

# Communal innovation: collective creation towards wellbeing

Juan David Reina-Rozo

Working Paper 02  
January 2019



MIT D-Lab  
Local Innovation Group

New Directions in Innovation Research  
Working Paper Series

# New Directions In Innovation Research Working Paper Series

This working paper series highlights research on emerging topics within the multi-disciplinary field of innovation studies by faculty and researchers based at and affiliated with MIT D-Lab. The series is intended to promote the early release of D-Lab research and to provide free, public access to working versions of papers which might subsequently take the form of journal articles.

Readers are encouraged to provide feedback, critique, and comments to the authors. Comments and feedback can be submitted to: [juandar@mit.edu](mailto:juandar@mit.edu)

---

## About the Author

Juan David Reina-Rozo is a PhD candidate in Engineering, Industry and Organizations at the Universidad Nacional de Colombia, where he founded the Technology and Innovation for Community Development Research Group. During the 2017-2018 year, he was a visiting Research Affiliate with the Local Innovation group at MIT D-Lab. He has a Bachelor in Industrial Engineering and a Master in Development and Environmental Studies. Juan David is a Fulbright Fellow and contributor to Engineering for Change.

## MIT D-Lab Local Innovation Group

D-Lab's Local Innovation Group conducts multi-disciplinary research on innovation processes and outcomes in communities facing development challenges around the world, particularly in the Global South. The group focuses on understanding innovation in under-studied contexts, including grassroots and community-based settings.

Through research and evidence synthesis, the group develops actionable knowledge on how innovation works in these contexts and how it can be effectively encouraged to promote sustainable local and regional development.

## Acknowledgments

The author acknowledges Alejandra Boni, Claudia Grisales, Elizabeth Hoffecker, Franziska Curran and Leonardo León for the comments and questions that allowed for the creation of space to reflect on innovation and collective action.

Cover photo: Arquitectura Expandida & Ojo al Sancoho (2017). “La Potocine Sala de Cine autogestionada y comunitaria.”

## Suggested Citation

Reina-Rozo, J. 2019. Communal innovation: collective creation towards wellbeing. D-Lab Working Papers: NDIR Working Paper 02. Cambridge: MIT D-Lab.

---

## MIT D-Lab

Massachusetts Institute of Technology  
MIT Building N-51, 3rd Floor  
265 Massachusetts Avenue  
Cambridge, MA 02139 [d-lab.mit.edu](http://d-lab.mit.edu)

Papers published in the NDIR Working Paper Series remain the intellectual property of their author(s), who retain all copyrights. All opinions expressed are those of the author(s) and do not necessarily reflect the views of MIT D-Lab or the research sponsors.

# Communal innovation: collective creation towards wellbeing

NDIR Working Paper #02  
January 2019

Juan David Reina-Rozo  
Universidad Nacional de Colombia

"Innovation comes from anywhere. Scientists and engineers do not have a monopoly of the imagination."

Akrich, Callon, Latour and Monaghan (2002, p. 212)

## Abstract

This article introduces the concept of “communal innovation” as the collaborative process through which marginalized communities or community-based organizations transform their social and ecological environment towards collective wellbeing. Communal innovations are emerging from place-based ontologies that allow for the construction of futures beyond the promise of “development.” In these contexts, design, and particularly collaborative design (co-design), is identified as a central tool to create plural notions of science, technology and innovation. This paper draws from literature in the fields of critical development studies, de-colonial studies and innovation studies, among others, to clarify the limitations of the conventional market-oriented innovation framework and to explore the possibilities for marginalized communities to create their own transitions towards collective wellbeing through a bottom-up perspective. The reflections which emerge from this analysis open new pathways for the engagement of the academy and civil society organizations to foster autonomy, freedom and communality in partnership with marginalized communities.

## 1 . Introduction

There are a number of global trends affecting the state of the planet and its societies that are of crucial concern and demand urgent attention and action. Thousands of ecosystems and species disappear each year and the consequences for communities<sup>1</sup> that depend on their relationship with nature is still unknown. Scientists are now arguing that the sixth mass planetary extinction of animal and plant species is

---

<sup>1</sup>For this text, “community” is defined as the set of people who share a territory and characteristics, desires, aspirations and/or challenges.

underway and is being caused by human activity (Ceballos et al., 2015; Ceballos et al 2017). Soil degradation affects 3.2 billion people (IPBES, 2018) and due to climatic, political and economic issues, millions of refugees and internally displaced people will be affected in the coming decades (Environmental Justice Foundation, 2017). Additionally, according to Rockström, et al. (2009) we have exceeded three of the seven planetary boundaries: climate change, rate of biodiversity loss, and nitrogen cycle.

In this context, it is important to raise the concept of the crisis of civilization (Leff, 2004, 2006), although it is a crisis of the Western notion of civilization. Negative effects on millions of living beings are being caused by a model of capitalist development based on extraction and consumption beyond the capacity of ecosystems' regeneration and people's resilience. This model of development as economic growth, represented reductively as GDP per capita, emerges from a singular and hegemonic world view, which reflects a thoroughly modern rationality and ontology (Sachs, 1992) (Sachs, 1992). Given the demonstrated lack of sustainability of this model, it is necessary to understand the processes that are affecting the urban and rural communities of the world, and the ecosystems on which they are interdependent, and more critically, to find collective solutions to generate new possible futures for these societies. Additionally, it is critical to make visible and celebrate the collective actions that groups, alliances and social movements are carrying out from all corners of the world to face the numerous aforementioned challenges.

Boaventura de Souza Santos warns that societies face modern problems for which modern solutions do not yet exist (2009). These complex problems caused by modernity must be confronted by complex solutions from other ontological perspectives. These, in turn, come from other worldviews, where new relationships, ways of knowing, knowledge and praxis are woven together for the creation and legitimation of other possible worlds. Building on this conceptual foundation, this paper problematizes the classic ideas of innovation, which have played an important role when it comes to reproducing the economic inequalities and power relations between the North and South in the context of the development myth (Munck & O'Hearn, 1999; Tuckner, 1999).

While the Eurocentric conception of innovation is still prevalent in many parts of the world, recently alternative conceptions of innovation are emerging in the academic literature and discourse. The objective of this paper is to explore and build on these alternative conceptions, focusing specifically on innovation processes which are led by marginalized social sectors. This paper therefore contributes to the study of innovation in informal and community-based settings, as well as to efforts to transform the broader discourse around innovation and its role in development. We start by discussing the role of co-design as a framework to create new and collective solutions to social and technological issues. This perspective offers an opportunity to suggest a plural idea of science, technology and innovation. We then formulate and introduce the concept of "communal innovation" as a new term to describe a collective process whereby marginalized communities create autonomous, free and breakout innovation. This term

is developed from a literature review of related concepts as well as from reflection on alternative epistemologies and ontologies.

The concept of communal innovation allows us to understand the creative and collective processes of communities that are affected by the hegemonic economic and cultural model of Western development from the perspective of locally-based practices and what is termed “the communality.” The communality refers to the construction of integral life collectively. As an ontological framework, the communality is based on the practices of the indigenous peoples of the Sierra Norte de Oaxaca (Mexico) and is composed of four “moments:” nature, social organization, production and reproduction, and enjoyment and exchange (Esteva, 2015; Martinez Luna, 2017). By developing the concept of communal innovation, this paper explores how innovation can be understood and re-envisioned from within other ontologies and epistemologies, such as that of communality, which exist within many of the world’s marginalized communities.

Additionally, we present the notions of ecologies of knowledge, transformation and innovation as ways to understand the collection of actors and relations in the communal innovation processes that have roots in specific places. We then further discuss the transitions discourses that have been emerging as an alternative to the Western development construct. Finally, we address some ideas for further research based on opportunities and challenges in the academic sector, and provide conclusions regarding the relevance of the concept of communal innovation to the practice of new processes of science and technology with marginalized communities.

## **2. Co-design for another science, technology and innovation**

Autonomous designs and Southern designs have emerged in recent times as alternatives that seek to recompose and redirect traditional design practices (Escobar, 2017, 2018, Gutiérrez, 2013, 2015a, 2015b). These approaches suggest the integration of new qualities into the paradigm of design, such as collaboration, plurality, participation and decentralization (Manzini, 2015). This kind of design is “called to create other worlds,” from different ontologies and epistemologies beyond the Western one (Escobar, 2017). This is a decolonial perspective which seeks to strengthen, rather than to erode, the collective autonomy of peoples and communities in the peripheries of the world where they still survive. In this context, Escobar argues clearly that, “new methods emphasize research in the initial phases of the process, with the designer as a facilitator and mediator rather than an expert; conceive design as eminently user-centered, participatory, collaborative and radically contextual” (2017, p.100).

This kind of collaborative design or co-design has been positioned by practitioners as an open and plural approach (Manzini, 2015). This is a novel lens which not only allows for the participation of new actors in the design process but also creates space for them to affect its dynamic with their knowledge, skills, resources, experiences, and

relationships. These dynamics are appropriate and generated by affected communities, not only by expert designers. This notion of co-design questions the tradition of authorship in various fields of knowledge, including product design, urbanism, architecture and engineering (Escobar, 2017). Starting from this reflection, the emergence of Autonomous design and Southern designs will have to intervene in the processes of science, technology and innovation and otherwise, in engineering as a whole.

Engineering is, in essence, a design profession, therefore, it is necessary to bring its practice face to face with the sectors of society, especially marginalized or subaltern communities, who have experienced the consequences of engineers' "technological creations." Ivan Illich argues that there must be an integration of science and modern technology with "tools that are usable with a minimum of good sense and learning" (2015, p. 87), that is, with other knowledge and senses. To add to the above, Ashis Nandy suggests that "modernity knows how to deal with those who are anti-science or anti-technology; it does not know what to do with those who use plural concepts of science and technology" (1987, p. 137). This paper argues that it is urgent to create plural and diverse conceptions of technoscience and innovation, broadly, collaboratively and from the subaltern communities.

A framework of science and technology that is relevant to marginalized communities allows us to think about the perspective of "situated technologies" that, in Escobar's words, "are not decontextualized and neutral, they are incarnated, place-based, convivial, [and] easy to use" (2017, p. 101). This lens on science, technology and innovation at the local level deserves more attention at the theoretical and practical level so that its design, creation and management processes, as well as its challenges and opportunities, can be understood (Ehn, Nilsson, & Topgaard, 2014). Escobar argues that "the application of Western expertise and technology to solve development problems privileges foreign, technological and usually commercial solutions at the expense of local political action or practice" (2017, par. 135). This is reflected in the conventional and widely-accepted definition of innovation, such as that found in the Oslo Manual, which states, "a common feature of an innovation is that it must have been implemented. A new or improved product is implemented when it is introduced into the market" (2005, par. 150)

Technological optimism and market-focused innovation have been the norm in traditional "development" interventions and even in the relationship between the university and society. In this case, Nandy suggests that "of all the utopias that threaten to totalize human consciousness the most seductive in our times has been the one produced by modern science and technology" (1987, p. 10). Meanwhile, Brown notes that (2009, p. 3) "a purely technocentric vision of innovation is less sustainable than ever ... what is needed is an approach to innovation that is powerful, effective and widely accessible." According to these scholars, a new narrative about innovation from

below must emerge collectively and seek to create transformative alternatives.

These reflections have gradually gained ground in social organizations, institutions and academia. For several decades, studies and initiatives have existed that claim the role of innovation for the general welfare and the commons, with a perspective that questions conventional notions of innovation. For example, the University of Sussex made an effort in 1969 to propose a series of recommendations to the United Nations within the framework of a new conception of science and technology, known as the Sussex Manifesto. Despite continuing to promote the idea of the modern science and technology paradigm, this manifesto called for a radical change in the international action and debate on the role of techno-scientific knowledge in the world and its relationship with the "underdeveloped" world (The Sussex group, 1969). Forty years later, the STEPS Center published the New Manifesto, in which they propose innovation as:

...not only science and technology, but also (and crucially) the related set of new ideas, institutions, practices, behaviors and social relationships that shape patterns, purposes, applications and scientific and technological results... Challenging these forces means promoting innovation that really works for marginalized people and environments that are currently threatened (STEPS Centre, 2010, p. 3).

Within the last decade, perspectives such as user innovation (Henkel & von Hippel, 2005; Von Hippel, 2005), open innovation (Chesbrough, 2003; Lichtenthaler, 2011), free innovation (Von Hippel, 2017), breakout innovation (Levitt Cea & Rimington, 2017) and autonomous innovation (Bahadur & Doczi, 2016) have emerged within groups, initiatives and national and international organizations. Despite this, when external actors intervene in local contexts to promote innovation, more often than not they are still operating out of the conventional framework of market-oriented innovation. Nevertheless, in a growing number of local contexts – particularly where populations are marginalized, low-income, or victims of conflict, non-market oriented approaches to innovation have emerged and are increasingly being studied and discussed in the social sciences. Some of the most relevant of these concepts from within the innovation literature<sup>2</sup> include: grassroots innovation (A. Gupta, 2012; A. K. Gupta et al., 2003; Smith, Fressoli, Abrol, Arond, & Ely, 2017), citizen innovation (Caamaño & Pascale, 2014), community innovation (Sheikh, 2014), jugaad or frugal innovation (Radjou, Prabhu, & Ahuja, 2012), humanitarian innovation (Betts & Bloom, 2014; Scriven & Gilmour, 2016), inclusive innovation (Heeks, Foster, & Nugroho, 2014) and the well-known social innovation (Moulaert, MacCallum, Mehmood, & Hamdouch, 2014).

The aforementioned concepts refer either to the population towards which they are

---

<sup>2</sup>For more information, consult the review of the literature by Pansera and Martínez (2017).

oriented (grassroots, citizen or community), the objective they pursue (humanitarian, inclusion or social) or even the practice on which they are based (jugaad or DIY). These perspectives are used to study initiatives and innovation processes around the world, some with more experience in specific geographies and others used mostly in the last decade. These different conceptions of innovation are sometimes used interchangeably in the literature and particularly in the development interventions at local level (Pansera & Martinez, 2017). Within the management and development of such initiatives, in some cases processes appear bottom-up in nature, whereas in other cases they resemble more traditional, top-down structures. However, some authors seem to continue conceptualizing mainstream innovation in general terms, despite conceptual advances, which means that innovation continues to be reduced to expert groups at the service of capital, oriented to markets and economic gains (Ehn et al., 2014).

### **3. Communal innovation: innovating together for another possible world**

Conceptual, theoretical and practical reflections around place-based innovations are necessary. A place-based approach, which is understood as the relationship between people and communities and their territories, is increasingly threatened. This local perspective faces more challenges today, given the hegemonic power of globalization on the planet. Escobar points it out as "the survival of the fabric of life in the place and the community, and therefore in difference, against the homogenizing capitalist pretension of transforming all peoples into economized and de-located citizens" (2017, p. 151). Now is time to foster innovation from the below.

Along these lines, Escobar adds that "solutions grow from place" (2010, 2017, 2018), where contextuality, conviviality and relationality are evidenced as fundamental characteristics of the innovation processes in the territory (Illich, 2015). The objective of this idea is to legitimize the knowledge and experience of marginalized social groups as a starting point and end of the co-design and innovation processes that wish to transform prevailing conditions in order to advance collective conceptions of wellbeing. This is how innovation from the communities becomes relevant, starting from the individuals that make up these collectives and organizations, who participate and collaborate to generate new meanings, forms, solutions and creations. This collective and autonomous process is based on the concept of local innovation, which refers to "the process by which people in a given location discover or develop new and better ways of doing things, using the resources available locally and by their own initiative, without pressure or without the direct support of formal research or development agents" (Wettasinha, Wongtschowski, & Waters-bayer, 2008, p. 4).

Local innovation, as described by these authors, is often generated by exploring curiosity or adapting to environmental, socio-economic or political changes in the local context, not exclusively or even predominantly for market-oriented purposes. The results of these local innovation processes can be technologies, institutional configurations or social organization (Wettasinha et al., 2008; Hoffecker, 2018).



However, both practitioners and academics have underrepresented collective political action as an essential factor of local innovation, particularly in the Western literature on this topic. Yet numerous examples of collaborative projects have been observed in which local actions create new meanings, practices and functions (Manzini, 2015). In Manzini's research around the world both in the Global North and South, he found that these initiatives share four common characteristics: their results are small, local, open and connected.

Although these processes of innovation have existed throughout history in the adaptation of communities and societies to challenges or opportunities in their territory, the context of neoliberal capitalism has created the need to overcome the individualistic paradigm of innovation towards a social and collective one, along the lines of the transformative change innovation frame (Schot & Steinmueller, 2018). We need a new pathway that includes plural processes of knowing, being, and creating emerging from an interconnected and collaborative vision of life (Escobar, 2018). Von Hippel, for example, argues that user innovation transcends typical forms of capitalist appropriation, given that it is often oriented towards collective use and free access (2017). In this sense, the results of innovation processes should be considered commons<sup>3</sup> (Bollier, 2014; Mattei, 2013). Bollier argues that these commons imply a different way of seeing, being and knowing, an alternative model to the traditional conception of development and thus, move towards another mode of socio-natural life mediated by these commons (2014).

A central element in the idea of the commons is collaboration. Innovation should be considered a living exercise in collaboration within the communities or grassroots organizations, as well as between them. This principle of dialogical collaboration is fundamental when different conceptions of the world or ontologies participate in the process to create and promote innovation. In particular, these exercises must materialize through a set of organizations that allow for the generation of the conditions of governance, administration, autonomy, mutuality and norms that these dynamics require (Thomson & Perry, 2006). According to Manzini, collaborative organizations should be considered "as bottom-up initiatives, not because everything happens at the grassroots level, but because the preconditions of their existence is the active participation of the people affected" (2015, p. 83). However, these organizations require other factors for their success, such as research, experimentation and the creation of prototypes to platforms, local networks and community-oriented tools (Escobar, 2017).

In the absence of concepts that describe innovation processes from subaltern communities and that create alternative futures, Communal Innovation (CI) is introduced as an emerging concept, which I define as the process of iterative innovation carried out by marginalized communities in response to contextual factors. This allows

---

<sup>3</sup>This term has several meanings in Spanish, while in Spain it is considered *procomunales*, in Latin America it is called *bienes comunes*.

the autonomous design and creation of pertinent, contextual and collective solutions to challenges, opportunities and aspirations in order to generate commons and, therefore, to move towards communality. This process is mediated by the collaboration of community members, communities and organizations in the territory.

Examples of processes of communal innovation include traditional farming practices. These farming practices are based on agricultural systems - and in some cases agro-ecological systems - with production intended for subsistence and for the market. Especially in the global South, peasants have created systems and life projects in order to maintain their own way of living, such as Food Sovereignty, which is “intended to combat the corporate food regime and the neoliberal frame of food security that sustained it” (McKeon, 2015, p. 243), or the Community Seed Banks, which are “initiatives that allow farmers access to planting material they desire, whilst maintaining agro-biodiversity” (Lewis & Mulvany, 1997, p. iv). Here, the role of biodiversity, the link with the territory and the interrelationships between the communities are essential. These processes led by smallholder farmers and organizations such as La Vía Campesina are localized, organic, flexible, shared and democratic, and as a result, those initiatives have been considered as a way out of the food crises (Escobar, 2017).

Communal innovation can also be found in urban communities that build their own infrastructure in a collective and open way. For example, in Ciudad Bolívar, a vulnerable and informal urban neighborhood in the southern edge of the city of Bogotá, Colombia, a collaboration between local residents, artistic and architectural collectives and educational groups resulted in Colombia’s first community-generated and collectively managed non-commercial cinema, “Potocine” (Franco, 2017). Another example involved the creation of a “free culture space” in Madrid called El Campo de Cebada (Corsín Jiménez, 2014), an initiative that is situated and contextualized to the local environment and culture.

These processes originated from the nonlinear exploration of collaboration, they are iterative and cyclical creations that strengthen community processes. Therefore, one can draw on the analogy of the spiral<sup>4</sup> to understand these processes: as the innovation process generates commons and knowledge, it becomes more robust and brings together more actors or organizations with the intention of participating in the collaboration (see Diagram 1). Thus, communal innovations have the qualities set out by Manzini (2015), which are the openness and freedom, the autonomy, and also the breakdown of the traditional top-down practices of formal innovation. Finally, these processes strengthen the interrelations of the communities with other actors of society in complex networks of innovation.

---

<sup>4</sup> In many indigenous communities, especially in Latin America (or Abya Yala) the spiral represents the cycle of life for their members. In this case, we create the analogy to cycles of iteration in the design and innovation process.



Diagram 1. Communal innovation process

The sets of collaborative organizations that participate in the innovation activities, in Manzini's words, generate an "ecology of collaborative encounters"; where the interactions between the actors of them are complex, adaptive and interdependent. In this way, collaboration is based on relationality, to face the issue of the disconnection of individuals (Escobar, 2017). Keeping this idea of collaborative ecologies, societies are becoming "laboratories of new ways of being and doing" (Manzini, 2015, p. 122).

### 3.1 Ecologies of knowledge, transformation and innovation

The notion of ecology comes from the natural sciences and refers to the interrelations of different living beings with each other and with their environment. One of its main units of analysis are ecosystems, which are communities of living organisms that share the same habitat. The analogy of ecology aids in understanding the processes of communal innovation, from the interrelations between the actors and their natural environment at the local level. Escobar proposes the concept of territorial ecologies, which are networks of ecosystems, places and communities (2017). On the other hand, the term of knowledge ecologies (de Santos Souza, 2012) has emerged from the social sciences to designate the constellation of the different types of knowledge, experiences and processes of knowledge construction, in particular of the epistemologies of the South (de Santos Souza, 2009). One of the main premises of the idea of knowledge ecologies is that the diversity of the world is infinite in epistemological terms. Likewise, the idea of the ecology of transformation has been raised as a route to counteract the ravages of global capitalism and to build sustainable communities (Hathaway & Boff,

2009). Among the components of this concept are rootedness in place, ecological justice, biological and cultural diversity, bio-regionalism, participatory democracy, and cooperative self-organization.

Building on these ideas, it is reasonable to find a multiplicity of uses for the concept of ecology as applied to social processes; furthermore, this collection of ecologies can be articulated and they are not mutually exclusive. In the previous cases, these ecologies allow us to analyze complex processes at the territorial scale and the local level, legitimizing tacit or traditional knowledge<sup>5</sup> of marginalized communities around social transformation. It should be noted that this idea does not intend to simplify social processes to mere relationships between actors and their exchanges; these processes are mediated by complex social dynamics such as power relations, oppression, exclusion, and others. However, the phenomenon of innovation is related to the notion of ecology. Wulf proposes the idea of the ecology of innovation as the set of "interrelated institutions, laws, regulations and policies that provide an infrastructure of innovation that implies education, research, fiscal policy and protection of intellectual property, among others" (2007, p. 1253). This notion of innovation ecologies allows innovation studies to connect to the study of science and technology (for example, actor-network theory), given its focus on actors as well as the relationships between them.

Processes of communal innovation are interrelated in the territories through networks or ecosystems made up of different actors, which can be human beings or not. Likewise, a factor of special interest is actors' agency and the diversity of ways in which the world is 'assembled' through socio-technical systems (Latour, 2008; Law, 2004). An additional element to make the idea of the ecology of innovation more complex is the idea of the rhizome. The rhizome is understood as a descriptive or epistemological model in which the organization of the elements does not follow lines of hierarchical subordination, contrary to the idea of the Porphyrian tree model<sup>6</sup>. The rhizome, then, reveals a totally different way of being and becoming in one's place (Deleuze & Guattari, 1987).

According to the previous ideas, the bonds between the actors in processes of communal innovation are determinant in the result of those processes. The collection of actors, their relationships, dynamics, institutions and infrastructures that allow the generation of communal innovations are called local innovation ecosystems. These are based on the idea of innovation ecosystems (Koslosky, Speroni, & Gauthier, 2015), and are nourished by notions such as networks and assemblages (De Landa, 2006; Latour, 2008), design ecosystems (Kommonen, 2013b, 2013a) or collaborative organizations

---

<sup>5</sup> In Spanish the correct word would be Saberes. Nevertheless, in English is challenging to express the difference between the explicit knowledge from academia and the learnings, experiences and know-how from communities.

<sup>6</sup> Model created by the philosopher Porfirio, by which the classification of substances in taxonomy is illustrated. Its logic goes from the universal to the particular  
[https://en.wikipedia.org/wiki/Porphyrian\\_tree](https://en.wikipedia.org/wiki/Porphyrian_tree).

(Manzini, 2015). There are also critical views of the ecological analogies collected by Oh et al., (2016) and those who still seek to continue working with these, for example Ritala & Almpantopoulou (2017). Thus, in these ecosystems of local innovation the intertwining between tacit and explicit knowledge to stimulate knowledge dialogues is key (Fals Borda, 1998; Leff, 2006; Nonaka & Konno, 1998). In the same way, highlighting the distributed condition of these ecosystems is important. These no longer correspond to centralized and hierarchical configurations, but on the contrary allow higher levels of complexity and self-organization. An additional feature is the intersection of local communities and information and communication technologies allowing new practices through bottom-up, top-down and peer-to-peer collaboration (or p2p) and combinations of these (Escobar, 2017).

#### **4. Building paths towards different notions of collective wellbeing**

Place-based communities seek to transform their conditions and make their aspirations and desires through processes of communal innovation. In other words, social groups generate transitions from their reality with deep challenges and opportunities to collective states of welfare. According to Shiva (2005, 2008), the keys to transitions are re-localization strategies, for instance the construction of distributed systems of organic food and energy based on local biodiversity. These systems are managed based on ecological integrity, soil and biodiversity conservation, local economies and grassroots democracy. Meanwhile, Escobar argues that "the bias for the small and the place-based, under the flag of re-localization, is another characteristic that brings together de-growth with post-development" (2017, p. 264). In this sense, in many of these transitions the role of the place in the conceptions of the future is central as it involves the relations of the people with their environment, culture and community. In addition, the role of the place in the processes of communal innovation is definitive, insofar as it is the cradle of the people's experiences, knowledge, and social relations with the territory. It is in this way, therefore, that transitions to other forms of living and relating are key to solving the cultural and ecological crises.

Within the broad spectrum of studies of transitions<sup>7</sup>, it is worth mentioning that alternatives to the development model and its multiple fresh variants have arisen from both the Global South and the Global North. These ideas range from De-growth in Europe (Demaria, Schneider, Sekulova, & Martinez-alier, 2013), Buen Vivir and Vivir Bien<sup>8</sup> in the Andes (Acosta, 2012, 2017; Gudynas, 2011; Gudynas & Acosta, 2011; Huanacuni, 2010), Ubuntu<sup>9</sup> in South Africa (Murove, 2014), Tazkijah<sup>10</sup> and Falah<sup>11</sup> in the

---

<sup>7</sup>To understand these dynamics and their relationships or dissociations see the works of Kothari, Demaria, & Acosta (2015) and Beling, Vanhulst, Demaria, Rabi, & Carballo (2018).

<sup>8</sup>Defined as "life in fullness."

<sup>9</sup>Defined as "I am because we are."

<sup>10</sup>Defined as "growth through purification."

<sup>11</sup>Defined as "human welfare."

Islamic culture (Sardar, 1996, 1999), Swaraj<sup>12</sup> in India (Kothari, 2014), Kongsu in China (Wang Tai Peng, 1994) and Post-development (Demaria & Kothari, 2017; Escobar, 2010, 2015). These counter-hegemonic currents seek to legitimize other ontologies through alternative modes of existence, being and doing, and better still, of inter-existence with their natural environments.

From the geographies of Abya Yala<sup>13</sup>, the original cultures of the Andes, there is the notion of Buen Vivir/Vivir Bien (Sumak Kawsay, in Quechua, Sumak Qamaña, in Aymara) as a holistic vision and de-economized social life. In the words of Gudynas and Acosta, buen vivir "constitutes an alternative to development and represents a potential response to the substantial criticisms of post-development" (2011, p. 78). Therefore, this is not the search for a single universal transition for the peoples of the world. On the contrary, the aim is to provide evidence of the plurality of social and natural modes of life that survive and are emerging, particularly from the communities at the peripheries, as well as the work that the academy is doing in the area of studies of post-development. To add to the above, resilience plays a fundamental role in weaving these mentioned alternatives and questioning the conventional ideas of sustainability. According to Escobar, resilience "involves sowing communities with diversity, social and ecological self-organization, strengthening the capacity to produce locally" (Escobar, 2017, p. 257). Therefore, the idea of reclaiming resilience at the community, local and grassroots level is essential to build a narrative around autonomy to travel the way to the commons.

#### **4.1 Last notes that move around these ideas**

Some key questions related to the role of the academy in the processes of building alternatives to development are: what is the role of the academy and the researchers in the processes of co-construction of knowledge? What is their role in the articulation of local innovation ecosystems and their transitions to collective wellbeing? Some promising existing responses can be found in the practices of Participatory Action Research (PAR) from Latin America (Fals Borda, 1998), as well as Action Research (AR) in Brazil, Europe and the United States. Lewin, a professor at the Massachusetts Institute of Technology (MIT), coined the term of Action Research in 1944 and defined it as "a comparative inquiry into the conditions and effects of various forms of research and social action that lead to transformation" (1946, p. 35). In this way, Action Research opens a space of discussion and reflection regarding the ability of science, technology and innovation to strengthen processes of social transformation through research with grassroots communities.

Recently, Research from Collective Action (Investigación desde la Acción Colectiva) has been proposed, in which "communities are part of the production of knowledge as

---

<sup>12</sup>Defined as "radical ecological democracy."

<sup>13</sup>For the Gunadule culture (Kuna) the American continent is referred to as Abya-Yala.

researchers and researchers are part of collective actions [of social transformation]" (Botero, 2013, p. 44). This deepens the idea of communities of practice and research, where not only dialogical processes of knowledge construction exist, but where researchers are also involved in the social processes of the communities (Fals Borda, 1981). Here, the role of communities is central and in fact imperative; without community there is no collective action. They know better than anyone their context and environment, in addition to embodying their history on a daily basis. However, from the field of design, another perspective which aims to transform practices in communities is the notion of *Disoñar*<sup>14</sup>, a concept created in Colombia which encourages practices that are different from, and much further than, "save the planet" or "help the world's poor". In this, it is desired to populate dreams to design, that is, dream to create. Thus, these processes start not from the notion of the problem (which itself is problematic in that it requires a solution which is constrained by who formulates the problem and for whom the problem-solving is taking place), but from the collective aspirations and desires of grassroots communities.

The future of research, design and action from the academy in conjunction with marginalized and affected communities should begin with reflection on the practices of design, science, technology and innovation as areas that have the potential to materialize other possible worlds (Reina-Rozo & Gaitán-Albarracín, 2017; Reina-Rozo & León, 2017). Broadening the spectrum and legitimacy of traditional knowledge in the areas of research, teaching and extension at universities is key. With this, it is possible to strengthen the theories, methodologies and practices of communal innovation, as an emerging area in the studies of innovation.

## **5. Some early conclusions and future questions**

At the beginning of this paper, we noted the crises that humanity is facing and creating and in particular the crises affecting peoples that have been historically, socially and economically marginalized. Innovation is a social and collective phenomenon that is undertaken by communities around the world. However, there is limited existing knowledge about the dynamics and nature of innovation processes which are undertaken by marginalized communities, especially when these innovation processes do not take place within a market-oriented paradigm. Therefore, the generation and conceptualization of other forms of innovation that allow for alternative practices and legitimize other ontologies is a priority today. The questions listed at the beginning of this text have not been answered deeply as this will be a process that will take time and that requires the active participation of many actors in society, especially those who historically have been excluded from these discussions. The notion of innovation has been re-formulated, and a space is created in which we can co-design and make reality

---

<sup>14</sup>This is a mix of two Spanish words *diseño* (design) and *soñar* (to dream). This concept was created by the poet, cultural activist and designer León Octavio in Cali, Colombia in the 80s.

a world where many worlds fit.<sup>15</sup>

This is how communal innovation is considered as a collaborative process that aims to strengthen the autonomy of communities affected by the conditions of their economic, political and ecological environments. These innovation processes are place-based, being pertinent, contextual and appropriate since they generate solutions to face their challenges and materialize their aspirations. The processes of communal innovation seek to create, strengthen and move new alternatives towards other possible and desirable worlds. However, the initiatives that emerge from the previously stated processes do not act independently or in isolation. These make up a series of complex assemblages or networks, called innovation ecologies, which are collaborative, territorial and transformative. The components of these ecologies can represent and interact with existing and new structures, dynamics and institutions. The ecologies are manifested through ecosystems of local innovation, which are collections of actors that interrelate in a complex, adaptive and dynamic environment to encourage and energize these processes.

This research explores design as a structural part of the innovation process, and recognizes that co-design, a practice that allows other actors to participate and organize their own design processes, is a critical and essential process. Relatedly, autonomous design is consolidated as a central element in the basic processes to contribute to possible futures, enhanced by its contextual nature, its roots in the territory, and the fact that it is plural and distributed in nature. The aforementioned concepts have been studied in the innovation literature and have emerged in recent years to designate the processes that affect or are affected by community-based organizations and/or marginalized communities. Therefore, it is necessary to create new frames of reflection oriented to understand, analyze and strengthen processes towards communality and conviviality.

Finally, it is necessary to understand more about the alternatives which contribute towards other futures and possible worlds. A diversity of ontologies and epistemologies can feed the ecosystems of innovation and, therefore, propagate new plural conceptions of science and technologies, to allow new relationships and solutions both in the South as in the Global North. The articulation and dialogue between these transitions discourses is key, at the same time the role of science, technology and innovation in those transitions is crucial. Nevertheless, some questions for the future that are emerging now are: how can these processes be fostered, registered and made visible? What kind of new institutions are necessary? What does disseminate means in this context? How to root the innovation ecosystems at the local level? How does collaboration affects these ecosystems?

The above questions need to move forward through a participatory research agenda

---

<sup>15</sup>Notion spread by the Zapatista movement since it's uprising on January 1 1994 in Chiapas, Southeast Mexico.



focused on the knowledge, opportunities and desires of local organizations and communities. This, in turn, should involve the collaboration of a diverse group of institutions, organizations and civil society groups. More research is needed on the relationship between the commons and collective processes of innovation in the field; in particular there is a need for empirical studies on these topics. By offering the concept of communal innovation as a starting point, this paper contributes to opening space for that research agenda.

## Bibliography

- Acosta, A. (2012). Buen vivir-Sumak kawsay: Una oportunidad para imaginar otros mundos. Quito: AbyaYala.
- Acosta, A. (2017). Living Well : ideas for reinventing the future. *Third World Quarterly*, 6597(November), 1-17. <https://doi.org/10.1080/01436597.2017.1375379>
- Akrich, M., Callon, M., & Latour, B. (2002). the Key To Success in Innovation \* Part II: The art of choosing good spokespersons. *International Journal of Innovation Management*, 6(2), 207-22.
- Bahadur, A., & Doczi, J. (2016). *Unlocking resilience through autonomous innovation*. London.
- Beling, A. E., Vanhulst, J., Demaria, F., Rabi, V., & Carballo, A. E. (2018). Discursive Synergies for a ' Great Transformation ' Towards Sustainability : Pragmatic Contributions to a Necessary Dialogue Between Human Development , Degrowth , and Buen Vivir. *Ecological Economics*, 144, 304-312. <https://doi.org/10.1016/j.ecolecon.2017.08.025>
- Betts, A., & Bloom, L. (2014). *Humanitarian Innovation : The State of the Art*. OCHA policy and studies series (Vol. 009).
- Bollier, D. (2014). *Think like a commoner. A short introduction to the life of the commons*. Gabriola Island, BC: New Society Publishers.
- Botero, P. (2013). Teoría social en movimiento: aportes desde los procesos de investigación y acción colectiva -iac - y algunas experiencias de investigación militante. En P. Boterio & A. Palermo (Eds.), *La utopía no está adelante: generaciones, resistencias e institucionalidades emergentes* (pp. 31-61). Manizales: CLACSO/CINDE.
- Brown, T. (2009). *Change by Design*. New York: Harper.
- Camaño, H., & Pascale, P. (2014). Innovación Ciudadana en Iberoamérica: participación digital para la transformación social. En *Memorias del Congreso Iberoamericano de Ciencia, Tecnología, Innovación y Educación* (pp. 1-16). Ciudad Autónoma de Buenos Aires.
- Ceballos, G., Ehrlich, P. R., Barnosky, A. D., García, A., Pringle, R. M., & Palmer, T. M. (2015). Accelerated modern human - induced species losses : Entering the sixth mass extinction. *Science Advances*, 1(5), 9-13. <https://doi.org/10.1126/sciadv.1400253>
- Ceballos, G., Ehrlich, P.R., and Dirzo, R. (2017) Biological annihilation via the ongoing sixth mass extinction signaled by vertebrate population losses and decline. *PNAS*, 114 (30). <https://doi.org/10.1073/pnas.1704949114>

- Chesbrough, H. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Boston, MA: Harvard Business School Press.
- Corsín Jiménez, A. (2014). The right to infrastructure: A prototype for open source urbanism. *Environment and Planning D: Society and Space*, 32(2), 342–362.
- De Landa, M. (2006). *A new philosophy of society: assemblage theory and social complexity*. New York: Continuum Press.
- de Santos Souza, B. (2009). *Una epistemología del Sur*. (CLACSO Coediciones, Ed.). México: Siglo XXI Editores.
- de Santos Souza, B. (2012). *De las dualidades a las ecologías*. La Paz, Bolivia: Red Boliviana de Mujeres Transformando la Economía.
- Deleuze, G., & Guattari, F. (1987). *A Thousand Plateaus: capitalism and schizophrenia*. Minneapolis: University of Minnesota Press.
- Demaria, F., & Kothari, A. (2017). The Post-Development Dictionary agenda : paths to the pluriverse The Post-Development Dictionary agenda : paths to the. *Third World Quarterly*, 6597(August), 1–12. <https://doi.org/10.1080/01436597.2017.1350821>
- Demaria, F., Schneider, F., Sekulova, F., & Martinez-alier, J. (2013). What is Degrowth? From an Activist Slogan to a Social Movement. *Environmental Values*, (22), 191–215. <https://doi.org/10.3197/096327113X13581561725194>
- Ehn, P., Nilsson, E., & Topgaard, R. (2014). *Making futures Marginal notes on innovation, design and democracy (First)*. Cambridge, Massachusetts: MIT Press.
- Environmental Justice Foundation. (2017). *BEYOND BORDERS: Our changing climate - its role in conflict and displacement*. London.
- Escobar, A. (2010). *Una minga para el postdesarrollo: lugar, medio ambiente y movimientos sociales en las transformaciones globales*. Universidad Nacional Mayor de San Marcos.
- Escobar, A. (2015). Degrowth , postdevelopment , and transitions: a preliminary conversation. *Sustainability Science*, 10(3), 451–462. <https://doi.org/10.1007/s11625-015-0297-5>
- Escobar, A. (2017). *Autonomía y diseño La realización de lo comunal (1ra ed.)*. Ciudad Autónoma de Buenos Aires: Tinta Limón.
- Escobar, A. (2018). *Designs for pluriverse Radical Interdependence, Autonomy, and the Making of Worlds*. Durham: Duke University Press.
- Esteva, G. (2015). Para sentipensar la comunalidad. *Bajo el Volcán*, 15(23), 171–186.
- Fals Borda, O. (1981). *Science and the common people*. Bogotá.
- Fals Borda, O. (Ed.). (1998). *Participación popular: retos del futuro*, Registro del Congreso Mundial de Convergencia en Investigación Participativa '97: Estado del arte. Bogotá: Icfes, Iepri, Colciencias.

- Franco, F. M. (2017). "La sala de cine de Ciudad Bolívar que pasó de la ilusión a la realidad." *El Tiempo*. Accessed 12/20/18 at: <https://www.eltiempo.com/bogota/potocine-la-sala-de-cine-de-ciudad-bolivar-45507>.
- Gudynas, E. (2011). Buen Vivir: Today's tomorrow. *Development*, 54(4), 441-447. <https://doi.org/10.1057/dev.2011.86>
- Gudynas, E., & Acosta, A. (2011). La renovación de la crítica al desarrollo y el buen vivir como alternativa. *Utopía y Praxis Latinoamericana*, 16(53), 71-83.
- Gupta, A. (2012). Innovations for the poor by the poor. *International Journal in Technological Learning, Innovation and Development.*, 5(1/2), 28-39.
- Gupta, A. K., Sinha, R., Koradia, D., Patel, R., Parmar, M., Rohit, P., ... Vivekanandan, P. (2003). Mobilizing grassroots' technological innovations and traditional knowledge, values and institutions: Articulating social and ethical capital. *Futures*, 35(9), 975-987. [https://doi.org/10.1016/S0016-3287\(03\)00053-3](https://doi.org/10.1016/S0016-3287(03)00053-3)
- Gutiérrez, A. (2013). Diseño del sur. *Proyecto Diseño*, 72-73.
- Gutiérrez, A. (2015a). El sur del diseño y el diseño del sur. En T. Santos De Souza, Boaventura; Cunha (Ed.), *Coloquio Internacional Epistemologías del Sur*. Coimbra: Proyecto Alice (Vol. 1, pp. 745-759). Coimbra, Portugal: Universidad de Coimbra.
- Gutiérrez, A. (2015b). Resurgimientos: sures como diseños y diseños otros. *Nomadas*, (43), 113-129.
- Hathaway, M., & Boff, L. (2009). *The Tao of liberation: exploring the ecology of transformation*. Maryknoll, NY: Orbis Books.
- Heeks, R., Foster, C., & Nugroho, Y. (2014). New models of inclusive innovation for development. *Innovation and Development*, 4(2), 175-185. <https://doi.org/10.1080/2157930X.2014.928982>
- Henkel, J., & von Hippel, E. (2005). *Welfare Implications of User Innovation*, 45-59.
- Hoffecker, E. (2018). *Local Innovation : what it is and why it matters for developing economies (New Directions In Innovation Research No. 1)*. Cambridge, Massachusetts.
- Huanacuni, F. (2010). *Buen Vivir / Vivir Bien Filosofía, políticas, estrategias y experiencias regionales andinas (Primera)*. Lima: Coordinadora Andina de Organizaciones Indígenas - CAOI.
- Illich, I. (2015). *La convivencialidad*. Ocotepéc: El Rebozo.
- IPBES. (2018). *Land Degradation and Restoration Assessment*. Medellín.
- Kommonen, K.-H. (2013a). *Design Ecosystems and the Design of Everyday Life*. Helsinki.

- Kommonen, K.-H. (2013b). *Design Ecosystems and the Landscapes for Co-creation*. Helsinki.
- Koslosky, M. A., Speroni, R. de M., & Gauthier, O. (2015). Ecosistemas de inovação – Uma revisão sistemática da literatura. *Revista Espacios*, 36(Nº 03), 1-17.
- Kothari, A. (2014). *Radical Ecological Democracy : A Path Forward for India and Beyond*. Great Transition Initiative.
- Kothari, A., Demaria, F., & Acosta, A. (2015). Buen Vivir , Degrowth and Ecological Swaraj : Alternatives to sustainable development and the Green Economy. *Development*, 57(3-4), 362-375. <https://doi.org/10.1057/dev.2015.24>
- Latour, B. (2008). *Reensamblar lo social: Una introducción a la teoría del Actor-Red*. Ciudad Autónoma de Buenos Aires: Manantial.
- Law, J. (2004). *After method: mess in social science research*. London: Routledge.
- Leff, E. (2004). *Racionalidad Ambiental La reapropiación social de la naturaleza (Primera)*. México D.F: Siglo XXI Editores.
- Leff, E. (2006). *Complejidad, Racionalidad Ambiental Y Diálogo De Saberes*, 7.
- Levitt Cea, J., & Rimington, J. (2017). *Creating Breakout Innovation*. *Stanford Social Innovation Review*, 16, 1-16.
- Lewin, K. (1946). Action Research and Minority Problems. *Journal of Social Issues*, 2(4), 34-46.
- Lewis, V., & Mulvany, P. M. (1997). *A typology of community seed banks*. Natural Resources Institute University of Greenwich UK.
- Lichtenthaler, U. (2011). Open Innovation: Past Research, Current Debates, and Future Directions. *Academy of Management Perspectives*, 25(1), 75-93. <https://doi.org/10.5465/AMP.2011.59198451>
- Manzini, E. (2015). *Design, when everybody designs: an introduction to design for social innovation*. Cambridge: MIT Press.
- Martínez Luna, J. (2017). *Comunalidad... camino que se hace... al andar*. México D.F.
- Mattei, U. (2013). *Bienes comunes: un manifiesto*. Madrid: Trotta.
- McKeon, N. (2015). La Via Campesina: The “Peasants” Way’ to Changing the System, not the Climate. *Journal of World-Systems Research*, 21(2), 241-249.
- Moulaert, F., MacCallum, D., Mehmood, A., & Hamdouch, A. (Eds.). (2014). *The International Handbook on Social Innovation: Collective Action, Social Learning and Transdisciplinary Research*. Edward Elgar Pub.
- Munck, R., & O’Hearn, D. (Eds.). (1999). *Critical development theory: contributions to a new paradigm (First)*. London: Zen Books.

- Murove, M. F. (2014). Ubuntu. *Diogenes*, 59(3–4), 36–47.  
<https://doi.org/10.1177/0392192113493737>
- Nandy, A. (1987). *Traditions, tyrannies and utopias. Essays in the politics of awareness*. New Delhi: Oxford University Press.
- Nonaka, I., & Konno, N. (1998). The concept of “Ba” Building a Foundation for knowledge creation. *California Review Management*, 40(3), 40–54.
- Oh, D. S., Phillips, F., Park, S., & Lee, E. (2016). Innovation ecosystems: A critical examination. *Technovation*, 54, 1–6.  
<https://doi.org/10.1016/j.technovation.2016.02.004>
- Oslo Manual. (2005). *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data (Third edit)*. New York: Statistical Office of the European Communities, Organisation for Economic Co-Operation and Development.
- Pansera, M., & Martinez, F. (2017). Innovation for development and poverty reduction: an integrative literature review. *Journal of Management Development*, 36(1), 2–13.
- Radjou, N., Prabhu, J., & Ahuja, S. (2012). *Jugaad Innovation: Think Frugal, Be Flexible, Generate Breakthrough Growth*. New York: John Wiley & Sons.
- Ritala, P., & Almpanopoulou, A. (2017). In defense of ‘eco’ in innovation ecosystem. *Technovation*, 60–61(February), 39–42.  
<https://doi.org/10.1016/j.technovation.2017.01.004>
- Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin III, F. S., Lambin, E., ... & Nykvist, B. (2009). Planetary boundaries: exploring the safe operating space for humanity. *Ecology and society*, 14(2).
- Sachs, Wolfgang (ed.). (1992). *The Development Dictionary: A Guide to Knowledge as Power*. London: Zed Books.
- Sardar, Z. (1996). Beyond development: An Islamic perspective. *European Journal of Development Research*, 8(2), 36–55. <https://doi.org/10.1080/09578819608426664>
- Sardar, Z. (1999). Development and the locations of eurocentrism. In *Critical development theory: contributions to a new paradigm (First, pp. 44–62)*. New York: Zen Books.
- Schot, J., & Steinmueller, W. E. (2018). Three frames for innovation policy: R&D, systems of innovation and transformative change. *Research Policy*, 47(9), 1554–1567.
- Schumpeter, J. (1934). *The Theory of Economic Development*. Harvard University Press.
- Scriven, K., & Gilmour, E. (2016). Humanitarian innovation. *Humanitarian Practice Network*, (66), 43–45. <https://doi.org/10.1016/j.robot.2014.03.014>
- Sheikh, F. A. (2014). Exploring informal sector community innovations and knowledge appropriation : A study of Kashmiri pashmina shawls. *African Journal of Science*,

- Technology, Innovation and Development, 6(3), 203–212.  
<https://doi.org/10.1080/20421338.2014.940171>
- Shiva, V. (2005). *Earth democracy: justice, sustainability, and peace*. Cambridge: South End Press.
- Shiva, V. (2008). *Soil not oil: environmental justice in an age of climate crisis*. Cambridge: South End Press.
- Smith, A., Fressoli, M., Abrol, D., Arond, E., & Ely, A. (2017). *Grassroots innovation movements (First)*. New York: Routledge.
- STEPS Centre. (2010). *Innovation, Sustainability, Development: A new manifesto*. Brighton: STEPS Center.
- The sussex group. (1969). *The Sussex Manifesto*.
- Thomson, A. M., & Perry, J. L. (2006). Collaboration processes: Inside the black box. *Public Administration Review*, 66(Special issue), 20–32.  
<https://doi.org/10.1111/j.1540-6210.2006.00663.x>
- Tuckner, V. (1999). The myth of development. In *Critical development theory: contributions to a new paradigm* (pp. 1–27). New York: Zen Books.
- Von Hippel, E. (2005). *Democratizing innovation*. Cambridge: MIT Press.  
[https://doi.org/10.1111/j.1540-5885.2006.00192\\_2.x](https://doi.org/10.1111/j.1540-5885.2006.00192_2.x)
- Von Hippel, E. (2017). *Free Innovation (First)*. Cambridge: MIT Press.
- Wang Tai Peng. (1994). *The origins of chinese Kongsis*. Selangor: Pelanduk.
- Wettasinha, C., Wongtschowski, M., & Waters-bayer, A. (2008). *Recognising local innovation: Experiences of ProInnova partners*. Silang, Cavite, The Philippines: IIRR/Leusden.
- Wulf, W. (2007). Changes in Innovation Ecology. *Science*, 316 (5829), 1253.  
<https://doi.org/10.1126/science.1145598>