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Leveraging collective intelligence: How to design and manage crowd-based business models

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Abstract   Advances in digital technologies have increased the possibilities for outsourcing business activities to crowds of independent contributors. Using the collective intelligence of a crowd opens a new range of business opportunities. In fact, crowdsourcing has led to the emergence of entirely new business models. Such crowd-based business models (CBBMs) can lead to an important competitive advantage while simultaneously presenting new challenges to entrepreneurs and executives. This article identifies and discusses three key challenges in designing and managing CBBMs: determining (1) the crowd's value to the firm, (2) how to create superior value for the crowd, and (3) how to capture value from the crowd effectively. Building on the crowd capital perspective and an analysis of the tactics and practices of successful CBBMs, this article offers propositions on how to overcome these challenges and manage such business models effectively. The identified practices can inspire decision makers when designing innovative CBBMs for their industries. Finally, the article concludes with a framework with the key decisions and tactics for effectively managing CBBMs.
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1. Crowds as value creators: New possibilities

Practitioners and researchers increasingly have identified crowdsourcing as a viable strategy to gather creative ideas and solutions, make decisions, and outsource small tasks (Prpić, Shukla, Kietzmann, & McCarthy, 2015). So far, the focus has been primarily on how firms can capture the aggregated wisdom of the crowd (Surowiecki, 2005) for their business challenges. Over recent years, however, firms from different industries have started to develop new business models that fundamentally integrate crowds in value creation logic. The emergence of these crowd-based business models is both driven by advances in internet-based

technologies (Kietzmann, Hermkens, McCarthy, & Silvestre, 2011) and a shift in the role of consumers toward becoming so-called 'prosumers' (Ritzer, 2014).

Crowd-based business models (CBBMs) are generally characterized by (1) the integration of contributors from outside the traditional firm boundaries, (2) the exploitation of technologies such as digital peer-to-peer platforms, and (3) the transfer of value creating activities to a crowd (Kohler, 2015). This requires the firm to open certain resources and processes to external contributors, often resulting in a strong interaction with these contributors and their resources. The activity of these contributors can range from conducting microtasks to creating and delivering entire products and services to the firm's customers. In this sense, CBBMs place even more importance on the crowd than traditional forms of crowdsourcing (Kohler, 2015).

Due to their inherent value co-creation with crowds, CBBMs can lead to novel and superior value propositions. Wikipedia is a case in point. Originally considered a lower-cost and lower-quality alternative to established encyclopedias, the founding team has built effective systems to engage and use a crowd of content contributors to review and update its articles constantly. As such, the platform soon developed into an exclusively comprehensive and up-to-date source of information. The rise of Wikipedia provided an initial confirmation of the power of collective intelligence for crowd-based value creation. Lévy (1997, p. 13) defines collective intelligence as:

> A form of universally distributed intelligence, constantly enhanced, coordinated in real time, and resulting in the effective mobilization of skills.. . The basis and goal of collective intelligence is mutual recognition and enrichment of individuals rather than the cult of fetishized or hypostatized communities.

In simple terms, the concept of collective intelligence builds on the idea that "[n]o one knows everything, everyone knows something" (Lévy, 1997, p. 13). As Wikipedia and other examples have shown, there exists a large potential for organizations to leverage the intelligence of individuals outside their boundaries. Or, as Sun Microsystem's co-founder Bill Joy aptly formulated in what is now known as Joy's Law: "No matter who you are, most of the smartest people work for someone else" (Lakhani & Panetta, 2007, p. 2).

Several new ventures have sensed this opportunity and developed business models that capitalize on individual contributors to create and/or deliver value based on their specific expertise. Take the example of Skillshare, a technology venture founded in 2011. Skillshare provides a digital platform that offers thousands of live classes on a broad variety of topics. Yet, instead of employees teaching these classes, the platform uses a crowd of independent experts to teach classes related to their expertise and interests. To gain access to the entire range of classes, individual learners pay a monthly fee to the firm. Convinced by the variety and relevance of the crowd-created content, businesses like Twitter or Adobe have adopted the service to train their employees. As a reward for their contributions, Skillshare pays a royalty to its crowd members depending on the number of students they can attract to their live classes. Such business models fulfill the original definition of crowdsourcing as the "outsourcing of an organizational function to a strategically defined network of human and non-human actors in the form of an open call" (Kietzmann, 2017, p. 3). Firms building a CBBM further have to integrate the crowd into the firm's general logic of creating value and transforming this value into revenues and profits. Business models generally raise and answer questions about how an organization creates and delivers value to its customers and transforms this value into revenues and profits (Teece, 2010). Developing a CBBM requires additional answers to the following three questions:

1. How can a firm assess the crowd's value for the firm?

2. How can a firm create superior value for the crowd?

3. How can a firm capture more value from the crowd?

Little knowledge exists regarding how firms approach these questions and solve specific challenges to successfully develop and manage CBBMs. Hence, in this article I aim to support managers in designing and managing these methods.

Each of the following three sections addresses one of the aforementioned questions to identify the relevant decision criteria and strategies of managers in successfully designing and running CBBMs. Section 2 presents criteria that executives can use to determine the value of a crowd for their business and decide whether they should attract more individuals to their crowd. Section 3 illustrates business practices to create superior value for crowds, allowing firms to compete with other crowd-based businesses. Section 4 discusses tactics to capture more value from the crowd by effectively leveraging

its potential. Finally, Section 5 presents an integrative framework that summarizes the main insights for successfully designing and managing CBBMs.

2. Measure to manage: What is the crowd's value to the firm?

While CBBMs can be highly effective, the decision to implement such a business model needs to be complemented with a thorough analysis of the crowd's potential value to the firm. Moreover, managing a CBBM requires an understanding about the optimal size of the firm's crowd. To achieve this, managers of CBBMs need to decide whether a further increase in the crowd's size will lead to more value creation to customers and ultimately more value to the firm. The crowd's value to the firm can be represented by the concept of *crowd capital*, defined by Prpić et al. (2015, p. 80) as ''organizational resources acquired through crowdsourcing.'' For the management of CBBMs, it is particularly important to assess the firm's net value gained from increasing the crowd size. This can be considered as the *marginal crowd capital*. In many cases, the relationship between the size of the crowd and the crowd capital can be described as an inverted U-shaped curve. In other words, the firm will only gain a positive marginal crowd value until a certain optimum point. At different stages of the firm's development, managers have to decide whether to invite individuals unconditionally to become contributors or to limit and/or preselect access of contributors to platform. The decision generally depends on six key criteria: (1) strategic objectives, (2) cost of crowd creation, (3) distribution of value creation among contributors, (4) risks from the crowd, (5) direct network effects, and (6) indirect network effects.

2.1. Strategic objectives

The firm's strategic objectives are the first key factors in determining the size of the crowd. A growth-oriented venture aiming to grow its content supply rapidly can benefit greatly from attracting as many content creators as possible. Strategy scholars have shown that firms operating in markets with strong positive network effects can create a competitive advantage through differentiation by building a larger contributor network than competitors (Eisenmann, Parker, & van Alstyne, 2006). Conversely, a company that intends to pursue a differentiation strategy by developing a library of high quality content for a small niche market will prioritize quality over quantity and thus would benefit from limiting access to its platform.

2.2. Cost of crowd creation

Creating a crowd requires a deliberate acquisition process. Particularly for more specialized tasks, firms need to approach the task of crowd creation in a way similar to their customer acquisition process. Access to potential crowd members is limited and in demand. Thus, to compete in the market for members of a specific crowd, firms have to acquire them through marketing activities (Choi & Lee, 2016). Generally, as the crowd tasks become more specialized, the acquisition costs will increase. However, the cost can change significantly over time with changes in the supply and demand of a particular type of crowd. Also, established platforms can often decrease the costs of contributor acquisition over time due to strong branding, scale economies in acquisition strategies, and word-of-mouth dynamics from existing contributors. Hence, managers are encouraged to measure the cost of acquiring additional crowd members continuously.

2.3. Distribution of value creation among contributors

Not all crowd members create equal value to the firm. In large crowds, the Pareto rule of 80/20 often finds empiric evidence. For the crowdsourcing context, the heuristic suggests that 20% of contributors often create 80% of the value. For instance, a study on crowdsourced science projects—involving volunteers for 'citizen science'—reported that only a small group of individuals was responsible for the majority of contributions and most participants did not contribute in any significant way (Franzoni & Sauermann, 2014). Yet, the value of a crowd member's contribution quality can change over time. Pioneering contributors, on the other hand, show high commitment to the platform and become more experienced over time; these participants can create a series of high-value contributions. Conversely, empiric insights into crowd-based innovation communities have shown that crowd members tend to contribute less valuable ideas over time because their creative thinking is often tied to their successful contributions from the past (Bayus, 2013). To assess these opposing effects, managers should monitor the net contribution of different crowd cohorts over time. This will determine whether the firm should keep on acquiring new crowd members.

2.4. Risks from the crowd

Managing a large crowd of contributors is not without risks. Wilson, Robson, and Botha (2017) studied failed crowdsourcing projects to identify associated

risks. In CBBMs, the crowd itself can potentially become a significant risk to the viability of the entire business model. For instance, manipulative crowd behavior has been observed in crowdsourced contests in which public figures leverage their audience to collectively support a prank. Comedian Stephen Colbert, for instance, used his television presence to motivate his audience to vote for the name 'Colbert' in a crowd-based competition initiated by NASA to name a new space module. With more than 200,000 votes, the name won the competition handily. Deciding to use a second-placed name from the competition, NASA came under strong public criticism (Sample, 2009). In standardized microtasks, crowd votes, and idea and solution contests, the potential damage is limited. Yet, in business models where contributors are responsible for creating and delivering value directly to consumers, every crowd member can cause sustainable harm to the attractiveness of the entire model. For instance, some companies have been strongly criticized after crowd members published copied or poorly researched content. Hence, managers need to assess critically how much control they want to maintain over the work of the crowd. Then, they should monitor frequently the amount of customer complaints to decide whether an increase in crowd size can harm the model or should only come with stronger control and curation mechanisms.

2.5. Direct network effects

Additional crowd members often influence the platform's value for the existing crowd. Some studies have revealed empirically a negative externality of increased network size on existing crowd members (Boudreau & Jeppesen, 2015). The same-side or direct network effects are particularly negative if supply is homogenous and additional content leads to the substitution of existing content (Belleflamme & Toulemonde, 2009). This dynamic has been described as *crowding-out* and identified as a key barrier to further innovation incentives (Boudreau, 2012). The effect is particularly high in platforms that incentivize crowd participation by sharing part of the firm's revenues with contributors according to the popularity of their contributions. As such, managers should measure the satisfaction, engagement, and performance of their existing crowd members over time to detect dissatisfaction from increased competition in the group. The amount of direct network effects is determined by (1) the heterogeneity of demand from customers, (2) whether the contributions are geographically limited, and (3) whether contributors compete for a scarce resource such as attention or money.

2.6. Indirect network effects

Many CBBMs effectively represent two-sided business models that connect the crowd as suppliers directly with the firm's customers. Thus, customer satisfaction with the firm's offering depends directly on the size and quality of the crowd—an effect known as cross-side or indirect network effects (Rochet & Tirole, 2003). A recent study on unpaid contributors in the context of multi-player gaming concluded that the attraction of additional contributors increased the motivation for players to engage in the game. Since an increase in contributors simultaneously led to less value for the existing crowd of contributors, the effects neutralized each other (Boudreau and Jeppesen, 2015). Generally, the attractiveness of an expertise marketplace such as Skillshare depends on the availability of sufficient crowd members at any time to fulfill the demand at any time. In those business models where crowd members produce lasting content such as entire apps or online courses, additional contributors generally will increase the value for customers if:

- Quality levels remain at least equal;

- The additional course does not simply substitute an existing one;

- Consumers are not pressured by the large selection to consume excessively; and

- Consumers can search effectively on the platform for specific niche products (Casadesus-Masanell & Hałaburda, 2014).

To date, measuring the indirect network effects has proven difficult in practice. Managers of successful CBBMs use rigorous data gathering and experimentation to understand the link between the size of the crowd and customer satisfaction with the total offering. Managers should integrate the six criteria into a management dashboard and frequently review changes in these metrics.

3. Four practices for creating superior value for the crowd

According to the crowd capital perspective, firms are benefiting from crowdsourcing when they successfully build the capabilities for acquiring and assimilating crowd members and harnessing crowd capital (Prpić et al., 2015). Similarly, building a sustainable CBBM requires mechanisms that attract

and engage crowd members who will contribute long-term to the firm. Being in a competitive situation when it comes to assembling crowds, companies must develop a clear value proposition to attract crowd members to participate (Kohler, 2015). Successful CBBMs tend to combine four practices when developing and delivering a value proposition to the crowd: identification of crowd members' contribution motives, development of design toolkits, mechanisms for the development of crowd members' capabilities, and the creation of value between contributors.

3.1. Identifying contribution motives of crowd members

Firms with CBBMs deliberately analyze the key motivation of crowd members to determine a suitable value proposition. Existing research has reinforced the idea that crowdsourcing platforms can attract and engage the crowd through extrinsic motivations such as an additional income opportunity (Frey, Lüthje, & Haag, 2011). Empirical evidence suggests that a more nuanced consideration can unlock great potential for attracting and engaging crowds in different business models (Kuznetsov, 2006; Lakhani & von Hippel, 2003). For instance, contributing training content can serve educators as a means of building a personal brand and a promotion channel for other products or consulting services. Likewise, contributors are driven by a large array of social or emotional motivations, ranging from the pure joy of contributing (von Ahn & Dabbish, 2004) to expectations of reciprocity (Andreoni, 2007) to recognition (Jeppesen & Frederiksen, 2006) to pride from an enhanced social image (Ellingsen & Johannesson, 2008). As a consequence, managers need to understand their crowds' actual motives for contributing. Identifying the core motives further helps to prioritize the related attributes of the value proposition. For instance, the blocking of Wikipedia in Mainland China led to a reduced readership of Chinese articles and thus smaller impact opportunity for contributors. As a consequence of the decreased audience, engagement of Chinese contributors from other parts of the world significantly decreased (Zhang & Zhu, 2011). Hence, introducing a paywall to Wikipedia likely would lead to significantly reduced engagement of its contributors. In business models that share revenues with crowds, contributors are often focused on revenue opportunities and individual performance. Managers should therefore identify the key value attributes they offer to crowd members and develop ideas for strengthening the value proposition around these motives.

3.2. Developing design toolkits for the crowd

Successful CBBMs provide design toolkits to their crowds that create a superior experience in executing the content, task, or service. The proposition of innovation toolkits has been suggested by von Hippel and Katz (2002, p. 2) in the context of user innovation:

> Toolkits for user innovation are coordinated sets of 'user-friendly' design tools that enable users to develop new product innovations for themselves. The toolkits are not general purpose. Rather, they are specific to the design challenges of a specific field or sub field.

Udemy, a platform offering a variety of online courses that are created entirely by a crowd of more than 20,000, was confronted initially with high abandonment rates of contributors who struggled to create high-quality courses due to a lack of pedagogical and technical know-how. As a consequence, the company developed a design toolkit based on the latest pedagogical findings, automatically guiding course creators through the process of planning, developing, and implementing engaging multimedia material. In addition, the platform provides contributors with a drag-and-drop structure to arrange modular videos, as well as assessments and text documents, all of which allow contributors to create their courses more efficiently. Attractive toolkits can serve as a differentiating factor among competing CBBMs by increasing the contributor experience and enhancing their impact.

3.3. Fostering development of crowd members' capabilities

CBBMs can create long-term relationships with crowds if they enable contributors to grow their skillsets by using the platform. Many of the firms therefore provide contributors with data-based feedback on their performance. Idea and innovation contests have proven most effective if contributors have high transparency over the criteria for winning such a contest (Huang & Fu, 2013). Similarly, crowd-based learning platforms can create value for contributors if they are allowed to receive customer feedback on the quality of their contributions. CBBMs often provide personalized dashboards and analytics tools to allow contributors to understand the engagement of customers with their contributions. Analytics solutions can help contributors learn about their work's quality and can lead to continuous improvement (von Hippel and Katz, 2002). For instance, Udemy integrates a survey into its courses

so that students can assess the quality of both the teacher and the course material. Between these assessments and data on students' actual engagement with instructors' materials presented in a visually attractive dashboard, contributors receive ongoing feedback about the quality of their contributions. Even contributors to microtask platforms such as translation services increasingly receive peer reviews that allow them to strengthen their skills. Managers should identify and develop effective tools to help their contributors receive timely feedback on their work. Such feedback mechanisms furthermore function as a quality control for the platform's content and provide a reputation mechanism that increases the contributor's perceived cost of switching to a competing platform.

3.4. Generating value between crowd members

Successful CBBMs deliberately support and incentivize contributors in generating value for each other. As seen above, network externalities between members of a contributing crowd are often negative. New contributors might crowd out or substitute existing members. Especially in paid crowd tasks, members compete for a limited market. Firms can overcome this negative externality by creating platform functions with positive externalities. Most prominently, CBBMs offer actively managed online communities for crowd members. Online teachers at Skillshare, for instance, can exchange ideas and best practices on how to structure lectures or how to deal with difficult students over these community platforms. Besides, the firm's communication toward the community of contributors plays an important role in whether they appreciate further members joining the crowd. Generally, a strong feeling of a social mission worth pursuing, a feeling of shared engagement against a competing platform, or individual benefits from an increased network of contributors will create positive direct network effects. Some forms of crowdsourcing, such as innovation contests or other competitive markets, inevitably lead to negative network effects between contributors. Yet, research has shown that contributors are more likely to join a contest—despite a large crowd—when they perceive the underlying procedure as fair and transparent (Franke, Keinz, & Klausberger, 2013). As a consequence, managers aiming to increase the value for their crowd can use one or more of these four practices to provide more value for crowds. The implementation of such mechanisms should be decided based upon a series of experiments with a sample of contributors.

4. Five tactics for capturing more value from the crowd

The third managerial challenge consists of actually capturing the value from the crowd's contributions. This relates to the third step in the crowd capital framework: harnessing the crowd capital. The analysis of the presented CBBMs suggests that managers use common mechanisms and practices to capture more value from crowds: (1) create complementarities between crowd contributions, (2) turn crowd members into firm ambassadors, (3) foster entrepreneurial behavior in crowd members, (4) manage risks of crowd behavior, and (5) lock in high-value crowd members.

4.1. Create complementarities between crowd contributions

One tactic to capture more value from a crowd is to ensure the complementarity of different contributions. While this is relatively easy for crowdsourcing projects involving votes, ideas, and smaller solutions, crowds in CBBMs compete in many cases for customer attention, influence, and revenues. Lists that rank contributions or crowd members by popularity tend to favor only a few choices that become even more popular over time. Yet, recent advances in search technologies and machine learning-based recommendation systems have enabled the co-existence of a variety of specialized supply (Weld et al., 2012).

4.2. Turn crowd members into firm ambassadors

Firms can capture more value from their developed crowd by transforming contributors into firm ambassadors. CBBMs that share revenues with the crowd provide incentives for contributors to promote their own content and therefore—at least indirectly—the firm's brand and platform. Platforms that build on more intrinsic motivations capture additional value from their contributors by motivating members to share company recommendations, the platform's social mission, or their own content with their social networks. Managers can use proven strategies and tools from marketing to enhance the contributors' rate of recommendations. For instance, Udemy has developed a sophisticated system of financial rewards for contributors who acquire new learners for their courses.

4.3. Foster entrepreneurial behavior of contributors

Traditional crowdsourcing projects such as idea competitions and voting campaigns build on the

concept of wisdom of the crowd. A large crowd will more likely gravitate toward a stronger solution than individual actors will (Chiu, Liang, & Turban, 2014), an idea generally credited to Aristotle (Ober, 2013). In the area of content creation, diversity of contributions is generally more important than convergence toward a common solution. In other words, platforms can capture more value if the crowd creates a broad set of content. Entrepreneurs and managers can build mechanisms that incentivize contributors to search actively for market gaps and help them recognize and exploit untapped opportunities (Smith, Manesh, & Alshaikh, 2013). For example, data-based analytics tools help contributors gain a better understanding of the existing supply created by the crowd, areas of high demand, and supply gaps. This information can further be used to develop a time-dependent pricing system that allows crowd members to recognize times of high demand. For instance, the ridesharing service Uber has developed a sophisticated model of price surging that incentivizes drivers to start driving when the demand temporarily exceeds the supply of available drivers in a particular area. The underlying mechanism of such instruments is to provide transparency about the market demand and guide contributors to high-impact areas of value creation.

4.4. Manage risks of crowd behavior

Managers can reduce the risks from opportunistic and damaging behavior of crowd members through active governance and control, review systems, and the creation of incentives for desired behavior. To decrease the odds of unintended crowd behavior, successful CBBMs provide a code of conduct and guidelines for participating on their platforms. Mistreating the code of conduct is usually sanctioned with increasing levels of punishment such as deactivation of a user's access to the platform. Detecting inappropriate content in crowd contributions, such as hidden advertisements to third-party offerings, would require a complete review of all crowd activities. This is practically impossible in services such as Skillshare in which crowd members interact directly with customers. Thus, platform providers rely on customers to provide feedback on such issues. To make use of the customer feedback, managers can develop an early-warning system that automatically checks the content for copyright infringements and signals unusual patterns of customer dissatisfaction or abandonment of the service.

4.5. Lock in high-value crowd members

Firms can capture more value from a crowd by increasing the duration of the relationships with high-value crowd members. As discussed above, a relatively small fraction of crowd contributors creates a large amount of the value. Here, the challenge consists in (1) identifying these high-value contributors, (2) designing mechanisms to strengthen the relationship with these contributors, and (3) appropriating the contribution's value. The level of potential appropriation of crowd contribution depends primarily on the type of the CBBM. In content marketplaces like Udemy, the contributor often maintains intellectual property rights and can decide to withdraw their contribution at any time. In crowd-based services like Skillshare, the risk of losing crowd capital is even higher since it depends on the contributors' continuous motivation to contribute. At the same time, such models provide high incentives for contributors to improve or renew their content frequently. Thus, managers of such business models are confronted with the challenge of locking in successful contributors. To do so, they should develop rewarding incentives for popular contributors with sustained engagement. For instance, elements and principles from game design—discussed under the term 'gamification'—are commonly used tools to sustainably motivate stakeholders to engage with a firm's platform (Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2016). Early empirical evidence suggests that game mechanics like leaderboards, points, and badges are effective tools to complement crowdsourcing tasks (Morschheuser, Hamari, & Koivisto, 2016; Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2015). Besides creating design elements to lock in contributors, managers should maintain continuously an open conversation with the crowd to understand its potential sources of dissatisfaction. Finally, actively measuring the level of engagement and retention of successful crowd members can serve as an early warning system for a potential decline in crowd capital due to crowd member dissatisfaction or the emergence of competing platforms targeting the same crowd.

5. Final thoughts

CBBMs extend the usefulness of crowdsourcing by building an entire value logic around crowd contributors that directly influences the customer experience. This logic goes beyond the idea of an aggregated 'wisdom of the crowd' by acknowledging the individual skills and expertise of every crowd

Figure 1.   Designing and managing successful CBBMs
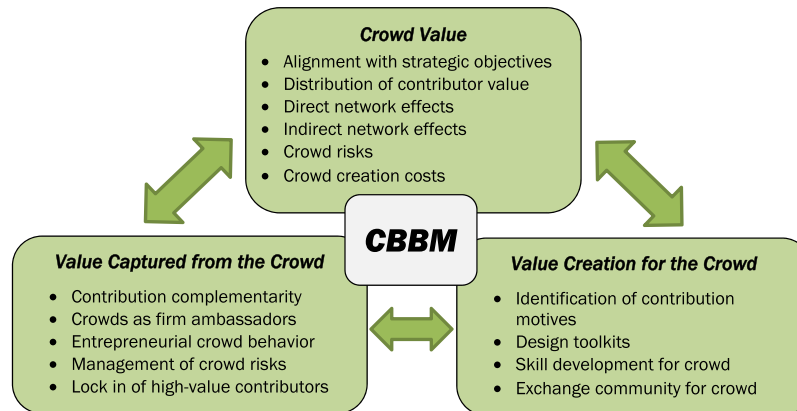
member. In this article, I have advanced the understanding of crowd-based business models, aiming to sensitize managers in favor of a more analytical approach to designing and managing CBBMs. While crowds have been identified as highly promising sources of value co-creation, managers need to analyze the crowd's actual value to their firm on a regular basis. As argued, a larger crowd does not necessarily increase value for the firm's customers. In fact, a true open call to individual contributors can decrease the customers' experiences and yield negative externalities on other contributors. I have therefore identified relevant criteria and decisions that correspond to the challenges of crowd acquisition, crowd capability development, and crowd capital harnessing. These decisions relate to three specific elements of crowd-based business models.

Figure 1 summarizes the identified criteria and practices that influence the firm's value from crowd creation and engagement (crowd value) as well as the practices for creating superior value for the crowd and capturing value from the crowd effectively. The outlined criteria can support executives in designing novel CBBMs and making informed decisions when managing them. The framework further identifies how established methods and tools—such as design toolkits—can support the development of crowd capital in these business models. Most importantly, the article can be seen as a call for a more deliberate approach to leverage collective intelligence effectively with complementary business models.

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