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23 From Open Labs to DiY Labs – Harnessing 'the wisdom of crowds' for Innovation

1 Introduction

Tapping into the 'wisdom of the crowd' to support innovation has come to dominate contemporary discourse on managing innovation at the firm level. Organised under the rubrics of open innovation (Chesbrough, 2006), this new turn to innovation management helps organisations to sense, explore, and exploit distributed knowledge, ideas, and insights, located beyond the boundaries of the firm to support organisational innovation efforts. Open innovation has become popular amongst organisations, since it enables them to delve into ideas outside of the silos of their corporate research and development [R&D] labs at a reasonable cost, as well as reduce pressure to use internal resources (Asakawa et al., 2010). Beyond these benefits, leveraging open innovation has almost become imperative for firms embedded in high-velocity environments to achieve a competitive edge (Ahn et al., 2017). In this regard many organisations have distinctive strategies, programs, and organising processes specifically designed to helping them to delve into the 'wisdom of the crowd' to support their innovation. Pushing past the boundaries of the firm, some organisations have gone as far to create spaces for their customers, suppliers, and other value network partners to interact with products and services, with the goal of them helping to create new products and services (Piller, Ihl and Vossen, 2011). Organised around the logic of co-creation or co-innovation (Wikhamn and Styhre, 2019; Leminen et al., 2018), these quintessential corporate innovation hubs, have become the focal point of attention of innovation research on open laboratories.

Several companies have developed diverse open laboratories that employ diverse methodologies to create and tap into novel and useful ideas located beyond their internal R&D laboratories (Fritzsche, 2018). Xerox, Apple, Google, and Cisco, for example, have physically set up innovative workshop centres within their firm (Berger and Brem, 2016). BMW, alternatively, partners with another lab organisation, Maker Space, which enables their staff to make use of Maker Space workshop facilities (Troxler, 2016). Others, such as DHL, host workshops for customers, to discover, discuss and co-create services to aid customers across the world (Fournier, 2017). Companies have also embarked in forming a 'digital' lab, which entails online sites for customers to discuss ideas in a forum style (Möslein and Fritzsche, 2017).

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For example, Starbucks has its own customer co-creation site, ideas.starbucks,com (What's your Stabucks idea, 2019). Customers can submit, talk through and refine innovative ideas as well as amend prototypes of new products on their dedicated site; they are then awarded for their contributions to encourage further engagement (Sigala and Chalkiti, 2015; Welch and Buvat, 2015). At the extreme end of the open lab continuum is what has come to be known as DiY Labs. These are community hub independent labs, they involve conducting basic to advanced experiments with new scientific technologies in private settings, more aptly known as 'hackspaces' (Downes et al., 2013; Halfacree, 2004). These hackspaces can be set in atypical lab environments, including for example, museums or private homes (Ellis and Waterton, 2005; Meyer, 2013). DiY Labs are also created by professionals for anyone, irrespective of their educational background and skillset (Gonlinelli and Ruivenkamp, 2016). They are based on an open-sourced principle meaning that they can involve an unlimited number of research activities (Wolinsky, 2009). Some of these labs have focussed on basic molecular biology investigations, to advance recombinant DNA technology and gene-editing (Sleator, 2016; Wolinsky, 2009; Revill and Jefferson, 2013).

While recent research on open innovation has extended our knowledge about open labs and how they may contribute to firm level innovation (Cruickshank, 2016; Toupin, 2014; Berger and Brem, 2016), our integrated understanding of how organizations could contribute and benefit from DiY Labs remains impoverished. In this regard, we know far less about the activities of DiY Labs and how the context within which they operate could potentially serve as sites for the identification of opportunities for innovation. In response, this paper seeks to extend our understanding of the emergence and significance of DiY Labs to the identification of distinctive opportunities for innovation and how organizations could contribute and benefit from them.

The paper contributes to the existing broad literature on open innovation in two ways. First, in addition to exploring the potentialities of DiY Labs to democratising science and innovation, we shed light on the emergence of new forms of organizing that may lead to the identification of opportunities for innovation. Second, we go further to suggest some potential ways of profiting from DIY Labs and calls managerial attention to new in ways to exploring and exploiting opportunities otherwise overlooked by their competitors.

The remaining paper is structured as follows. First it provides an overview of open laboratories as strategic contexts for harnessing 'the wisdom of crowds' for innovation. Next is a cursory overview of the rise and organizing logics of DiY Labs as community-based innovation hubs. Following this, we delineate the potentialities of DiY Labs serving as a context and opportunity for the identification of opportunities for innovation. We then propose some potential ways organizations could profit from DiY Labs, as demonstrated with a Heuristic Framework before we conclude.

2 Open Laboratories as Innovation Hubs

Open laboratories offer a range of benefits for the organisation they form part of, primarily enabling the firm to have access to complementary technologies, knowledge, and ideas to support their innovation activities (Thestrup and Robinson, 2016). Open laboratories could potentially help firms to make strategic use of their external environment to capture ideas and also monitor how their internal inventions are utilised by their customers and other external actors (Chesbrough and Crowther, 2006). In this regard, open laboratories promote inbound open innovation, through engaging back and forth with customers and other organisations, to trigger the development of product innovations (von Hippel, 2009; Chesbrough, 2006). Open laboratories do so by putting staff and customers together to collectively align on new concepts, crucially empowering customers to work with firms to find and develop novel solutions to their problems (von Hippel, 2009; Cruickshank, 2016). Hatch (2014) reports that firms partnering with workshop organisations like Fab Labs are able to provide customers tools to directly produce prototypes and solutions for free or at an affordable price during their open laboratory workshops, bringing their innovative solutions to life. From a wider perspective, firms can also enhance their commercial awareness as they probe and evaluate social trends, open-ended futures, and inarticulate and unconscious societal aspirations that are discussed within open laboratory workshops (Toupin, 2014). Existing evidence suggests that many firms have benefited from these innovative open laboratories. DHL for instance, noted that their workshops with customers significantly improved their rate of customer satisfaction (Fournier, 2017). Accenture has also developed its own Innovation Hub which acts as a valuable tool for the corporation to showcase their innovations to partners, clients and other stakeholders (Accenture, 2019). Elsewhere, Starbucks engaging their customer base through their 'online' open laboratory have been soliciting for new ideas to support their innovation processes (Ståhlbröst et al., 2013).

Open laboratories grant organizations the power to vary the approach they take to manage conversations and the entire innovation discourse they seek to orchestrate (O'Hern and Rindfleisch, 2010). Such control over the operation of the open laboratory workshop, organizations can obtain stakeholder perceptions of a service they are developing, gathering feedback in stages, and extending the organizations understanding of the conditions under which their innovations could potentially be speciated (Chesbrough and Crowther, 2006). As an extension of outbound innovation, Fritzsche (2018) noted the influence of open laboratories on how organizations could cultivate and nurture their corporate foresight potential so they could survive better in their business environments frequently characterised by change, ambiguity, and complexity. Providing opportunities for organizational members to subject their assumptions to scrutiny, and question the viability and sustainability of their business models *vis a vis* competing alternatives (Fritzsche, 2017; Rene, 2010). Akin to the DiY movement of the late 20th century (e.g. Toffler 1980), community hub

independent labs conducting basic to advanced experiments with new scientific technologies are gaining popularity. We argue that these communal labs, often-referred to as DiY Labs, which are popping up in cities around the world (Kuiken, 2016; Rognoli, 2015), could potentially serve as sites for the identification of opportunities for innovation.

3 Do-it-Yourself (DiY) Labs

Organised around open-source principles, DiY Labs are independent community-based science research hubs, often set up by Scientists and Science Enthusiasts to learn, experiment and get involve with the world of Science, technology and innovation [STI] advancement. These 'citizen laboratories' are flourishing because they are attracting volunteers, communities, groups, and venture capitalists, making them alternative homes for talent located within and beyond the theoretical boundaries of universities and organizations keen to open up the processes of science, technology, and innovation to the public (Hecker et al., 2018; Sleator, 2016; Landrain, 2013). In carrying out basic and often advanced experiments in private buildings often labelled as 'hackspaces', DIY Labs are challenging the near monopoly of traditional institutions such as universities and private organizations as the fundamental locus for practicing science (Downes et al., 2013; Halfacree, 2004). They do this by providing context for people to meet at unconventional settings and locations to try their hands on scientific experiments, discuss and share knowledge on emerging technological trajectories, and alternative potential means to push scientific frontiers further. Providing scientific educational outreach and putting tools into the hands of those who want to learn, DiY Labs have come to represent a platform for science and engineering innovation at the grassroots level. Thus, the new turn to DiY Labs promise to demystify and democratise STI by enabling amateurs to conduct basic and surprisingly complex experiments (Sleator, 2016; Meyer, 2013), and fostering citizen science in areas such as molecular biology, recombinant DNA technologies, bioinformatics, genetic engineering and gene editing [e.g. CRISPR/Cas9] technologies.

Recent concerns and apprehensions about the operations and regulations of DIY Labs (Ferretti, 2019; Wolinsky, 2009), their ethical implications (Fiske et al., 2019; Wexler, 2016), and the ambivalences of their hazards in fostering responsible science (Tanenbaum, et al., 2013), have put these labs in the spotlight. Critics have gone further to argue that DiY Labs pose security threat to public health and environmental safety as they often operate free from rules and regulations that oversee the operations of the well-established firms and universities (Gorman, 2011). Their unregulated experiments, conducted in rudimentary facilities including kitchens and garages, often breach international laboratory protocols, and as argued by Revill and Jefferson (2013), might accidentally or intentionally unleash devastating

consequences on human life. Beyond these concerns, we see DiY Labs as a natural extension of open laboratories whose potentialities in challenging organizations and universities as the only place to do serious research, offers an alternative model for the search and identification of opportunities for innovation (Seyfried et al., 2014). The starting point for organizations to profiting from these labs, we argue, is to commit to the new turn to democratising innovation, engaging with DiY Labs, and treating them as independent open-ended innovation crucibles, whose activities and practices could start or disrupt existing innovation and technological trajectories.

4 DiY Labs as Open Innovation Crucibles

While many DiY Labs tend to specialise in particular innovation and technological domains, they frequently have no limits on the 'research' and innovation activities they can undertake. Conceptualised as innovation crucibles (Gonelli and Ruivenkamp, 2016), we argue that the open source principles on which DiY Labs operate qualifies them as quintessential sites for the identification of limits and the generation of opportunities for innovation that could be tapped by organizations in three distinct ways.

Firstly, these laboratories provide unprecedented spaces for people from diverse occupations to collaborate and explore scientific problems in the same environment. DiY Labs therefore serve as a locus to sharing and mobilizing differential, competing, and often disparate visions of individuals to pushing further the frontiers of science, technology, and innovations that have the potential to change lives (Sarpong and Maclean, 2012).

Second, free from bureaucracy, protracted funding, and the trappings of the traditional publishing systems, DiY Labs are able to respond to the discontentment of formally organized research communities to explore place emphasis on alternative ways of 'doing' science and prioritise free open access channels to 'communicating' science (Wolinsky, 2009; Nicholson, 2012). In so doing, DiY labs have come to represent the centres of excellence that conduct basic and, mostly, blue-sky research that might otherwise not be funded by research councils because value cannot be readily captured from their current applications (Griffiths, 2014; Ferreti, 2019). In exploiting new technologies such as 3D printing to help them induce cheap and cost-effective lab equipment for their experiments, DiYLabs are not only becoming viable centres to pursuing 'serious' science outside universities. They are gradually becoming much more accessible to the public as the cost of running them keep going down (Tanenbaum et al, 2013).

Third, many DiY Labs tend to host volunteer-organised 'hackathons' where technical people and laymen are invited to work together to find creative ways of "overcoming the inherent limits of a system, improving, re-appropriating or

subverting it beyond the original intentions of its creator" (Patterson, 2017). Such innovation festivals, we argue, provide a playful environment for creative individuals to assemble, wind-tunnel their ideas, and build collaborative projects in safe spaces.

5 Capturing Value from DiY Labs

Beyond the hope and hype, the ownership structure of most DiY Labs, the cost of running them, and the open source principles on which they operate presents challenges for the management of their intellectual property and patent rights (Landrain et al., 2013; Gorman, 2011). How could organizations potentially create and capture sustainable value from DiY Labs? In responding to this lacuna, we present a heuristic framework that could provide organisations with relevant insight into their own ways of organising and managing their innovation activities that can prepare them to capture sustainable value from DiY Labs to support their innovation activities.

Our heuristic framework is organised on the premise that the focal firm has a R&D function embedded within their organisation. As shown in the Figure 23.1, the dotted arrows indicate the continuous flow of boundary spanners or personnel joining DiY Labs. We delineate key ways organisations could capture value from DiY Labs along three lines of attention. First, by incentivising employees to join DiY
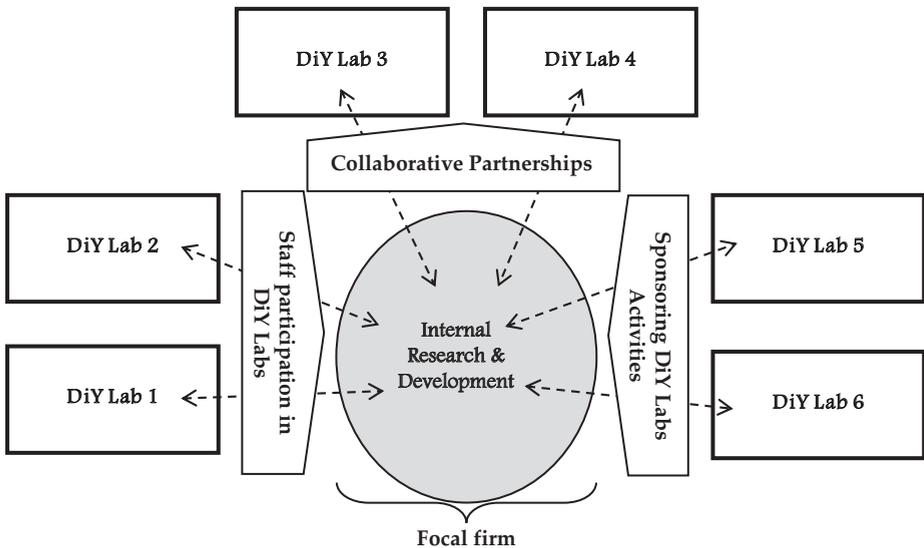

Figure 23.1: Capturing value from DiY Labs.

Labs so they may be exposed to new ideas and insights located beyond the confines of firms' R&D labs. The second involves the orchestration of strategic partnerships with DiYs so they can access their potentially complementary knowledge and ideas to support their organizing processes. Finally, they stand a greater chance of capturing sustainable value from DiY Labs by sponsoring their Hackathon tournaments that have come to represent independent strategic creative forecasting sites.

5.1 Incentivising Staff to Join DiY Labs

Joining a DiY Lab is the first step to gaining first-hand access to their praxis and the discourse shaping their everyday doings and organizing. In this regard, the starting point for organizations seeking to profit from DiY Labs is to encourage their employees to join DiY labs in their communities. In particular, organization can create and develop specific incentives schemes aimed specifically at their R&D employees to get them jump onto the DiY bandwagon. Following their participation in DiY Lab events, R&D teams can organise periodic internal meetings, for staff to discuss and share their experiences in participating in DiY Labs and potentially what the organization can learn from them. In order to obtain buy-in to such scheme, organizations may have to proactively endorse the advantages of these DiY labs to their employees, highlighting the possibility of sharing their skills with other professionals, and contributing to improving the public understanding of science (Sleator, 2016; Meyer, 2013).

Bring employees into contact with customers, DiY Labs provide a platform for communicating and scrutinizing new ideas (Songwu, Riqi and Anping, 2009; Seyfried et al., 2014; Berger and Brem, 2016). Providing context for employees and customers to interact in real time, continuously reflect on their "doings", share their thoughts, and describe their interpretive schemes, they serve as sites for enacting new techno-structures and wind-tunnelling ideas in safe environments. This rich, socially embedded know-how can be contextually captured to improve customer capabilities, business models, and in turn sustainable value creation and capture (von Hippel, 2009 Chesbrough, 2006). DiY laboratories thus have the power to not only develop the talent of the focal firm, they also put staff in the driving seat to accelerate innovative changes within the firm.

5.2 Establishing Strategic Partnerships with DiY Labs

Beyond encouraging their employees to join DiY Labs, we encourage organizations, particularly, their R&D departments, to go further to establish strategic partnership with DiY Labs within and beyond their immediate geographical location. The ultimate objective here is to unearth exactly what actors involved in DiY Labs actually

do, thereby bridging the gap between the theory and practice of innovation as something people do. These partnerships could involve supporting the research that DiY Labs undertake and backing them as genuine research hubs. However, these strategic partnerships should be based on two caveats, the first being that the firm's R&D employees and other employees can freely access these DiY Labs with ease, thus facilitating our first recommendation to incentivise staff to join DiY Labs. The second being that to a certain degree, the research undertaken at these DiY Labs should in the broadest sense, be ethical, near cutting edge, and if possible be of interest to the focal firm. This could involve projects in search for commercial applications and strategic fit between technology and markets aimed at enhancing product portfolio (O'Hern and Rindfleisch, 2010). These strategic partnerships with DiY Labs may also entail the building of a series of alliances with other businesses, universities, and institutions that may also sought to build bridges with with DiY Labs. Such initiatives, we surmise, do not only have the potential to mobilise different actors within an innovation eco-system focus on exploring specific nascegeneric technologies with broad potential applications (O'Hern and Rindfleisch, 2010). They also legitimise the new research model promoted by of DiY Labs, support their growth in the community, and in turn, contribute to the new turn to democratising innovation (von Hippel, 2009; Chesbrough, 2006), and support the research performance of the focal firm (Asakawa, et al.,2010).

5.3 Sponsoring DiY Labs and their Hackathon Tournaments

As an extension of the strategic partnerships forged between firms and independent DiY Labs, we propose that firm's as part of the R&D investment can support DiY Labs and their creative forecasting events. These events which frequently take the form of Hackathon tournaments do not entail the search for technical precision; neither do they require just technical skills for people to take part. Rather, it's about usefulness and the identification of viable area(s) of application following the development of a technology (Joe and Fiona, 2018; Simon, 2015). Thus, Hackathon tourneys provide opportunities for the study how people interact with technology in their daily practices and the resultant enacted structures [rules and resources instantiated in recurrent social practice], are (re)constituted in their recurrent engagement with the technologies at hand. Sponsoring such events, we argue, gives the organizations the incentive and leverage to uncover new layers of meaning and stake their claim in framing the initial boundaries of emerging technologies. At a time when scarcity of highly skilled talent in the technology world is becoming a real challenge, having access to such events provide opportunities for winning the race to identifying and recruiting talent otherwise overlooked by competitors to supporting the focal firms in-house innovation activities.

6 Conclusion

In this paper, we have sought to examine the organizing logics of open innovation, focusing on DiY Labs, and how organisations could potentially profit from them. Conceptualized as innovation crucibles, we unpack how these Labs have come to represent a strategic site for the identification of opportunities for innovation. Organized along three strategic lines of attention, we delineate three mutually inclusive ways of organizing that could potentially support organizations to benefit from the activities of DiY Labs. These includes incentivising staff to join local DiY labs, the active building of strategic partnerships with DiY Labs, and committing to sponsoring DiY Labs and their Hackathon events. Departing from the essentialist view of prescribing rules of engagement, to placing emphasis on what organizations can do to exploit the potentialities of DiY Labs, our heuristic framework on capturing value from DiY Labs, we surmise, could be leveraged by organisations' to harness and exploit ideas from DiY Labs to support their innovation activities in ways otherwise overlooked by their competitors.

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