and "M31" with many more responses for "Drive and pay the charge" than any other postcode. Our only explanation for this is that somebody was trying to make the predominantly blue

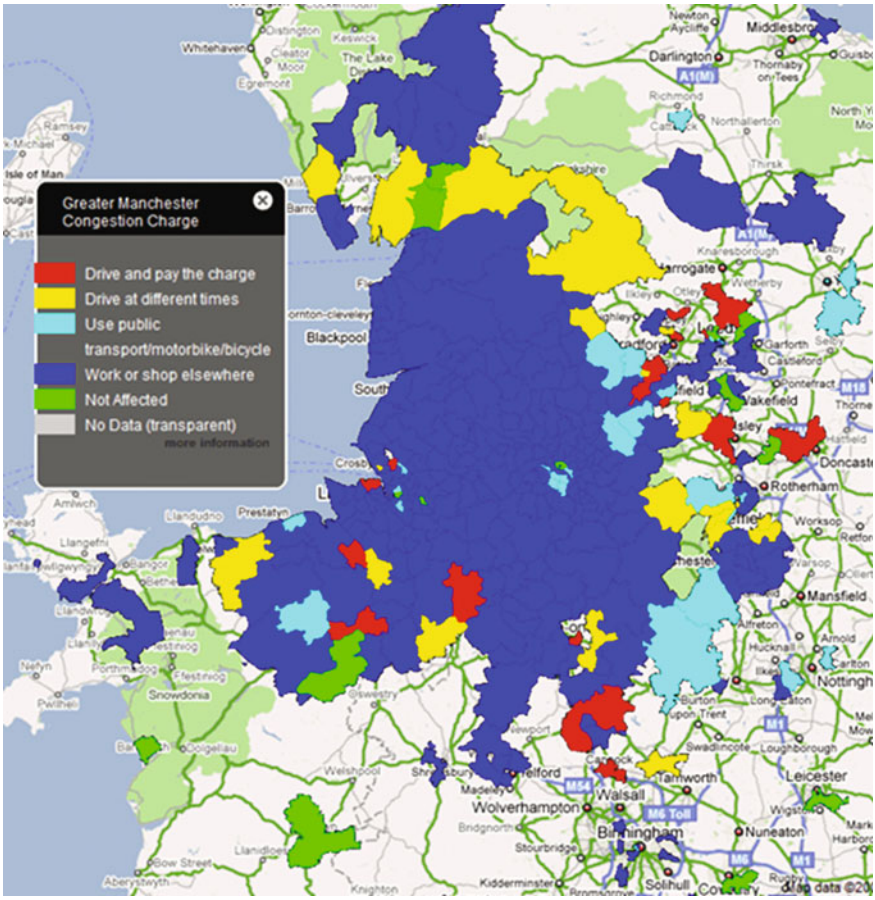

Fig. 13.3 Greater Manchester Congestion Charge Survey—live map can be viewed at the following link: http://www.maptube.org/map.aspx?mapid=239. *Source* own

map turn red for his or her own postcode. Geographic density of responses is an important issue with georeferenced surveys, as the non-uniform nature of the responses needs to be taken into account when analysing the data.

SurveyMapper has preventions built into the core of the system to prevent users, as well as identifying, from gaming the system and adding extra responses to a survey. By default, each survey only allows a single IP address to vote on a survey. If a user is logged into the system, their response is logged and the interface will prevent the user from viewing the "Enter Response" page. As SurveyMapper also allows users to vote from embed surveys, third-party apps that implement the SurveyMapper API as well as users who are not logged in, extra precautions have been implemented to detect irregularities in patterns of response. A database table of all responses, which serves as a time series master list, is checked nightly for patterns of burst activity in the remote chance that a user has defeated the response

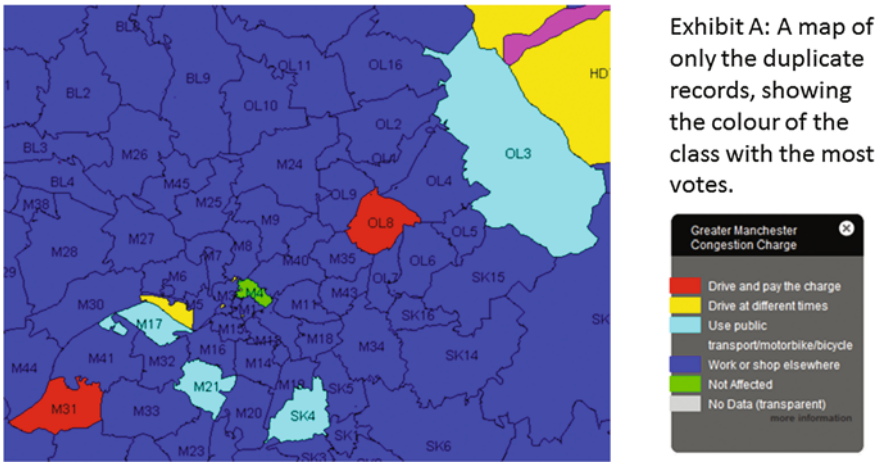

Fig. 13.4 Selecting only the data for IP addresses which were used more than once reveals some interesting results. Further analysis shows hundreds of responses entered for "M31" and "OL8" from two addresses. *Source* own

lockout event. Surveys that are currently live maintain a count of individual responses for each individual question as well as a value that is visualised on the map. As soon as a survey ends, a transient table is created and the results are rebuilt from the master list removing any responses that seem suspicious. This table is then archived to save space on the server and to speed up responses to the survey for future visits. This method of validation ensures that the results returned to the user, via the direct data download, have been checked for accurate survey results that have been provided to the survey creator.

13.3 Tweet-o-Meter

While exploring use cases of the SurveyMapper system, the team identified that to promote usage of the platform outside the Website, an API would be needed to submit responses to surveys from third-party applications and that allowing users to quickly submit responses without visiting the main SurveyMapper Web application. Twitter, a social media platform, that enables users to send messages of 140 characters or less proved to be the best solution to allow users to quickly respond to a survey. It was envisioned that a user would learn of a survey from posts within their social network and be able to submit a response by either retweeting a post, the process of sharing a tweet with your own network, or creating a post with the survey id and the response value.

This method of posting real time using tweets was popularised during the winter of 2010 when the UK experienced an unusually prolonged spell of severe cold weather that resulted in heavy snowfall (Met Office 2011). Twitter users started to organically

share regional snow reports throughout the UK in real time by rating the current snowfall on a scale from 0 to 10 and including the first half of their postcode within the tweet. As this trend started to spread, various Websites appeared mapping the real-time results on top of online maps. One such Website was UK Snow Map (Marsh 2014) created by Ben Marsh, a freelance Web developer. At the same time, the team at UCL CASA started to experiment with collecting the UK Snow tweets from Twitter and mapping them using the choropleth mapping technique used for SurveyMapper.

Figure 13.5 shows the total number of tweets collected during January 2010 when some of the heaviest snowfall was taking place. Of all the tweets collected, 36.4 % included a postcode ("Steady heavy snow in Chesham HP5 #uksnow"), while 28.8 % included a postcode and an amount ("#uksnow SG10 3/10"). This exposes a basic problem with this type of crowdsourcing, because not everybody has the same opinion about the amount of snow. One person's 5/10 might be another person's 8/10, depending on where they live in the country and how much snow they are used to. Using the synoptic data from the Meteorological Office, the reported depth of snow in centimetres was compared with tweets in the same postcode, leading to the conclusion that there was no measurable correlation between the two (Fig. 13.6). However, when looking at the general question of whether there was any snow in the area, the crowdsourced data compared more favourably with the official Met Office snow amounts.

Twitter exposes the data stored within the system via two authenticated APIs: the Streaming and the Search API. The Streaming API allows developers to make a connection with the API and receive updates automatically as they happen. A persistent connection is made to the API endpoint, and data are fed to the third-party program when a user sends a publically available tweet. The Search API requires a third-party program to request the data from the API endpoint repeatedly over a period

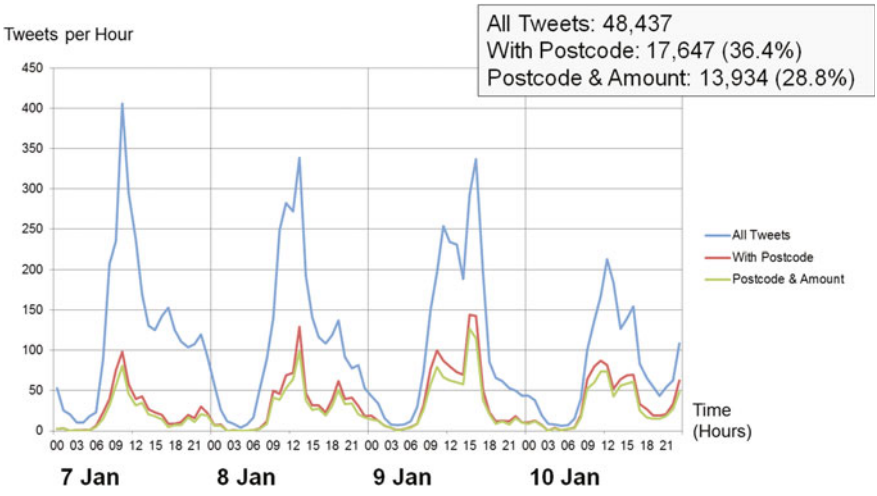

Fig. 13.5 Tweets collected from UK geoboundary during 2010 snowfall. *Source* own

Fig. 13.6 Data for 6 January 2010 12Z, the map on the *left* shows postcode sectors where there is snow on the ground using the Meteorological Office data. The map on the *right* shows the #uksnow counts from Twitter. *Source* own

of time. As the data are requested, the API returns the last available tweets (up to a maximum of 100 tweets) depending on the search query passed to the API. By making multiple requests over a period of time and tracking the last message collected, the third-party application can build a subset of tweets over time. The API serves tweet data in 3 different capacities: the Firehose, the Garden Hose and the Spritzer. The FireHose represents an unfiltered, raw feed of all tweets globally for the search query provided. The Garden Hose is a 10 % sample of all tweets queried, and the spritzer represents a 2 % statistical sample of data. Both the Firehose and Garden Hose require prior agreements with Twitter for access, which is assessed on a case-by-case basis; therefore, the spritzer feed is commonly used by third-party applications. Unlike the Streaming API, the Search API is rate limited by the number of requests within a period of time. At the time of development (2010 version 1 of the API), this limit was undocumented, but through experimentation was calculated at around 350 requests per hour. As per version 1.1 of the Twitter API, this rate limit has been extended to 180 requests per 15-min period—720 requests an hour.

During the experimentation phase with SurveyMapper and the Twitter API, we started archiving and storing the tweet and relevant metadata returned from the API using several machines inside the laboratory. Each machine ran several processes to collect data from the Search API asynchronously and aggregated the data within a central data repository for analysis at a later date. Automating the data collection between multiple distributed machines in this fashion, we were able to collect more than the 2 % sample provided by the Streaming API. A central visualisation was created to monitor and control the individual machines' collection, as each machine was located in different physical locations around the laboratory.

Tweet-o-Meter is a visualisation of 16 real-time gauges monitoring the rate of activity of individual tweets geolocated 30 km from the administrative centre of 16 cities around the world, focusing on New York, London, Paris, Munich, Tokyo, Moscow, Sydney, Toronto, San Francisco, Barcelona and Oslo (Fig. 13.7). The first candidate cities were chosen based on the first line of chorus to the song "Pop Musik" by band M ("New York, London, Paris, Munich, Everybody talk about pop musik.") This served to ground the project into popular culture to attract users to view and use the site. The visualisation also serves a secondary purpose as a visual indicator of multiple processes on a given machine's output over time. Each gauge monitors the aggregated rate of tweets, or tweets per minute (TPM), in a given city, and the value is updated in real time.

Having multiple processes, mining data on separate physical hardware yielded approximately 12 million tweets over 3 days of collection (Weekend Friday–Monday) for a 30 km radius around London. Two separate categories of geocoded data were returned from the API: public tweets that were geolocated from a device capable of determining location (e.g. smartphone with GPS sensor) and tweets that have been positioned by reverse geocoding the location from a user's profile location. It is important to note that these tweets were flagged as publically available tweets by the creator which allowed the geolocation of a tweet to be shared with third-party applications. Through experimentation and various collections at differing times, it was found that that approximately 2 % of all tweets in a 30 km radius had detailed latitude/longitude coordinates associated with a tweet.

Using this, collection method allowed the system to successfully experiment by collecting responses for surveys created within SurveyMapper. By mining tweets for the hashtag #5Acts4wildlife, the 5Acts4wildlife campaign aimed to

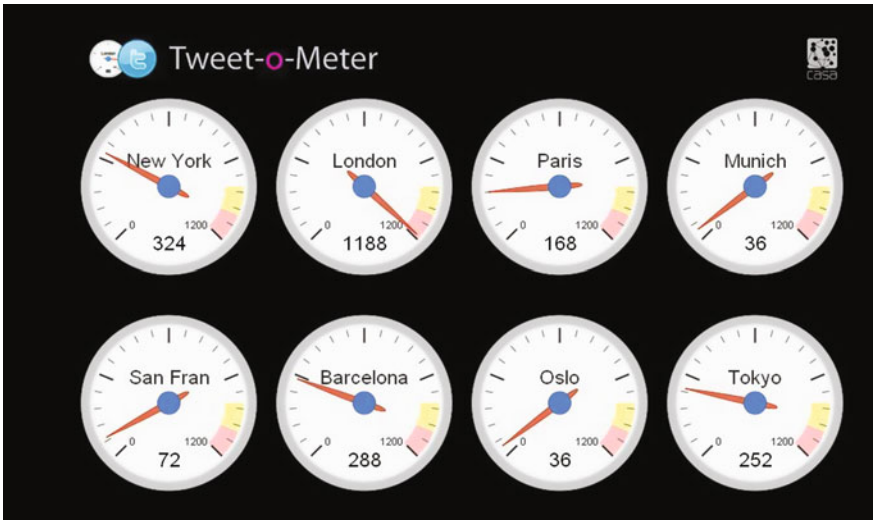

Fig. 13.7 Tweet-o-Meter real-time gauges for 8 cities. *Source* own

crowdsourced opinion on 5 campaigns that affect wildlife during a single week in January 2011. Due to the resource-intensive nature of setting up collectors to mine data for a specific survey, this process was set up manually to feed data to SurveyMapper, but recent advances in cloud computing now allow clusters of virtualised hardware to be set up automatically to mine data from Twitter and collect response data.

Tweet-o-Meter has featured on and been used by various media outlets across the world, namely CNN and Discovery Channel, Canada, during the Fukushima Earthquake in 2011 and has been used by various companies to collect social media data for visualisation and analysis. Storing the data in a central repository allowed social scientists within the laboratory to create new visualisations based on the archived city data. One such project set out to create a set of "New Cities Landscapes" which highlighted the landscape of the peaks and troughs of these hidden cities using the geolocated Twitter data. The team also collected and analysed data for the mobile phone network, EE, for analysis of the 4G mobile connectivity roll-out. The data for 10 major cities across the UK and the top 250 trending words in each city were extracted and passed on to a digital artist who created an infographic and set of visualisations for art galleries in each city.

Collecting and archiving approximately 5 million tweets a day to power the Tweet-o-Meter dials and subsequent research uses significant hardware resources. The collection of Twitter data, including relevant metadata for each tweet, for the 2 weeks of the London 2012 Olympics Games for the 22 separate venues, utilises approximately 1.5 TB of hard drive space. Therefore, to provide an archive of 4 years' worth of data for each of the 16 cities became unsustainable. At present, the system discards data 48 h after collection by the Tweet-o-Meter collectors. This ensures that space on the physical machines is not overloaded, but at the same time allows researchers to recall data within the 16 cities in the eventuality of a major incident happening within the collection boundary.

13.4 Big Data Toolkit

Researchers often rely on the skills of other researchers in different disciplines to help answer questions that are important to their own research. Researchers normally contact data suppliers and are given access to interesting datasets or discover a set of data that have been released on an Open Data store, such as the GLA London DataStore (GLA 2011). However, many of the issues of analysing the data still remain the same.

"Imagine you had a massive computer database that contained all possible measurements that could ever be made over the entire span of all space and time. You could query it with any question and it would deliver the result instantaneously. All big data is merely a subset of this the biggest data that could ever exist. What would your project ask it?" (Ramalingam 2013).

Providing a generalised toolkit for social scientists, not only to collect the data but also to analyse the data from the different services, will empower them to ask questions of the social media output without the need to learn complex APIs or build bespoke tools to gather data.

Many of the social media services provide different APIs to access the data each with differing server technologies. For example, some APIs rely on simple authentication, username and password or API keys, to access data while others require complex handshakes to be performed, oAuth2, for example. Technically proficient researchers are able to write custom applications to collect the data from these services, but lack the skill in analysing and visualising the data. Conversely, spatial, geographical and social scientists are able to analyse and visualise the data to draw conclusions about use of our cities, but sometimes lack the technical expertise to acquire the data from the source. The Big Data Toolkit seeks to help researchers by providing a toolkit with a simple interface to break down these barriers to the data and allow researchers to analyse the data in varying ways (Fig. 13.8).

Cloud Computing allows users to pool vast numbers of computing resources together to build complex and dynamic systems. The emergence of cloud computing providers has increased in modern-day computing, allowing developers to leverage the vast amount of computing power available using idle computing cycles of large companies' infrastructure. In recent years, the decrease in cost of CPU time, storage and the competitive nature of these platforms have made burst cloud computing affordable. For example, a standard virtualized machine consisting of a modest CPU (2.8 Gb Quad Core) and 50 Gb of storage, networking, bandwidth and power, situated in one of the American Amazon data centres, costs approximately $0.80 per hour, whereas the same physical machine running in a local cluster would

Fig. 13.8 Big Data Toolkit collection page showing real-time collection statistics. *Source* own

cost a few thousand pounds at the outset, which does not including ongoing running costs such as machine (electric, cooling systems, etc.).

The toolkit utilises these cloud platforms to outsource computing capacity for data collection, for a nominal cost to the end-user. By creating virtualised machines in the cloud, the user can create multiple collectors, gathering data from various locations.

To test this new method of data collection, we distributed multiple collectors on Amazon's Web Service infrastructure (AWS) during the 2011 presidential debates between Barack Obama and Mitt Romney. We decided to experiment by collecting Twitter data for an entire nation, for a single specific event, capturing the maximum amount of data possible and to test the architecture of the system. A single virtual machine image of the Big Data Toolkit was created and replicated on 87 virtual machines (each running 4 regional collectors) for a period of 4 h (Fig. 13.9). A master database served as single repository of data, and each machine over time correlated its own records and merged them into the master MySQL database. A master server acted as an intermediary between the cluster on AWS and the Big Data Toolkit desktop application, providing jobs to each machine after initial installation and configuration. Each machine connected to the master server and retrieved a latitude/longitude coordinate pair, radius and a unique collector identifier to set up the collectors, which was logged by the master server for tracking purposes. This control server relayed collection statistics, current collection totals and snapshots of data collected back to the application, providing a real-time dashboard of collection statistics. A total of 692,986 geolocated tweets (approximately 8 % of all tweets sourced) were collected in the master database (Fig. 13.10), which allowed social scientists to analyse the differences in sentiment between the East and West Coast voter opinions over a 10 min rolling average throughout the 4-h period.

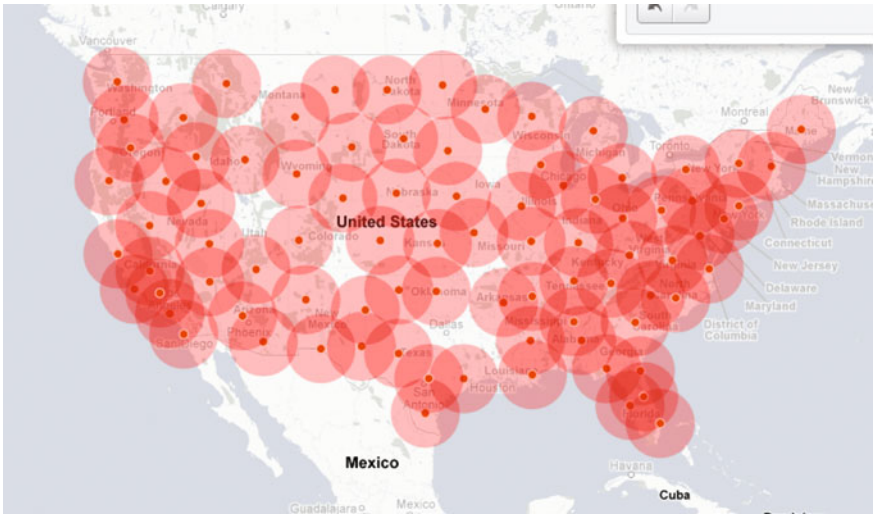

Fig. 13.9 Distributed collection experiment showing collector radius for virtual machines. *Source* own

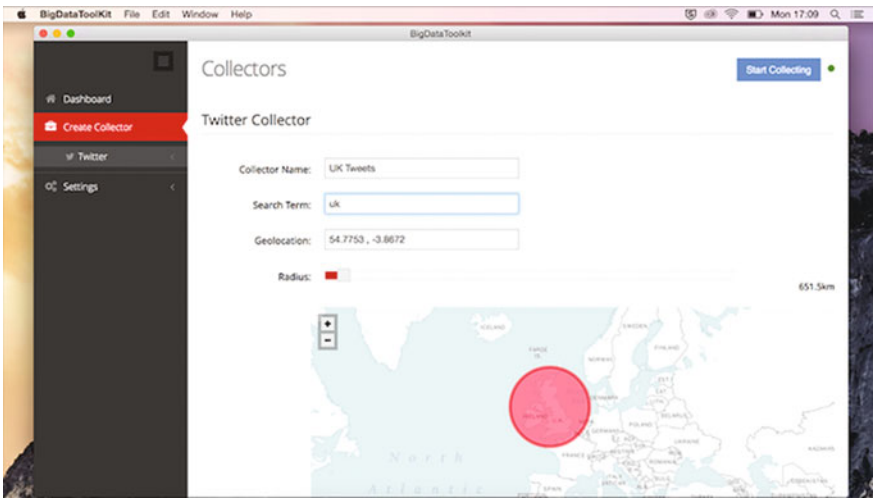

Fig. 13.10 Big Data Toolkit application—setting geographical radius for collection. *Source* own

The toolkit allows users, by combining the tools documented within the chapter, to mine and analyse various social media data in one application without having previous knowledge of the underpinning APIs. The toolkit is modular by design, and modules are added to allow users to collect data from various API (Fig. 13.8). As new services and APIs are identified, modules can then be added to the toolkit without making significant changes to base system. This data can be fed into different analytical packages, included within the toolkit, giving real-time feedback on the collection to the user. The feedback is provided via charts, data feeds, maps and dynamic interactive word clouds (Fig. 13.11) which allows the user to define new search terms, change locational regions where the data are collected or edit the data while the collection is being carried out.

The Big Data Toolkit currently provides data for a number of services that are central to UCL CASA research. The toolkit provides social media data collection for City Dashboard, a real-time dashboard of open data for various cities in the UK, and various visualisations including the London Data Table, PigeonSim, iPad Video Wall, as well as Tweet-o-Meter and SurveyMapper. The system also provides data collection services for Internet of schools, a partnership of schools that are equipped with real-time sensors and QRator, a collaboration with UCL Digital Humanities and the UCL Grant museum providing visitor engagement through digital tablets.

The toolkit stores all data within a MySQL database, which is installed locally on a user's system. All data that are collected are visualised from this central location so that the various processes and applications can share datasets. Due to the terms and conditions stipulated by some of the APIs, the sharing of data outside of the application is forbidden; therefore, by using the users' own login credentials and datastore, they can legitimately use the API while keeping within the application's terms and conditions.

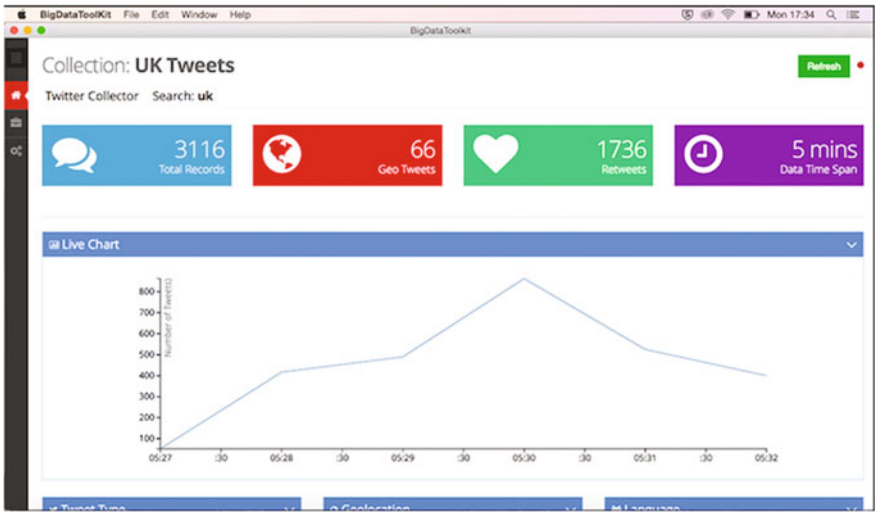

Fig. 13.11 Big Data Toolkit application—live chart of data collected within first 5 min of collection. *Source* own

Due to the modular design of the toolkit and the ability to use cloud computing to create multiple collectors to watch geographical areas, we can build a workflow to mine data continuously from different services and compare and analyse the data in real time. This provides social scientists with a complete view of all social media output for multiple locations and allows them access to the raw textual data for research purposes.

13.5 Conclusion

Crowdsourcing data for scientific projects has yielded interesting results for various applications. Projects such as Galaxy Zoo and Zooniverse have brought citizen science to the forefront of research and reduced the time taken to analyse large datasets, which would have not been possible using standard, algorithmic and processing techniques. Systems and techniques for social scientists are emerging, but there is a key need, while simplifying the collection and analysis and ensuring access to the raw data, to provide toolkits that do not require specialist tools. The crowdsourcing of geographically tagged social media has notable potential for the humanities, not to replace any current techniques but to add to the availability of data, "big data", that can be collected on demand, regardless of location and at short notice. It is moving towards an era of "as required" data collection with analysis in real time and removing the current need for knowledge about APIs or complex data collection systems. The backend to social science data collection is a complex

computer science problem, the front end, now thanks to systems such as the Big Data Toolkit, which is simply a new workflow in the research method database and the ability to tap into the crowd.

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