

Crowdsourcing: Global search and the twisted roles of consumers and producers

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Abstract

Crowdsourcing spreads and morphs quickly, shaping areas as diverse as creating, organizing, and sharing knowledge; producing digital artifacts; providing services involving tangible assets; or monitoring and evaluating. Crowdsourcing as sourcing by means of ‘global search’ yields four types of values for sourcing actors: creative expertise, critical items, execution capacity, and bargaining power. It accesses cheap excess capacities at the work realm’s margins, channeling them toward production. Provision and utilization of excess capacities rationalize society while intimately connecting to a broader societal trend twisting consumers’ and producers’ roles: leading toward ‘working consumers’ and ‘consuming producers’ and shifting power toward the latter. Similarly, marketers using crowdsourcing’s look and feel to camouflage traditional approaches to bringing consumers under control preserve producer power.

Keywords

Brand communities, control, crowdsourcing, digital labor, global search, marketing, open innovation, prosumer, sharing economy, working consumers

Prologue

In a Mark Twain story that has delighted and inspired generations, Aunt Polly orders her young nephew, Tom Sawyer, to paint the fence along the street. Tom not only dreads this kind of work, he also knows that executing this task will subject him to serious mockery from his peers, village boys enjoying their day of leisure. However, he turns the tables. When the first boys come by, Tom pretends to be highly motivated by his work: displaying fascination with and dedication to his task, he ‘informs’ his peers that it requires extraordinary responsibility and skillfulness—qualities not

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everyone possesses. Apparently, a natural actor, Tom eventually gets the boys so interested in painting that they offer him all the little treasures in their pockets, in return for an opportunity to paint. Accordingly, Tom changes roles from being a producer who himself fulfills a task (i.e. internal sourcing) to out-contracting work (i.e. external sourcing), enjoying the power of the buyer who picks and chooses from among multiple offers. At the literal end of the day, everybody seems happy: Aunt Polly (i.e. the end consumer) owns a perfectly painted fence; the boys are highly satisfied with their leisure time spent contributing to fulfilling an interesting task (which is common in crowdsourcing); and Tom, pioneering a role which we later call *consuming producer*, has considerably increased his wealth.

Linus Torvalds' approach to developing the open-source operating system Linux resembles Tom Sawyer's fence-painting strategy (MacKie-Mason, 2010). Microsoft's de facto monopoly paired with their intellectual property policies had left a generation of computer engineers frustrated: condemned to an operating system they could not modify.¹ Within 3 months of engineering professor Andrew Tanenbaum publishing a rudimentary operating system's source code, the newsgroup discussing and improving it grew to 40,000 subscribers—among them Finnish engineering student Linus Torvalds. Building on Tanenbaum's work, Torvalds wrote Linux, a basic operating system conforming to IEEE industry standards. He made the source code available on the Internet, inviting fellow engineers to rewrite existing modules and create new ones (Moody, 2001; Torvalds and Diamond, 2001). The initial Linux kernel established Torvalds' credibility as a resourceful, highly motivated producer and issued a plausible promise to the community: Linux was weak enough to call for further improvement, yet good enough to convince them that it could evolve into something great (Raymond, 1999). Torvalds received an overwhelming stream of improved and additional Linux modules from around the globe. He responded by infusing his producer role with that of an exemplary consumer: critically evaluating incoming solutions, choosing the best ones, and presenting the community with his selection—the latest Linux releases, which came out at a fast pace, sometimes more than once a day—always giving contributors extensive credit. Like Tom Sawyer, Linus Torvalds migrated from producer and sole (internal) source of production to *consuming producer* tasked with managing multiple external sources. He constantly stimulated and rewarded the community with ego-satisfying responses and displaying rapid improvement in their work. He treated contributors as his most valuable resource; in response, they became exactly that (Raymond, 1999).

This article synthesizes existing research, weaving together the fine disciplinary yarns of open innovation research, organization theory, consumer studies, sociology, and philosophy of art to encourage an understanding of how and with what consequences crowdsourcing transforms the roles of consumers and producers (Kleemann et al., 2008; Wexler, 2011). Crowdsourcing spreads and morphs quickly, now playing a major role in areas as diverse as creating, organizing, and sharing knowledge; producing digital artifacts; providing services involving tangible assets; or monitoring and evaluating. Defining crowdsourcing as sourcing by means of *global search*, we propose a framework that describes all crowdsourcing initiatives as yielding combinations of four fundamental types of value for sourcing actors. Examining crowdsourcing in its societal context, we show that it mobilizes particularly cheap resources: societies' excess capacities at the work realm's margins. Putting those resources to work further rationalizes society.

Consumer studies argue that today's consumers are both buyers and sources of value creation, involved in making and selling products and services (e.g. customers engaging in self-service or parading brand logos in their daily routines; Zwick et al., 2008). We show that crowdsourcing further blurs consumer and producer roles by getting consumers to employ their excess capacities (e.g. time, effort, knowledge, and assets), acting as suppliers. We further demonstrate that the advent of *working consumers* (Cova and Dalli, 2009; Voß and Rieder, 2005) is intimately tied to

the emergence of *consuming producers*, and we examine how this development impacts the relative power of consumers and producers. Finally, we point to crowdsourcing as a spectacle deploying *working consumers*' and *consuming producers*' look and feel to revamp traditional consumer and producer roles.

Mobilizing for production

Journalist Jeff Howe (2006) coined the term 'crowdsourcing', a portmanteau of 'crowd' and '(out-)sourcing'. In this article, we consider crowdsourcing to be when (a) an actor (individual, team, or organization) tasks external sources with solving a problem or executing a task *and* (b) the actor identifies these sources (individuals, teams, or organizations) through a call broadcast to a crowd.

'Crowd' commonly refers to many people gathered closely in one place (OED, 2009). A crowd acting collectively is traditionally either seen as a source of social unrest (rioters, mobs, etc.) or societal progress (legitimate strikes, political rallies, etc.; Wexler, 2011). In the context of crowdsourcing, 'crowd' has a different meaning, referring to a mass audience that is reachable through a communication channel such as a traditional mass medium or the Internet, rather than locally gathered. These crowds have become sources for developing and producing goods and services (Benkler, 2006).

Broadcasting a call soliciting contributions to problem solving or task execution from a crowd is an act of mobilization. Successful mobilization translates into many individuals self-selecting and identifying themselves as potential contributors. Broadcasting instantiates one-to-all communication (1:∇). Ideally, one actor addresses all relevant recipients (e.g. Torvalds, in principle, invites all computer engineers to improve Linux). Until recently, one-to-all communication occurred almost exclusively through mass media, delivering information and entertainment to citizens and advertising to consumers. In producer–consumer relations, broadcasting's main role was rather expensive one-way communication aimed at shaping consumer preferences (Gabriel and Lang, 2006).

By contrast, crowdsourcing is an approach to sourcing that employs one-to-all communication for developing and producing a vast array of goods and services. Sourcing concerns business-to-business relations, more specifically, the decision to make internally or buy externally (Coase, 1937). Understood as procurement from previously unknown sources identified through broadcast search, crowdsourcing provides an alternative to both making in-house and buying from designated contractors typically selected based on preexisting business relationships, recommendations from trusted third parties, or market research (Afuah and Tucci, 2012; Jeppesen and Lakhani, 2010).

Crowdsourcing relies on two-way communication: an actor who wants a problem solved or task executed calls upon a crowd of potential contributors, a number of whom respond by offering contributions. Hence, crowdsourcing is only possible under conditions that secure a chain of communicative acts from the sourcing actor to the crowd and back. Specifically, it is necessary that

1. The sourcing actor possesses technological and economic means to distribute a call to a crowd of potential sources (Doan et al., 2011);
2. A sufficient number of potential sources from the crowd (a) attend to the call, (b) find it intelligible, and (c) deem it worth their effort (Franke et al., 2013);
3. Potential sources willing to contribute have access to technologically and economically feasible means for communicating their contributions to the sourcing actor (Afuah and Tucci, 2012);
4. The sourcing actor is able to understand and evaluate the received contributions and selects one, a few, or many contributors as external sources (Cohen and Levinthal, 1990).

None of these conditions is trivial, and only if all are fulfilled is crowdsourcing possible and able to provide an alternative to internal sourcing or (external) sourcing from designated contractors.

Crowdsourcing does not necessarily rely on the Internet. Sourcing actors can broadcast calls to the general public via mass media or public spaces, or disseminate calls to expert audiences (e.g. professional communities) through specialized media channels and professionals' formal and informal networks. Potential contributors can respond by mail, phone, or in person. In fact, crowdsourcing was in use before the inception of Web 2.0. For instance, police forces have a long tradition of broadcasting calls to mobilize the general public in helping solve crimes. However, one-to-all communication as a means to producing goods or providing services remained rare until the Internet opened a new era of mobilization (Tapscott and Williams, 2006).

Arguably, there is a trend toward increasingly digitized production and modularized product architectures (Baldwin and Clark, 2000) while hardware and software tools are advancing rapidly—becoming cheaper, yet more powerful and increasingly compatible, if not integrated (von Hippel, 2005). Consequently, means of production are becoming more widely accessible and even abundant in some sectors of economically and technically advanced societies (Shirky, 2010). Such enabling factors increase crowds' ability to receive calls, carry out digitized work, and transmit results electronically (Baldwin and von Hippel, 2011; Hanekop and Wittke, 2008).

Any Internet user can, in principle, broadcast to all other users, acting as a global media provider. Hence, one-to-all communication is no longer a privilege of only the most high-powered actors such as state agencies or large corporations (Blank and Reisdorf, 2012). However, successful mobilization requires capturing the crowd's attention, which is challenging in an attention-based economy characterized by information over-abundance but attention scarcity (Davenport and Beck, 2001). Consequently, many actors use intermediaries that enjoy a reputation for interesting calls to the targeted crowd and broadcast calls on behalf of sourcing actors. Comparable to broadcasting corporations and the press, intermediaries selling one-to-all communication are powerful players, 'a new digital elite' (Verona et al., 2006; Wexler, 2011).

To summarize, crowdsourcing shifts the focus from crowds as sociopolitical entities to crowds as sources of economic value. Similarly, one-to-all communication's role in the economy shifts: thus far, mainly a tool for selling, it is becoming a tool for developing and producing goods and services. Crowdsourcing is arguably part of a broader shift in organizing production, specifically, of a trend toward increased external sourcing (Lakhani et al., 2013). It locates external sources by first mobilizing crowds through web-based calls and then depending on the task, selecting one, a few, or many respondents as external sources. For instance, police pursuing a fugitive mobilize the crowd, hoping that out of the many respondents, one or a few can provide the needed information. By contrast, Linux draws on input from a vast number of contributors. In 1991, it started with about 10,000 lines of original code from Torvalds; based on contributions from the crowd, it grew steadily to 6,624,000 in 2005 (Linux Foundation, 2012).

The mechanics of crowdsourcing

Global search

Assuming a fully functioning communication chain (from the sourcing actor to the crowd and back) permitting crowdsourcing *could* be chosen, under what conditions *would* it be chosen over other types of sourcing? Adopting a problem-solving perspective (Nickerson and Zenger, 2004) informed by complexity theory (Kauffman, 1993; Simon, 1969), researchers have progressed toward identifying the conditions under which crowdsourcing occurs. Lakhani et al. (2013) show that the nature of the task (i.e. its decomposability) and the distribution of required knowledge (i.e.

its scarcity) affect the choice between alternative sourcing types. Afuah and Tucci (2012) address the known inclination of human actors to search locally when solving a problem (e.g. looking for the cause close to the effect and drawing on familiar knowledge that previously proved useful; Cyert and March, 1963). Such local searches render actors myopic (Levinthal and March, 1993). However, the costs of distant search are usually prohibitively high due to the number and nature of solution alternatives—increasingly numerous and incomprehensible due to their reliance on unfamiliar knowledge (Gavetti et al., 2012). Afuah and Tucci (2012) maintain that crowdsourcing occurs because, depending on the availability and communicability of knowledge, it can significantly lower distant search costs.

The distinction between local and distant search is predicated on the concept of *search* or *solution space*, which is an abstract, multidimensional space containing all theoretically possible solutions plus information about their quality (i.e. value). On this view, problem solving equals navigating the solution space in search of the best possible (i.e. most valuable) solution (Afuah and Tucci, 2012; Levinthal, 1997). An actor deciding how to source a problem's solution or task's execution faces a similar but non-identical problem: choosing the best source from among all potential contributors, including the sourcing actor. Sourcing actors cannot choose from among all theoretically possible solutions (i.e. the entire abstract solution space). Instead, they search (partly or entirely) the empirical set of all potential sources, thus only finding solutions available to at least one such source.

The literature suggests that human actors are *satisficers* (Simon, 1955), preferring local to distant search (Cyert and March, 1963; Levinthal and March, 1993). We conclude that sourcing actors go through for the following sourcing options, only extending the search radius if previous searches have not yielded a technically and economically satisfying result:

1. Internal sourcing: The sourcing actor is the source of choice;
2. External sourcing to local dedicated contractors: Sources are identified based on sourcing actors' own knowledge or knowledge from trusted people and documents;
3. External sourcing to distant dedicated contractors: Sources are identified based on knowledge about how or where to conduct distant search (i.e. search heuristics; Benner and Tushman, 2002). For instance, a police detective seeking to learn critical information from a community inaccessible to her can use an informant who may draw on yet another informant;
4. Crowdsourcing: Sources are identified through *global search*, a brute-force approach ideally covering the complete search space by reaching *all* potential sources via one-to-all communication. *Global search* aims at identifying the *global optimum* (i.e. finding the best available solution by identifying the best possible source). Note that 'global' refers to search space, not to geographical space—although with crowdsourcing the two increasingly coincide.

Sourcing actors search the set of possible contributors, a network with the sourcing actor at its center. Searching as locally as possible yet as globally as necessary, they extend their search radius stepwise, from one sourcing actor to eventually all potential sources, until they identify satisfactory sources. The further the search, the higher the likelihood of finding a large number of sources drawing on increasingly diverse knowledge.

Value from global search

Generally, global search creates value in two ways: First, the sourcing actor seeks rare, high-quality contributions yet cannot limit the search to specific search-space areas. Hence, global

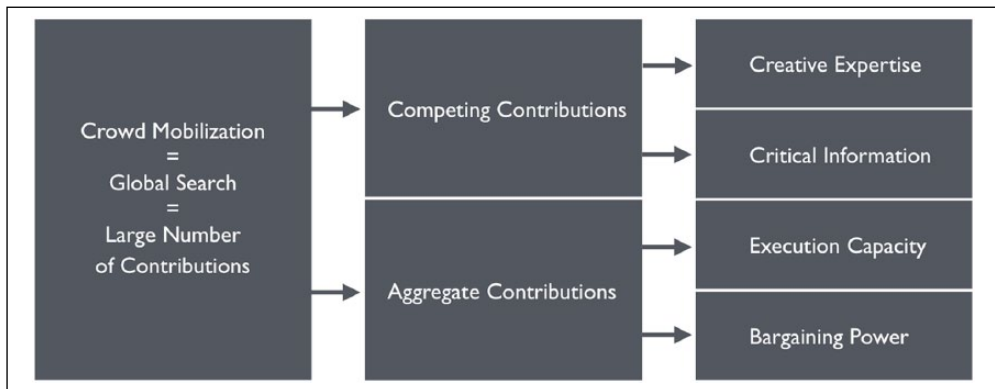


Figure 1. Value from crowdsourcing.

search aims at maximizing the number of contributions to increase the likelihood of finding the rare, sought ones. Contributions are competitive, selecting one or a few distinguished ones while neglecting all others, often the vast majority. Second, if the sourcing actor aims at an aggregate effect achievable through accumulating many similar contributions, global search is the appropriate approach because searching everywhere maximizes the number of identified sources and received contributions.²

We now elaborate on and illustrate our two cases calling for crowdsourcing: competing contributions, where redundant ones are eliminated from a set of received contributions, and aggregate contributions, where all received contributions jointly generate a cumulative effect. We suggest a framework identifying four types of values from sourcing by means of global search: access to (1) *creative expertise* and (2) *critical items*, as well as to increased (3) *execution capacity* and (4) *bargaining power* (see Figure 1).

Creative expertise. We refer to *creative expertise* as a distinct capacity: superior domain knowledge, or the ability to novelly recombine and modify knowledge from one or more domains, or a combination of both criteria (Amabile, 1996). We maintain that under two conditions, sourcing agents employ global search for accessing creative expertise. First, the task is sophisticated in the sense that after exhausting all known means of further decomposing it into simpler subtasks, the task still requires creative expertise. Second, this creative expertise cannot necessarily be found locally or in specific distant areas, hence the sourcing actor assumes random distribution of potential contributors. Typically, sourcing agents broadcast calls for creative expertise via so-called innovation-platforms (i.e. web-portals) operated by intermediaries with a reputation for attracting interesting calls and capable contributors. The intermediary serves as a nexus for numerous seekers and contributors, acting as a trustee to ensure the *ex ante* announcement of the award paid for the best contribution(s) and the actual full payment (Colombo et al., 2013; Howells, 2006).

Consider an example illustrating crowdsourcing targeting at randomly distributed *creative expertise*: NASA invested significant resources in developing reliable predictions of solar flares, achieving no more than 55% prediction accuracy. They turned to InnoCentive, an innovation platform reaching over 350,000 potential contributors from nearly 200 countries (InnoCentive, 2014). NASA broadcast a call, essentially consisting of a general problem statement, and a US\$30,000 award for the best solution(s). Within a 3-month period, 500 individuals expressed interest in the problem and 11 submitted solutions. The winning solution, from a retired telecommunications

engineer, reached 85% prediction accuracy, using only ground-based equipment instead of the orbiting spacecraft NASA traditionally used (Lakhani et al., 2013).

There are two major challenges associated with this type of crowdsourcing. First, it tends to turn out as a winner-take-all competition, leaving the majority of contributors with little to no financial reward, potentially undermining their willingness for sustained participation. Second, distant search for creative expertise can involve difficult cross-disciplinary communication: calls must be intelligible across knowledge domains, and sourcing actors may have to evaluate solutions that rely on areas of expertise that they meet with ignorance or even prejudice (Cohen and Levinthal, 1990).

Critical items. We use the term *critical items* to denote informational or material items that already exist or are by-products of potential contributors' daily lives, yet are of critical importance to a sourcing agent's problem or task. Other than creative expertise, critical items are 'ready-mades', shared in response to a call but rarely produced for it (e.g. sightings of wanted criminals or missing pets, details about using and maintaining technical devices, and obscure objects such as spare parts for end-of-life products). Sourcing actors unable to narrow their search tend to opt for global search: using their own or intermediaries' platforms to broadcast calls for specific critical items, ideally to all potential contributors.

Consider as examples numerous Internet forums where people broadcast specific questions about technical devices; online classifieds (e.g. Craigslist); or Large Emergency Event Digital Information Repository (LEEDIR), a platform Californian police use to call upon eyewitnesses to provide videos or photos of specific emergency events.

Again, contributions are competitive: one or a few high-quality contributions suffice. Yet, some redundancy can be beneficial because consistency in information from independent sources or between older and newer information potentially indicates validity and thus can help determining the accuracy of critical information received. In addition, the information's credibility depends on the source's credibility, which is why many platforms track and display contributors' merits.

Execution capacity. We expect actors to opt for crowdsourcing when a task requires exceedingly high *execution capacity*; is decomposable into many well-structured similar subtasks that can be processed in parallel based on common, widespread knowledge; and these subtasks, when executed, yield partial results that can easily be aggregated into the final result.

Consider Microsoft's utilization of users for product testing as an example of crowdsourcing that increases the sourcing actor's execution capacity. Software testing requires exceedingly high execution capacity because the number of test cases grows exponentially with a program's functional richness (Cormen et al., 1993). Microsoft copes with this workload by offloading much of it onto customers, mostly Windows and Office users, requesting that they authorize the transmission of automatically generated error messages that inform the vendor of software problems. Similarly, researchers launched the platform Galaxy Zoo to enlist contributors in classifying about 900,000 galaxies. This task requires exceedingly high execution capacity, yet is decomposable into many small subtasks that can be executed in parallel based on common knowledge and yield easily communicated and aggregated results. Providing an estimated equivalent to 83 labor-years, contributors generated 50 million classifications within 7 months (Franzoni and Sauermann, 2013).

Bargaining power. We have argued that actors seeking technically *and* economically satisfactory sources extend their search radius stepwise. Technically satisfactory solutions identifiable through localized search do not preclude economically motivated global searches. Sourcing actors should opt for global search when they expect it to yield heretofore unknown, economically attractive sources. Maximizing the number of received contributions, global search is an instrument for

affecting demand–supply ratios in sourcing actors’ favor—increasing their bargaining power over contributors and consequently lowering prices. Similarly, intermediaries attracting large numbers of both contributors and sourcing actors create a near-perfect market, known for lowering prices to the minimum possible under respective historical circumstances (Arrow and Debreu, 1954).

Consider 99designs (2014), an electronic marketplace for graphic design. Engaging more than 900,000 designers, the platform offers sourcing actors the possibility (a) to initiate a design competition by broadcasting a design brief and the remuneration (US\$299, US\$499, US\$799, or US\$1199); (b) to select from over 40,000 design templates, then have the design customized for US\$99; or (c) to contract a small design job (typically modifications of existing graphic designs) for US\$19 (99designs, 2014). Most sourcing agents could find local sources for these tasks—but rarely at such low costs.

Enabling a growing number of globalizing markets, crowdsourcing increases market efficiency and strengthens sourcing actors’ bargaining power. Furthermore, it reduces prices by including contributors who are willing to accept particularly low prices—a topic with important ethical implications (e.g. opportunities a more inclusive society offers and risks of rising exploitation), which we address in the next section.

To summarize, crowdsourcing allows actors to generate value from otherwise inaccessible creative expertise and critical items, as well as from increased execution capacity and bargaining power, non-mutually exclusive types of value.³ Consider Linux’s creation as exemplary of simultaneously aiming at execution capacity and creative expertise. Torvalds’ ability to mobilize an enormous workforce for debugging software (utilizing knowledge common within the Linux community) is salient in his approach to crowdsourcing. He was also able to benefit from creative expertise: receiving software modules elegantly rewritten to make them more efficient, and new modules adding valuable functionality only creative experts could conceive. Linux benefits from numerous contributions, creating an aggregate effect at the systems level (i.e. enhanced features and functionality require many modules), yet competing at the module level (i.e. every module update makes the previous version obsolete).

Similarly, MTurk (Amazon Mechanical Turk), an electronic marketplace for micro-tasks offering sourcing actors ‘access to a global, on demand, 24 × 7 available workforce’ (MTurk, 2014), exemplifies the combined effects of increased execution capacity and bargaining power. Sourcing actors break big tasks into numerous micro-tasks that only require commonly available knowledge and can be executed in parallel (e.g. tagging images and transcribing videos). The global reach of calls broadcast via MTurk translates into a substantial labor surplus, which results in sourcing agents’ increased bargaining power and, finally, low wages (an estimated average hourly wage under US\$2.00, far below US minimum wage; Ross et al., 2010).

Twisted roles of consumers and producers

Crowding in: the motivation to contribute

Up to this point, we have entertained a producer perspective and, for analytical purposes, treated crowdsourcing as a decontextualized phenomenon. Henceforth, we examine it in its social context, as a manifestation of and contribution to ongoing dynamics at the societal level. We start by examining crowdsourcing’s value to contributors.

Studies of contributor motivation consistently find the range of factors known to account for the motivation to work (Latham, 2007):

1. Joy and entertainment: Contributors see crowdsourcing that involves creative challenges as enjoyable, interesting, playful, thrilling, and fun (Franzoni and Sauermaun, 2013; Füller,

- 2010; Langner et al., 2014). Mindless micro-tasks require little effort (Benkler, 2006) and can help overcome boredom, for instance, passing time on the subway or even in the workplace (Brabham, 2012a; Marvit, 2014);
2. Self-actualization and meaning: The act of creation can provide contributors with a sense of achievement and satisfaction, thus becoming a vessel for self-actualization (Cova and Dalli, 2009; Lakhani and Wolf, 2005). Similarly, contributing to crowdsourcing that serves a greater good (e.g. maintaining public space or creating open content) can give individual lives meaning (Arvidsson, 2008, 2010; Budhathoki and Haythornthwaite, 2012);
 3. Belonging and recognition: Belonging to and loving a community (including user-, brand-, or fan-communities), experiencing social interactions, and befriending like-minded people are reasons for participating (Füller, 2010; Füller et al., 2011);
 4. Skill development and signaling: The opportunity to engage in professional work that meets industry standards and that peers and firms recognize is an important reason for contributing (Ebner et al., 2009; Jeppesen and Frederiksen, 2006; Langner et al., 2014; Leimeister et al., 2009). Crowdsourcing aids career advancement because contributors can develop, document and signal their skills while expanding their networks (Brabham, 2010);
 5. Income and interest: Financial rewards (e.g. guaranteed payments per executed micro-task or prize money from innovation contests) motivate participation. Studies examining the relative importance of intrinsic and extrinsic motivation in tournament-based crowdsourcing have produced mixed results (Boudreau et al., 2011; Füller et al., 2010; Leimeister et al., 2009; Terwiesch and Xu, 2008; Zheng et al., 2011). Notwithstanding, in poorer countries crowdsourcing is gaining importance as a source of primary income (Irani and Silberman, 2013; Ross et al., 2010). Apart from direct payments, a vested interest in shaping the product can also motivate contributors (Lerner and Tirole, 2002; Shah, 2006). Consider again Linux: 75% of all kernel development is now done as part of engineers' regular work. The four top-contributing firms alone—Red Hat, Novell/SUSE, Intel, and IBM—account for almost one-third of the kernel (Linux Foundation, 2012).

Excess (re-)sources: cui bono?

Having explored the grounds on which sourcing actors opt for global search, and potential contributors respond to calls, we now turn to crowdsourcing as a pivotal macro-societal phenomenon. Definitely, crowdsourcing is an instrument of inclusion, aiming at reaching *all* potential contributors—hence, its inherent potential to reach needy and marginalized contributors, bring in new ones who do not rely on contributing but welcome it as a new opportunity, and consequently bring down contribution prices.

Crowdsourcing favors marginality. Economically marginalized contributors from so-called emerging markets are gaining importance: Reportedly, about 70% of 99design sales come from North America, the rest mainly from Europe; yet about half the money 99design pays out goes to Asian designers (Ho, 2013). MTurk's crowd has shifted 'from a primarily moderate-income, U.S.-based workforce towards an increasingly international group with a significant population of young, well-educated Indian workers' who treat 'Turking' as a serious job (Ross et al., 2010: 2863). Apparently, policy makers in developing countries view crowdsourcing as an opportunity for connecting marginalized human resources to the world economy. For instance, the 'Malaysian government's strategy to develop the nation into an international hub for digital work' includes providing training and infrastructure (e.g. 2500 telework centers) for executing micro-tasks (Digital Malaysia, 2014: 1). As for demographically marginalized contributors, recall the contest for predicting solar flares. Conventional wisdom would expect an astrophysicist from a major research center to prevail; yet the winner was an outlier, at the fringes in terms of his qualifications

(a telecommunications engineer tackling an astrophysics problem) and socioeconomic position (a retiree, presumably enjoying his well-earned discharge from the workforce). Winning scientific problem-solving contests was found to positively relate to *not* being trained in the field paramount in the problem and to being a woman (i.e. underrepresented in science's inner circle; Jeppesen and Lakhani, 2010). Furthermore, anecdotal evidence points to retirees and hobbyists as important sources of creative expertise (Howe, 2008). Similarly, MTurk provides a diverse crowd, including stigmatized groups such as mentally challenged individuals and former criminals, with discrimination-free access to a labor market (Benner, 2015).

Crowdsourcing exceeds and extends work realm boundaries. Individuals, who work in more or less regular jobs yet choose to work more, can seize additional opportunities through crowdsourcing. Contributing as a hyper-flexible side job or hobby infringes on the recreational realm. It exploits spare cycles (i.e. 'downtime not claimed by work or family obligations—a quantity now in surplus'; Howe, 2008: xiii–xiv) as well as underutilized knowledge and assets: Crowdsourcing utilizes 'cognitive surplus' (i.e. untapped time and talent; Shirky, 2010). Working in their free time, many contributors appear amateur, yet in terms of qualifications are professional (e.g. 65% of the InnoCentive crowd hold PhDs and another 19% hold other advanced degrees; Brabham, 2012b, Jeppesen and Lakhani, 2010). Furthermore, crowdsourcing draws on surplus assets that private households do not fully exploit (e.g. extra rooms or temporarily idle cars). Platforms such as Airbnb and UberX broadcast calls for specific asset-based services. Competing in the hotel and taxi industries by brokering peer-to-peer services such as temporary accommodation in private homes and transportation in private cars, respectively, these intermediaries are so-called *sharing* or *peer-to-peer economy* forerunners (Henn, 2013).

In short, crowdsourcing generates value from mobilizing untapped resources at the fringes of and even outside the work realm, from channeling *societal excess capacities* toward developing and producing goods and services.

Consequently, crowdsourcing lowers prices by mobilizing many contributors, thereby increasing supply and systematically attracting contributors willing to accept low pay. At the individual level, such willingness may appear economically justifiable: Low pay according to Western standards can have significant purchasing power in poorer countries (Benner, 2015). Contributors who view their work as an investment in future career advancement (e.g. skill development and signaling) may not expect immediate returns. Most importantly, whatever pays for contributors' living (or employers) quasi-subsidize contributions made during spare time (or paid working hours, respectively). If the necessary time and assets are already covered, any additional income above the variable costs of contributing increases contributors' wealth, economically justifying the effort. This economic rationale of selling excess capacities at marginal cost, paired with the intrinsic value of contributing, provides a basis for crowdsourcing marshaling additional (re-)sources at low cost or even free of charge (e.g. numerous reviews and evaluations of products and services, and reports of software errors and public infrastructure deficiencies). Clearly, this is attractive to sourcing actors. In the extreme, when make-or-buy becomes make-or-take, not much is left to decide.

However, agreeable sourcing actors and individual contributors may find crowdsourcing; at the aggregate contributor level, its effects can be problematic. Contributors who need not factor in the true cost of labor in developed countries, namely, developed countries' amateurs and developing countries' digital laborers, bring established moderately and highly skilled workforces under economic pressure (Aytes, 2013; Zwick, 2013). The dearth of regulation further amplifies this effect: thus far, tax and labor laws (e.g. prescribing benefits, working hours, or age) either do not apply to crowdsourcing or are unenforceable (Cherry, 2009). Hence, the question, can crowdsourcing send labor costs spiraling downward, causing a loss of income from regular jobs, only to become even more attractive as a source of increasingly necessary additional income?

More equal opportunities, infringement on the recreational realm, and falling contribution prices are expectable effects that follow from conceptualizing crowdsourcing as sourcing through global search. We have provided evidence that these effects are current empirical phenomena. To our knowledge, extant evidence neither suffices to quantify their extent nor predict how deep they will eventually run. Implicit in these effects is the potential of crowdsourcing to further rationalize society. Focusing on changing producer and consumer roles, the next section explores this matter.

Working consumers and consuming producers: the power of purchasing

One-to-all communication is powerful. Initially, when limited to one-way communication, it turned everyone into audience (i.e. consumer). Since it functions both ways and recipients can efficiently respond to broadcast calls, everyone is becoming a supplier: what they own (i.e. goods and assets), can do (i.e. skills, expertise, and creativity), or come by (i.e. observations and experience) turns into potential input and means for production. Crowdsourcing further blurs the already-fuzzy roles of producer and consumer (Ritzer, 2013; Toffler, 1980), shifting the latter farther toward supply and propelling an increasingly seamless integration of consumers into the value chain (Humphreys and Grayson, 2008). Thereby, it contributes to—and arguably completes—the *working consumer's* emergence (Cova and Dalli, 2009; Voß and Rieder, 2005).

Drawing on *producer* and *consumer* as analytical categories in the sense of Weberian ideal types (Weber, 1949/1904), this line of argument examines current societal development in light of historical contrasts—specifically, with the era of mass production, characterized by a divide between two distinct, complementary spheres: production versus consumption; businesses providing supply in exchange for earnings versus private households generating demand through spending; and creating during tightly organized, often-tedious working hours versus choosing and using (up) during free, supposedly delightful, leisure time (Gabriel and Lang, 2006; Humphreys and Grayson, 2008). Individuals oscillate between these spheres, adopting only one role at a time, thereby enacting the so-called Fordist Deal of a quiescent labor force in exchange for increasing standards of living (Gabriel and Lang, 2006). By contrast, crowdsourcing is currently emanating from technically and economically highly evolved regions. It is indicative of Post-Fordist *contemporary capitalism* of increasing deregulation, employer power, globalization, financialization, and, as Toffler—who coined the term ‘prosumer’—predicted as early as 1980, by a trend away from mass products toward mass customized or personalized goods and services, thereby infusing the consumer role with increasingly more producer elements (Gabriel and Lang, 2008; McDonough et al., 2010).

The literature focuses on three ways working consumers work when consuming (Cova et al., 2011; Cova and Dalli, 2009; Rieder and Voß, 2010; Zwick et al., 2008). First, they spend time and effort carefully customizing ‘their’ products. Second, they go along with restructured (self-)service encounters, in which consumers carry out increasingly large parts—a development retail stores, restaurants, and gas stations lead, with banks, airlines, and many others following suit. Third, they verbally, non-verbally, and symbolically communicate with their peers in ways that enhance certain products’ and services’ (brand) value. In all three cases, consumers’ work does not earn them money but instead tends to put them at the economic disadvantage of increasing prices or decreasing service quality (Bonsu and Darmody, 2008; Zwick et al., 2008).

Differently yet complementarily, crowdsourcing blurs boundaries between production and consumption by creating numerous possibilities for acting as a supplier, typically by working outside work: executing micro-tasks (e.g. MTurk), providing services (e.g. Airbnb), crafting designs (e.g. 99designs), innovating products (e.g. InnoCentive), assisting authorities (e.g. LEEDIR), and so on. Thus, crowdsourcing has a potential for rationalizing not only production processes but also life

worlds: expanding work into recreational and social life, and substituting occasions and capacities virtually free of instrumental concerns with productive activities under an effectiveness-and-efficiency regime. Again, the resultant impact on life worlds depends on crowdsourcing's societal pervasiveness. Moreover, it hinges on the kind of additional instrumentally rational activities (e.g. simple or sophisticated tasks) and forgone leisure activities (e.g. computer games or quality time with family). Hence, effects expectedly differ by crowdsourcing type and contributor demographics. Future research is warranted to determine and explain them.

The trend toward working consumers is imposed on and advanced by consumers. Experiencing 'cultural fatigue' due to disenchantment with regular forms of consumption (Gabriel and Lang, 2008; Korczynski and Ott, 2006) and a lack of meaning at work due to overly rationalized production in a 'McDonaldized' society (Ritzer, 1999), consumers assume a more active role, taking over parts of the value chain. For instance, *user- and community-driven innovation* produces cutting edge results, heralded as a counter approach to firm-driven producer innovation and as the foundation for aligned producers and consumers' *co-creation* (von Hippel, 2005). A total of 6.1% of UK consumers engage in product innovation (von Hippel et al., 2012), as do 5.2% in the United States and 3.7% in Japan (Ogawa and Pongtanalert, 2011). Similarly, the rapidly growing *maker movement*, a community-driven social movement, aims to create a new culture of producing (Davis, 2013). Makers employ do-it-yourself and do-it-together techniques to develop and market unique products, often made from used, discarded, or defect materials (Stangler and Maxwell, 2012). They frequently share community production facilities, organize large trade fairs, and receive increasing governmental support (Anderson, 2012). As Dougherty (2012) suggests, 'people's need to engage passionately with objects in ways that make them more than just consumers' fuels the maker movement (p. 12).

Interestingly, consumers claim a bigger share of the producer role at a time when power has shifted from production to consumption. Capitalism inevitably favors the buyer: the customer who pays—or refuse to do so—is sovereign. Historically, the ultimate success of mass production is the rise of wealthy masses and, consequently, buyer markets. Economic power lies with those who control demand (Keynes, 1936). Since the 1950s, big corporations have been counteracting increasing consumer power by establishing influential marketing departments, specializing in anticipating consumer behavior (i.e. market research), and shaping consumer preferences (i.e. advertising and public relations). Art theorist Boris Groys (2003) captures the cultural side of the economic power shift toward demand, suggesting that economic rationality, not morality, has decided the historic fight between work asceticism and hedonic consumption.

Vanguard artists anticipated this development, shifting their role as artists from ideal producer to exemplary consumer (Groys, 2003). Romanticism saw the artist as the secular creator: epitomizing the opposite of estranged labor, the ideal producer combined virtuosity (i.e. superior craftsmanship), originality (i.e. genius), and autonomy (i.e. unconventional work- and lifestyle) to create unique artworks with an *aura* that no replica, human- or machine-made, would ever possess (Benjamin, 1969/1939; Kant, 1952/1790). Duchamp pioneered the art of collage and installation, which introduced a fundamental shift. Artists no longer create *ex nihilo*, but instead (re)use existing artifacts (e.g. reproduced artworks, mass-produced consumer goods, objects amateurs created, and by-products of everyday life). The center of originality shifted from creating something new to new ways of selecting from what is already there and reusing it (i.e. recombining and reframing it in original ways). Today, advanced choosing and using (i.e. consuming) is artists' primary domain (Groys, 2003). Consequently, many artists reject the notion of creativity as an economic concept, insisting instead that taking a critical stance is contemporary artists' *raison d'être* (Van den Berg, 2009).

Fundamentally, contemporary capitalism's producers (i.e. businesses) pursue an identical strategy. Expanding external sourcing, they increasingly play the customer role: critically evaluating and selecting from among various suppliers' results and combining the chosen pieces into value-added arrangements. In precisely this sense, our analysis suggests that crowdsourcing contributes to the consuming producer's emergence, complementing that of the working consumer. Getting paid and yet assuming the power of those who pay, consuming producers are predicated on three conditions.

First, consuming producers prefer buying to making, ideally sourcing everything externally except the capability for sourcing (Anand and Daft, 2007; Kakabadse and Kakabadse, 2005). Consequently, consuming-producer firms are vertically disintegrated (Piore and Sabel, 1984) and critically rely on expertise in selecting and managing sources, their ultimate core competence, which they share with the pioneers of modern art and Linus Torvalds. Second, consuming producers depend on choice from among many suppliers, a condition contemporary capitalism's transparent globalized markets and crowdsourcing-enabled global search increasingly provide. Third, as producers nevertheless, consuming producers must eventually sell what they buy. To safeguard against final customers doing to them what they do to suppliers—namely, exercising buyers' full economic power—consuming producers rely on traditional techniques for anticipating consumer behavior and shaping consumer preferences, as well as on recent marketing approaches that facilitate consumers' bonding and identifying with producers (e.g. branding, co-creation, and consumer empowerment; Cova et al., 2011; Zwick et al., 2008).

The trend toward working consumers and consuming producers has implications for wealth distribution (i.e. value capture). It tends to lower prices at which consuming producers (i.e. sourcing actors) buy, as discussed in the previous section, and increase those at which they sell. Focusing on selecting, (re)combining, and (re)using existing knowledge, products, and services, consuming producers are ultimately brokers engaged in making by buying, which affords them a disenchanting, rational stance. Contrarily, after decades of increasing disenchantment with producing and consuming mass goods (Gabriel, 2005), consumers—remember the maker movement or user-innovators—seem to long for a re-enchanting world and Romantic notions of creativity and identity, such as authorship, authenticity, or aura. The result could be a skewed field, allowing interest-driven consuming producers to sell at relatively high prices to identity-driven working consumers who identify with producers and forego bargaining power (Arvidsson, 2010; Rowley and Moldoveanu, 2003).

Twist again: crowdsourcing as a spectacle

Converting social values, such as community or creative achievement, into economic value not only plays an important part in mobilizing crowds for developing and producing goods and services; it also influences the value chain's end, where sourcing is complete and the product is sold (Arvidsson, 2008, 2010). To maximize captured economic value, as Gabriel and Lang (2008) pointedly put it, producers 'endlessly pursue the Holy Grail of control, seeking to anticipate consumer trends on behalf of capital [...] coupled with investment in attempts to shape or tempt consumption to its benefit' (p. 334). Yet, this approach requires identifying a reasonably small set of target groups, which growing market fragmentation renders increasingly impossible. Making a virtue of necessity, producers turn to marketing as *co-creation*, investing in supporting consumers (e.g. user groups, consumer tribes, fan, and brand communities) in how they make use of, modify, reinterpret, and communicate about their products (Lusch and Vargo, 2006; Prahalad and Ramaswamy, 2004). Co-creation aims at a form of governmentality whereby producers refrain from openly controlling consumers and instead 'work with and through the freedom

of the consumer subject, all the while hoping that the subject's experience of freedom follows a prescribed program' (Zwick et al., 2008: 184). In fact, Zwick et al. (2008) maintain that co-creation aims at more than mere docile Foucauldian subjects, namely, at working consumers who contribute to producer innovation, be it out of identification with the producer or in an attempt to create oppositional forms of consumption that nevertheless stimulate corporate innovation.

The trend toward working consumers and consuming producers has a particular twist to it: amid the dynamics of changing roles, it preserves a power advantage of producers over consumers that might otherwise erode due to increasingly saturated and fragmented markets. Moreover, there are instances of 'crowdsourcing without sourcing' that add yet another twist: traditional marketing agendas (i.e. anticipating and shaping consumption) disguised by the look and feel of crowdsourcing, and the invocation of values such as empowerment, creative achievement, or community. In these cases, what appears to be crowdsourcing is indeed a spectacle, distracting consumers to prevent them from recognizing and resisting marketing they no longer find appealing.

Consider Fiat's marketing campaign for the new, eventually highly successful Fiat 500. Prior to the launch, Fiat initiated what appeared to be a crowdsourcing initiative, inviting consumers to use a digital concept laboratory for designing their own car models and accessories by choosing from a toolkit of predefined elements. Over 47,000 registered users created 282,708 models (Pattuglia, 2011). Several design contests for consumers, with juries of Fiat experts and prominent public figures, awarded cash prizes of up to €5000 each (Filieri, 2012; Kleemann et al., 2008). Fiat considered the campaign highly successful: The contests received broad media coverage and made consumers feel part of a Fiat 500 community, with a say in the new car's development. Fiat presented themselves as an 'open-source organization' with the intent to build a 'car for the people, made by the people'—a gross overstatement of, if not a euphemism for, what actually took place (Pattuglia, 2011: 37).

Fiat implemented some minor ideas from users (e.g. an Italian flag sticker accessory)—just enough, it seems, to preserve the campaign's credibility. Its design suggests that consumers' creative input in car development was of only secondary, if any, relevance. Typically, calls for creative expertise address important problems; issue precise, elaborate problem statements; and are open to numerous types of solutions. Conversely, marketing using the look and feel of crowdsourcing addresses low-risk problems that could be otherwise solved. It relies on extremely open questions (i.e. how could we improve our products) conducive to generating raw ideas but unlikely to yield implementable concepts, or it restricts consumers' responses to tightly confined solution spaces by requiring the use of toolkits that only offer small sets of predefined choices (i.e. essentially equivalent to questionnaires; Goduscheit and Jørgensen, 2013).

Aiming at selling rather than buying (i.e. sourcing), these initiatives are designed to gather market intelligence and increase brand awareness and loyalty. As for market intelligence, knowledge of consumer preferences is largely tacit. Using toolkits and openly sharing favorite ideas as part of idea contests aids the communication of what consumers deem important and desirable (von Hippel, 2001; Whitla, 2009). Fiat, for instance, learned about consumers' preferred colors and how to increase the car's price in ways consumers would accept (Filieri, 2012; Pattuglia, 2011). As for branding, idea contests can infuse brands with values such as innovativeness, responsibility, and respect for customers (Djelassi and Decoopman, 2013), while stimulating media coverage and social-media 'buzz' (Whitla, 2009; Willmott, 2010). Moreover, creativity is intrinsically motivated (Amabile, 1996): Identifying with how and for whom one acts, instead of remaining critically distant, increases the likelihood of succeeding in idea contests. Marketing posing as crowdsourcing thus issues a seductive yet illusionary invitation to co-create that lures consumers into lowering their critical guards and opening up—making consumers more willing and able to share intimate knowledge, and susceptible to corporate messages (Moscovici, 1985). Conversely, producers sourcing for

innovation use platforms specifically designed to attract contributors capable of combining domain-specific knowledge necessary for technically excellent solutions with intimate knowledge of consumer needs and preferences. Despite their potential for beneficial spillovers, sourcing and campaigning constitute different agendas requiring different setups (e.g. platforms).

Our main point here is not the lack of sincerity in crowdsourcing as a spectacle (Bromley and Powell, 2012; Nyberg et al., 2013). In fact, some consumers are well aware of the ruse (Djelassi and Decoopman, 2013), yet in identifying with the respective brand, they tend to be rather 'generous' regarding corporate ethics (Franke et al., 2013). We conclude our explorations into the twisted roles of consumers and producers by emphasizing that the trend toward working consumers and consuming producers does not eradicate traditional consumer and producer roles. On the contrary, the old persists: where the new has not (yet) arrived, as part of the new (e.g. consuming producers employing traditional marketing techniques), and by posing as the new (i.e. reinvigorating traditional roles by using emergent ones as a disguise). The Holy Grail of control is still being pursued, although increasingly by means of covert operations.

Conclusion and implications for further research

As crowdsourcing initiatives spread and morph quickly, seeing the bigger picture becomes non-trivial. We have introduced a framework that depicts the multitude of crowdsourcing variants as yielding four types of values for sourcing actors. Adopting a rather decontextualized perspective, we have described the basic functioning of crowdsourcing as well as what sourcing actors and contributors stand to gain. The situated practices, however, on which the mechanics of crowdsourcing rely warrant further research: How do sourcing actors, many of them organizations, decide for or against crowdsourcing? How do they establish and maintain communication chains spanning the boundaries of diverse institutional arrangements (e.g. from sourcing firms via intermediaries to crowds and back)? What are the conditions and processes enabling contributors from the crowd to deliver high-quality contributions and sourcing actors to recognize and act upon them? Pioneering studies have demonstrated the potential fruitfulness of these future research areas (Keinz et al., 2012; Kleemann and Eismann, 2012; Kleemann et al., 2012; Lakhani et al., 2013; Lifshitz-Assaf, 2014; Lüttgens et al., 2014). Thus far, much of the territory remains uncharted.

Examining crowdsourcing in its societal context, we have elicited and critically examined the kind of effect it has on consumer and producer roles, specifically, how it contributes to the working consumer's and consuming producer's emergence. Doing so, we have identified, expressly and tacitly, six closely related directions for future research: (1) the process of crowdsourcing-related rationalization of consumers' life worlds and its qualitative and quantitative outcomes; (2) the extent to and processes by which businesses assume a consuming-producer role and the resulting impact on core and peripheral staff and organization structure; (3) the extent and mechanisms of shifting power and wealth from (working) consumers toward (consuming) producers; (4) the design, implementation, and enforcement of regulatory frameworks and industry standards affording further seizing opportunities from crowdsourcing while promoting procedural and distributive justice at national and international levels (Djelic and Sahlin-Andersson, 2006); (5) the emergence of intermediaries as a new digital elite affecting business and society; (6) the potential of crowds to emerge as political entities, capable of collective action (Ermoshina, 2014; Irani and Silberman, 2013; Marquis et al., 2011; Wexler, 2011).

Crowdsourcing has a potential for grave economic and social impact. This article has explored it from both a rather functionalist perspective at the actor level and a rather critical perspective at the societal level. We conclude by maintaining that rigorous and relevant research on crowdsourcing requires more of both: pragmatic search for its underlying mechanisms and superior understanding

of how to make use of it, as well as critical examination of its social effects and side effects, informed by *cui bono* as a leitmotiv: who benefits—how, when, where, why, and from whom?

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Notes

1. Computer programs typically exist in two versions. The *source code*, the original program written in standard programming language, is understandable to and modifiable by capable engineers. Customers receive the *binary code*, an automatic source code translation to a string of zeros and ones that computers execute but which is as unintelligible to engineers as if it were intentionally encrypted. To protect intellectual property rights of proprietary software owners, source codes can remain secret. If given only the binary code, no matter their ingenuity, computer engineers can neither modify nor further develop the program.
2. Consistent with the problem-solving perspective, this distinction is fundamentally rooted in complexity theory, specifically in the distinction between two types of complexity. *Algorithmic information content* (or Kolmogorov complexity; Chaitin, 1974; Li and Vitányi, 1997) refers to the amount of information a program contains, which translates to the amount of space required to store it after exhausting all compression algorithms. *Algorithmic time complexity* (Moldoveanu and Bauer, 2004; Papadimitriou, 1994) refers to the computational power necessary to execute the program, typically measured in number of operations or run time. These complexity types yield fundamentally different results when assessing total complexity of multiple items. To measure algorithmic information content, anything redundant is discarded: hence, algorithmic information content of 1 or 10 copies of a program is identical. In contrast, algorithmic time complexity is cumulative: executing a program 10 times requires a computational capacity 10-fold that of running it once.
3. Four types of values from crowdsourcing allow for 15 ($2^4 - 1$) possible combinations, comprising at least one of them. We have found empirical examples for most but not all. As of publication, we are not in a position to tell whether the missing forms will eventually appear or be found theoretically impossible.

References

- 99designs (2014) Retrieved February 20, 2014, from <http://www.99designs.com>
- Afuah, A. and Tucci, C. L. (2012) ‘Crowdsourcing as a Solution for Distant Search’, *Academy of Management Review* 37(3): 355–75.
- Amabile, T. M. (1996) *Creativity in Context*. Boulder, CO: Westview.
- Anand, N. and Daft, R. L. (2007) ‘What Is the Right Organizational Design’, *Organizational Dynamics* 36(4): 329–44.
- Anderson, C. (2012) *Makers: The New Industrial Revolution*. New York: Crown Publishing.
- Arrow, K. J. and Debreu, G. (1954) ‘Existence of an Equilibrium for a Competitive Economy’, *Econometrica* 22(3): 265–90.
- Arvidsson, A. (2008) ‘The Ethical Economy of Customer Coproduction’, *Journal of Macromarketing* 28(4): 326–38.
- Arvidsson, A. (2010) ‘The Ethical Economy: New Forms of Value in the Information Society?’ *Organization* 17(5): 637–44.

- Aytes, A. (2013) 'Return of the Crowds: Mechanical Turk and Neoliberal States of Exception', in T. Scholz (ed.) *Digital Labor: The Internet as Playground and Factory*, pp. 79–97. New York: Routledge.
- Baldwin, C. and Clark, K. (2000) *Design Rules—The Power of Modularity*. Cambridge: MIT Press.
- Baldwin, C. and von Hippel, E. (2011) 'Modeling a Paradigm Shift: From Producer Innovation to User and Open Collaborative Innovation', *Organization Science* 22(6): 1399–417.
- Benjamin, W. (1969/1939) 'The Work of Art in the Age of Mechanical Reproduction', in H. Arendt (ed.) *Illuminations—Walter Benjamin—Essays and Reflections*, pp. 217–51. New York: Schocken. (German original 1939).
- Benkler, Y. (2006) *The Wealth of Networks: How Social Production Transforms Markets and Freedom*. New Haven, CT: Yale University Press.
- Benner, C. (2015) *Crowdwork - zurück in die Zukunft? Perspektiven digitaler Arbeit*. Frankfurt: Bund.
- Benner, M. J. and Tushman, M. L. (2002) 'Process Management and Technological Innovation: A Longitudinal Study of the Photography and Paint Industries', *Administrative Science Quarterly* 47(4): 676–706.
- Blank, G. and Reisdorf, B. C. (2012) 'The Participatory Web', *Information, Communication & Society* 15(4): 537–54.
- Bonsu, S. K. and Darmody, A. (2008) 'Co-Creating Second Life: Market–Consumer Cooperation in Contemporary Economy', *Journal of Macromarketing* 28(4): 355–68.
- Boudreau, K. J., Lacetera, N. and Lakhani, K. R. (2011) 'Incentives and Problem Uncertainty in Innovation Contests: An Empirical Analysis', *Management Science* 57(5): 843–63.
- Brabham, D. C. (2010) 'Moving the Crowd at Threadless', *Information, Communication & Society* 13(8): 1122–45.
- Brabham, D. C. (2012a) 'Crowdsourcing: A Model for Leveraging Online Communities', in A. Henderson and J. Delwiche (eds) *The Routledge Handbook of Participatory Culture*, pp. 120–41. New York: Routledge.
- Brabham, D. C. (2012b) 'The Myth of Amateur Crowds', *Information, Communication & Society* 15(3): 394–410.
- Bromley, P. and Powell, W. W. (2012) 'From Smoke and Mirrors to Walking the Talk: Decoupling in the Contemporary World', *The Academy of Management Annals* 6(1): 483–530.
- Budhathoki, N. R. and Haythornthwaite, C. (2012) 'Motivation for Open Collaboration: Crowd and Community Models and the Case of Openstreetmap', *American Behavioral Scientist* 57(5): 548–75.
- Chaitin, G. J. (1974) 'Information-Theoretic Computational Complexity', *IEEE Transactions on Information Theory* IT-20: 10–15.
- Cherry, M. A. (2009) 'The Global Dimensions of Virtual Work', *Saint Louis University Law Journal* 54: 471–96.
- Coase, R. H. (1937) 'The Nature of the Firm', *Economica* 4(16): 386–405.
- Cohen, W. M. and Levinthal, D. A. (1990) 'Absorptive Capacity: A New Perspective on Learning and Innovation', *Administrative Science Quarterly* 35(1): 128–52.
- Colombo, G., Buganza, T., Klanner, I. M., et al. (2013) 'Crowdsourcing Intermediaries and Problem Typologies: An Explorative Study', *International Journal of Innovation Management* 17(2): 1–24.
- Cormen, J., Leiserson, C. and Rivest, R. (1993) *Introduction to Algorithms*. Cambridge, MA: MIT Press.
- Cova, B. and Dalli, D. (2009) 'Working Consumers: The Next Step in Marketing Theory?' *Marketing Theory* 9(3): 315–39.
- Cova, B., Dalli, D. and Zwick, D. (2011) 'Critical Perspectives on Consumers' Role as 'Producers': Broadening the Debate on Value Co-Creation in Marketing Processes', *Marketing Theory* 11(3): 231–41.
- Cyert, R. and March, J. (1963) *A Behavioral Theory of the Firm*. Englewood Cliffs, NJ: Prentice-Hall.
- Davenport, T. H. and Beck, J. C. (2001) *The Attention Economy: Understanding the New Currency of Business*. Cambridge, MA: Harvard Business School Press.
- Davis, G. F. (2013) 'Politics & Society after the Corporation', *Politics & Society* 41(2): 283–308.
- Digital Malaysia (2014) 'Crowdsourcing Service Providers (CSPs) Partner Prospectus'. Retrieved from <http://de.slideshare.net/ar1815/digital-malaysia-csp-prospectus-14-may-2014>
- Djelassi, S. and Decoopman, I. (2013) 'Customers' Participation in Product Development through Crowdsourcing: Issues and Implications', *Industrial Marketing Management* 42(5): 683–92.

- Djelic, M. and Sahlin-Andersson, K. (2006) *Transnational Governance: Institutional Dynamics of Regulation*. Cambridge: Cambridge University Press.
- Doan, A., Ramakrishnan, R. and Halevy, A. Y. (2011) 'Crowdsourcing Systems on the World-Wide Web', *Communications of the ACM* 54(4): 86–96.
- Dougherty, D. (2012) 'The Maker Movement', *Innovations: Technology, Governance, Globalization* 7(3): 11–14.
- Ebner, W., Leimeister, J. and Krcmar, H. (2009) 'Community Engineering for Innovations: The Ideas Competition as a Method to Nurture a Virtual Community for Innovations', *R&D Management* 39(4): 342–56.
- Ermoshina, K. (2014) 'Democracy as Pothole Repair: Civic Applications and Cyber-Empowerment in Russia', *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, 8(3), article 4. doi:10.5817/CP2014-3-4.
- Filieri, R. (2012) 'The How and Why of Consumers' Co-Creation: Evidence from the Fiat 500 Case Study', in *Academy of Marketing Conference 2012: Marketing: Catching the Technology Wave*, Southampton, 2–5 July, pp. 1–6. Retrieved from <http://nrl.northumbria.ac.uk/11191/>
- Franke, N., Keinz, P. and Klausberger, K. (2013) 'Does This Sound like a Fair Deal? Antecedents and Consequences of Fairness Expectations in the Individual's Decision to Participate in Firm Innovation', *Organization Science* 24(5): 1495–516.
- Franzoni, C. and Sauermann, H. (2013) 'Crowd Science: The Organization of Scientific Research in Open Collaborative Projects', *Research Policy* 43(1): 1–20.
- Füller, J. (2010) 'Refining Virtual Co-Creation from a Consumer Perspective', *California Management Review* 52(2): 98–123.
- Füller, J., Faullant, R. and Matzler, K. (2010) 'Triggers for Virtual Customer Integration in the Development of Medical Equipment—From a Manufacturer and a User's Perspective', *Industrial Marketing Management* 39(8): 1376–83.
- Füller, J., Hutter, K. and Faullant, R. (2011) 'Why Co-Creation Experience Matters? Creative Experience and Its Impact on the Quantity and Quality of Creative Contributions', *R&D Management* 41(3): 259–73.
- Gabriel, Y. (2005) 'Glass Cages and Glass Palaces: Images of Organization in Image-Conscious Times', *Organization* 12(1): 9–27.
- Gabriel, Y. and Lang, T. (2006) *The Unmanageable Consumer: Contemporary Consumption and Its Fragmentation*. London: Sage.
- Gabriel, Y. and Lang, T. (2008) 'New Faces and New Masks of Today's Consumer', *Journal of Consumer Culture* 8(3): 321–40.
- Gavetti, G., Greve, H., Levinthal, D. A., et al. (2012) 'The Behavioral Theory of the Firm: Assessment and Prospects', *The Academy of Management Annals* 6(1): 1–40.
- Goduscheit, R. and Jørgensen, J. (2013) 'User Toolkits for Innovation—A Literature Review', *International Journal of Technology Management* 61(3/4): 274–92.
- Groys, B. (2003) *Topologie Der Kunst*. München; Wien: Hanser.
- Hanekop, H. and Wittke, V. (2008) 'Der Anwender Als Innovator', *Arbeits- Und Industriesoziologische Studien (AIS)* 1(1): 7–29.
- Henn, S. (2013) 'What's Mine Is Yours (for a Price) in the Sharing Economy', in NPR Blog—All Tech Considered. Retrieved October 5, 2014, from <http://www.npr.org/blogs/alltechconsidered/2013/11/13/244860511/whats-mine-is-yours-for-a-price-in-the-sharing-economy>
- Ho, V. (2013) 'Design Competition Model Is Working for 99designs, Especially in Asia', *TechCrunch*. Retrieved February 21, 2014, from <http://techcrunch.com/2013/08/06/design-competition-model-is-working-for-99designs-especially-in-asia/>
- Howe, J. (2006) 'The Rise of Crowdsourcing', *Wired Magazine*, June. Retrieved from <http://archive.wired.com/wired/archive/14.06/crowds.html>
- Howe, J. (2008) *Crowdsourcing—Why the Power of the Crowd Is Driving the Future of Business*. New York: Three Rivers.
- Howells, J. (2006) 'Intermediation and the Role of Intermediaries in Innovation', *Research Policy* 35(5): 715–28.

- Humphreys, A. and Grayson, K. (2008) 'The Intersecting Roles of Consumer and Producer: A Critical Perspective on Co-Production, Co-Creation and Prosumption', *Sociology Compass* 3(2): 963–80.
- InnoCentive (2014) Retrieved October 5, 2014, from <http://www.innocentive.com/about-innocentive/facts-stats>
- Irani, L. and Silberman, M. (2013) 'Turkopticon: Interrupting Worker Invisibility in Amazon Mechanical Turk', in *Proceedings CHI 2013*, Paris, 27 April–2 May, pp. 611–20. New York: ACM Press.
- Jeppesen, L. and Frederiksen, L. (2006) 'Why Do Users Contribute to Firm-Hosted User Communities? The Case of Computer-Controlled Music Instruments', *Organization Science* 17(1): 45–63.
- Jeppesen, L. and Lakhani, K. R. (2010) 'Marginality and Problem-Solving Effectiveness in Broadcast Search', *Organization Science* 21(5): 1016–33.
- Kakabadse, A. and Kakabadse, N. (2005) 'Outsourcing: Current and Future Trends', *Thunderbird International Business Review* 47(2): 183–204.
- Kant, I. (1952/1790) *Critique of Judgment*. Oxford: Oxford University Press. (German Original 1790).
- Kauffman, S. A. (1993) *The Origins of Order: Self-Organization and Selection in Evolution*. New York: Oxford University Press.
- Keinz, P., Hienert, C. and Lettl, C. (2012) 'Designing the Organization for User Innovation', *Journal of Organization Design* 1(3): 20–36.
- Keynes, J. M. (1936) *The General Theory of Employment, Interest and Money*. London: Palgrave Macmillan.
- Kleemann, F. and Eismann, C. (2012) 'Fazit und Ausblick', in T. Beyreuther, K. Duske, C. Eismann, et al. (eds) *consumers@work: Zum neuen Verhältnis von Unternehmen und Usern im Web 2.0*, pp. 266–75. Frankfurt: Campus.
- Kleemann, F., Eismann, C., Beyreuther, T., et al. (2012) *Unternehmen im Web 2.0. Zur strategischen Integration von Konsumentenleistungen durch Social Media*. Frankfurt: Campus.
- Kleemann, F., Voß, G. G. and Rieder, K. (2008) 'Un(Der)Paid Innovators: The Commercial Utilization of Consumer Work through Crowdsourcing', *Science, Technology and Innovation Studies* 4(1): 5–26.
- Korzynski, M. and Ott, U. (2006) 'The Menu in Society: Mediating Structures of Power and Enchanting Myths of Individual Sovereignty', *Sociology* 40(5): 911–28.
- Lakhani, K. R. and Wolf, R. (2005) 'Why Hackers Do What They Do: Understanding Motivation and Effort in Free/Open Source Software Projects', in J. Feller, B. Fitzgerald, S. Hissam, et al. (eds) *Perspectives on Free and Open Source Software*, pp. 3–21. Cambridge, MA: MIT Press.
- Lakhani, K. R., Lifshitz-Assaf, H. and Tushman, M. L. (2013) 'Open Innovation and Organizational Boundaries: The Impact of Task Decomposition and Knowledge Distribution on the Locus of Innovation', in A. Grandori (ed.) *Handbook of Economic Organization: Integrating Economic and Organization Theory*, pp. 355–82. Northampton: Edward Elgar.
- Langner, B., Farchi, T. E. and Seidel, V. P. (2014) 'Taking the Eyes off the Prize: Recreational Labor in Innovation Contests', in *Academy of Management Proceedings*. Retrieved from <http://proceedings.aom.org/content/2014/1/12957.abstract>
- Latham, G. P. (2007) *Work Motivation: History, Theory, Research, and Practice*. Thousand Oaks, CA: Sage.
- Leimeister, J. M., Huber, M., Bretschneider, U., et al. (2009) 'Leveraging Crowdsourcing: Activation-Supporting Components for IT-Based Ideas Competition', *Journal of Management Information Systems* 26(1): 197–224.
- Lerner, J. and Tirole, J. (2002) 'Some Simple Economics of Open Source', *The Journal of Industrial Economics* 50(2): 197–234.
- Levinthal, D. A. (1997) 'Adaptation on Rugged Fitness Landscapes', *Management Science* 43(7): 934–50.
- Levinthal, D. A. and March, J. G. (1993) 'The Myopia of Learning', *Strategic Management Journal* 14(2): 95–112.
- Li, M. and Vitányi, P. (1997) *An Introduction to Kolmogorov Complexity*. New York: Springer.
- Lifshitz-Assaf, H. (2014) 'From Problem Solvers to Solution Seekers: Dismantling Knowledge Boundaries at NASA', Retrieved from <http://dx.doi.org/10.2139/ssrn.2431717>
- Linux Foundation (2012) 'Linux Kernel Development: How Fast It Is Going, Who Is Doing It, What They Are Doing, and Who Is Sponsoring It', Report, Linux Foundation, San Francisco.

- Lusch, R. F. and Vargo, S. L. (2006) 'Service-Dominant Logic: Reactions, Reflections and Refinements', *Marketing Theory* 6(3): 281–88.
- Lüttgens, D., Pollok, P., Antons, D., et al. (2014) 'Wisdom of the Crowd and Capabilities of a Few: Internal Success Factors of Crowdsourcing for Innovation', *Journal of Business Economics* 84(3): 339–74.
- McDonough, T., Reich, M. and Kotz, D. M. (2010) *Contemporary Capitalism and Its Crises*. Cambridge: Cambridge University Press.
- Mackie-Mason, J. (2010) 'Tom Sawyer Production on the Internet: Getting the Good Stuff in, Keeping the Bad Stuff Out', Retrieved from <http://deepblue.lib.umich.edu/handle/2027.42/78183>
- Marquis, C., Lounsbury, M. and Greenwood, R. (2011) 'Community as an Institutional Order and a Type of Organizing', *Research in the Sociology of Organizations* 33: ix–xxvii.
- Marvit, M. Z. (2014) 'The Wages of Crowdwork: How Amazon Created the Most Exploited Workforce You've Never Seen', *The Nation*, 24 February, pp. 18–25.
- Moldoveanu, M. C. and Bauer, R. M. (2004) 'On the Relationship between Organizational Complexity and Organizational Structuration', *Organization Science* 15(1): 98–118.
- Moody, G. (2001) *Rebel Code: Linux and the Open Source Revolution*. Cambridge, MA: Perseus.
- Moscovici, S. (1985) 'Social Influence and Conformity', in G. Lindzey and E. Aronson (eds) *The Handbook of Social Psychology*, pp. 347–412. New York: Random House.
- Mturk (2014) Retrieved February 20, 2014, from <https://www.mturk.com/mturk/welcome>
- Nickerson, J. A. and Zenger, T. R. (2004) 'A Knowledge-Based Theory of the Firm? The Problem-Solving Perspective', *Organization Science* 15(6): 617–32.
- Nyberg, D., Spicer, A. and Wright, C. (2013) 'Incorporating Citizens: Corporate Political Engagement with Climate Change in Australia', *Organization* 20(3): 433–53.
- OED (2009) *The Oxford English Dictionary*, 2nd ed. Oxford: Oxford University Press.
- Ogawa, S. and Pongtanalert, K. (2011) 'Visualizing Invisible Innovation Continent: Evidence from Global Consumer Innovation Surveys', pp. 1–19. Retrieved from <http://dx.doi.org/10.2139/ssrn.1876186>
- Papadimitriou, C. (1994) *Computational Complexity*. Reading: Addison-Wesley.
- Pattuglia, S. (2011) *Integrated Marketing Communication and Brand Management: The Case of Fiat 500*. DSI Essays Series, vol. 8. Milano: McGraw-Hill.
- Piore, M. J. and Sabel, C. (1984) *The Second Industrial Divide*. New York: Basic.
- Prahalad, C. K. and Ramaswamy, V. (2004) 'Co-Creation Experiences: The Next Practice in Value Creation', *Journal of Interactive Marketing* 18(3): 5–14.
- Raymond, E. (1999) 'The Cathedral and the Bazaar', *Knowledge, Technology & Policy* 12(3): 23–49.
- Rieder, K. and Voß, G. G. (2010) 'The Working Customer—An Emerging New Type of Consumer', *Psychology of Everyday Activity* 5(2): 2–10.
- Ritzer, G. (1999) *Enchanting a Disenchanted World: Revolutionizing the Means of Consumption*. Thousand Oaks, CA: Pine Forge.
- Ritzer, G. (2013) 'Prosumption: Evolution, Revolution, or Eternal Return of the Same?' *Journal of Consumer Culture* 14(1): 3–24.
- Ross, J., Irani, L., Silberman, M. S., et al. (2010) 'Who Are the Crowdworkers? Shifting Demographics in Mechanical Turk', in *Proceedings CHI 2010*, Atlanta, GA, 10–15 April, pp. 2863–72. New York: ACM Press.
- Rowley, T. and Moldoveanu, M. C. (2003) 'When Will Stakeholders Act? An Interest and Identity-Based Model of Stakeholder Mobilization', *Academy of Management Review* 28(2): 204–19.
- Shah, S. K. (2006) 'Motivation, Governance, and the Viability of Hybrid Forms in Open Source Software Development', *Management Science* 52(7): 1000–14.
- Shirky, C. (2010) *Cognitive Surplus: How Technology Makes Consumers into Collaborators*. London: Penguin.
- Simon, H. A. (1955) 'A Behavioral Model of Rational Choice', *Quarterly Journal of Economics* 69: 99–118.
- Simon, H. A. (1969) *The Sciences of the Artificial*. Cambridge, MA: MIT Press.
- Stangler, D. and Maxwell, K. (2012) 'DIY Producer Society', *Innovations: Technology, Governance, Globalization* 7(3): 3–10.

- Tapscott, D. and Williams, A. D. (2006) *Wikinomics: How Mass Collaboration Changes Everything*. Toronto, ON, Canada: Penguin.
- Terwiesch, C. and Xu, Y. (2008) 'Innovation Contests, Open Innovation, and Multiagent Problem Solving', *Management Science* 54(9): 1529–43.
- Toffler, A. (1980) *The Third Wave*. New York: Bantam.
- Torvalds, L. and Diamond, D. (2001) *Just for Fun: The Story of an Accidental Revolutionary*. New York: Harper Collins.
- Van Den Berg, K. (2009) 'Kreativität. Drei Absagen Der Kunst an Ihren Erweiterten Begriff', in A. J. Stephan, S. Eckhard and S. Nico (eds) *Rationalität Der Kreativität?* pp. 207–24. Wiesbaden: Springer VS.
- Verona, G., Prandelli, E. and Sawhney, M. (2006) 'Innovation and Virtual Environments: Towards Virtual Knowledge Brokers', *Organization Studies* 27(6): 765–88.
- von Hippel, E. (2001) 'User Toolkits for Innovation', *Journal of Product Innovation Management* 18(4): 247–57.
- von Hippel, E. (2005) *Democratizing Innovation*. Cambridge, MA: MIT Press.
- von Hippel, E., De Jong, J. P. J. and Flowers, S. (2012) 'Comparing Business and Household Sector Innovation in Consumer Products: Findings from a Representative Study in the United Kingdom', *Management Science* 58(9): 1669–81.
- Voß, G. G. and Rieder, K. (2005) *Der Arbeitende Kunde*. Frankfurt: Campus.
- Weber, M. (1949/1904) 'Objectivity of Social Science and Social Policy', in M. Weber (ed.) *The Methodology of Social Sciences*, pp. 49–112. Glencoe, IL: Free Press. (German Original 1904).
- Wexler, M. N. (2011) 'Reconfiguring the Sociology of the Crowd: Exploring Crowdsourcing', *International Journal of Sociology and Social Policy* 31(1/2): 6–20.
- Whitla, P. (2009) 'Crowdsourcing and Its Application in Marketing Activities', *Contemporary Management Research* 5(1): 15–28.
- Willmott, H. (2010) 'Creating 'Value' beyond the Point of Production: Branding, Financialization and Market Capitalization', *Organization* 17(5): 517–42.
- Zheng, H., Li, D. and Hou, W. (2011) 'Task Design, Motivation, and Participation in Crowdsourcing Contests', *International Journal of Electronic Commerce* 15(4): 57–88.
- Zwick, D. (2013) 'Utopias of Ethical Economy: A Response to Adam Arvidsson', *Ephemera* 13(2): 393–405.
- Zwick, D., Bonsu, S. K. and Darmody, A. (2008) 'Putting Consumers to Work: 'Co-Creation' and New Marketing Govern-Mentality', *Journal of Consumer Culture* 8(2): 163–96.

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