Review article

Grassroots innovation in alternatives to development: a review

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Abstract

Alternatives to development represent fairer forms of social, economic, and political organization, including environmental sustainability criteria as well. Many new outcomes are created during the design and everyday construction of alternatives to development (e.g., knowledge, practices, social relations, institutions). We may think, therefore, that innovation plays a key role in how such alternatives are imagined and materialized. However, the literature on alternatives to development does not appear to have focused much on innovation. In addition, there is academic literature on innovation that has coined and developed the concept of "grassroots innovation" to refer to innovation realized by grassroots groups. Yet, this literature does not seem to have focused on alternatives to development as innovation-rich spaces. Based on these observations, our objective in this paper is to analyze the potential role of grassroots innovation in alternatives to development, especially in contexts of the global South. To this end, we conducted a literature review along three axes: (1) grassroots innovation; (2) post-development and alternatives to development; and (3) Zapatism, an alternative to development in Mexico (in the last two axes we looked for direct or indirect references to grassroots innovation). Our results confirmed the previous observations. Nevertheless, we identified multiple and diverse innovative outcomes in the literature on post-development, alternatives to development and Zapatism, and altogether our findings suggest a very important role for grassroots innovation in these alternatives. Based on our review, we have provided a preliminary characterization of how grassroots innovations may look like and occur in alternatives to development (particularly in contexts of the global South). We emphasize the need to develop a theoretical-conceptual framework on grassroots innovation from the global South to improve its explanatory power given the diversity of existing alternatives to development. In addition, we call for more empirical studies that focus on identifying grassroots innovations and assessing their relevance to the design and everyday construction of alternatives to development.

Keywords: EZLN; Grassroots movements; Indigenous autonomies; Post-extractivism; Radical alternatives; Social innovation

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Introduction

Alternatives to development seek to rethink the productive logics and ways of life imposed by the neoliberal developmentalist paradigm to create new, more just, and sustainable societies. Theories about alternatives to development have been mostly built around notions such as post-development, post-growth, post-extractivism and degrowth (Acosta 2015; Demaria *et al.* 2019; Escobar 2017; Gudynas 2012). These theoretical strands recognize a great diversity of alternatives to development, such as Buen Vivir in South America, Zapatism in Mexico or Ubuntu in South Africa (Chuji *et al.* 2019; Leyva-Solano 2019; Ramose 2015). This diversity of alternatives arises from imagining, creating, reinventing or experiencing novelty in indigenous and traditional cultures, rooted in specific places and territories, often as a grassroots insurgency against the dominant capitalist economic model, which has increased poverty, social inequality and environmental degradation (Baronnet & Stahler-Sholk 2019; González-Casanova 2003; Gudynas 2011; Lang *et al.* 2013; Stahler-Sholk 2010).

We argue that grassroots movements, organizations and communities that have embarked on the design and everyday construction of alternatives to development are agents that create innovations to enact and materialize other possible worlds. For example, the post-development[1] literature, and specifically that which is concerned with specific alternatives to development, addresses *Buen Vivir* as a new Andean-based way of life, for which constitutional legal innovations have been created to recognize the rights of Nature (e.g., cases of Ecuador and Bolivia) and community reconfiguration based on new forms of political and territorial autonomy (Escobar 2010; Gudynas 2015; Stahler-Sholk 2016; Zibechi 2007). Also, Escobar (2017) recognizes the potential of autonomous design[2] for social innovation[3] and the generation of new collective practices based on traditional and local knowledge coupled with an intercultural dialogue with other communities and social actors (Escobar 2016, 2017). However, although there is an increasing academic literature that is concerned with the analysis of innovation created by grassroots organizations and communities (i.e., *grassroots innovation*), there are barely studies that have focused on the role of grassroots innovation in the design and construction of alternatives to development (see this omission in recent key publications on grassroots innovation, e.g., Hossain 2016; Smith *et al.* 2017).

Studies on grassroots innovation have been mostly realized in Europe and India. In the context of Europe, grassroots innovation has been defined as new networks of organizations and activists that generate bottom-up solutions and are focused on exploring alternatives for social change geared toward sustainability (Seyfang & Longhurst 2013; Seyfang & Smith 2007; Smith *et al.* 2017). In the context of India, grassroots innovation is understood as innovation created by individuals, families or collectives from marginal groups or poor communities, which has a large focus on technical innovation to create new products or technologies based on local traditional knowledge. Moreover, in India, grassroots innovation has been institutionalized so that it can be promoted actively by public institutions, NGOs and academics (Gupta *et al.* 2003; Pansera 2013; Kumar & Bhaduri 2014; Ustyuzhantseva 2015; Gupta 2016). Theoretical and empirical studies that have analyzed grassroots innovation in Europe and India have attempted to be comprehensive in explaining why and how innovations from the civil society have occurred in their own social-environmental contexts as well as to characterize what are such innovations, who are their agents, what are their values and motivations, among other similar questions.

We claim that neither of the dominant grassroots innovation approaches are well suited to analyze the innovations created and mobilized by grassroots movements, organizations and communities in most alternatives to development that have emerged across the globe, particularly in the global South[4]. On the one hand, the literature on grassroots innovation in Europe has a greater focus on solutions to achieve sustainable development or transitions to sustainability. Its main agents are middle and upper-middle-class urban citizens concerned by the main societal environmental problems (i.e., climate change, pollution, biodiversity loss or unsustainable food production and consumption patterns). These grassroots agents are driven by their ideology—usually anti-capitalist—rather than by the need to fulfill their basic human needs (Seyfang & Smith 2007). On the other hand, the Indian take on grassroots innovation focuses mostly on the invention of products and technologies produced by grassroots people, that are based on local traditional knowledge and thus are culturally appropriate, and that can improve local livelihoods and the well-being of poor people. In this case, grassroots innovation promoters from public institutions, NGOs, or academia seek to help poor people become innovators and profit from their inventions; therefore, this system of grassroots innovation is underpinned by a capitalist ideology even though it has social goals (Gupta 2016). In contrast to both approaches, the grassroots innovation that can be envisioned as necessary to create and put forward alternatives to development would mostly be driven by an anti-capitalist ideology within social movements, organizations and communities in rural areas of the global South. Hence, we argue that a new theoretical framework is needed to analyze grassroots innovation in the context of alternatives to development.

We posit that grassroots innovation can be inferred from the literature on post-development and alternatives to development even though the term may not be used and very few studies have focused on the analysis of anything clearly related to innovation (Gudynas 2011; Escobar 2014; Esteva 2014; Kothari *et al.* 2019). Then, to analyze grassroots innovation from these literatures, we must examine analyses concerning new collective ideas, processes and outcomes that result in new local knowledges, practices, beliefs, products, technologies, programs or institutions. Such ideas, processes, or outcomes may often not be fully new but based on new collective readings of traditions and external knowledge to enable grassroots groups to better adjust to the present socioeconomic, political and environmental contexts. This type of innovation is driven by sharing knowledge and fostering social learning across grassroots movements, organizations and communities. It is usually motivated by the defense of grassroots' territories and life as a condition to (re)produce their livelihoods and cultural identity. In addition to novelty or newness, some specific characteristics of grassroots innovations in the context of alternatives to development may refer to creating radical ruptures with the economic and cultural logics of capitalism, crafting deep social-ecological transformations to pursue just sustainabilities, enabling intercultural dialogues to create new knowledges, or building community autonomy through collective organization and management to be as independent of the state and the neoliberal market as possible. Grassroots innovations generated in the construction of alternatives to development may have specific values like diversity, austerity, defense of the commons[5], relational ontologies, social and ecological justice, absence of hierarchies, the dignity of individual and collective labor, care for life and sustainability, among others.

We suggest that grassroots innovation may be a keystone in the design and everyday construction of alternatives to development because these seek to rethink and reconfigure how grassroots (re)produce their material and symbolic living conditions

and how they relate to the dominant capitalist society. However, despite the alleged importance of grassroots innovation to drive and shape alternatives to development, the analysis of this type of innovation has remained mostly unexplored in the academic literature on post-development as well as in the literature on specific alternatives to development. Thus, our objective in this article is to produce a preliminary assessment of the role of grassroots innovation in the design and everyday construction of alternatives to development. To that end, we carry out a literature review that is global in scope. However, we examine in greater detail literature concerned with or produced in the global South since it is where some of the most vibrant alternatives to development have flourished. We complement our review with an in-depth analysis of grassroots innovation in Zapatism, which is a specific alternatives to development in Chiapas (Mexico) that many post-development scholars acknowledge as one of the most revolutionary, influential, and well-established alternative to development worldwide (Zibechi 2004; Esteva 2005; Andrews 2011). Our analysis of grassroots innovation in Zapatism consists of a review of academic literature and, more importantly, of gray literature and other materials produced by the Zapatistas, coupled with ethnographic fieldwork we have carried out in a Zapatista community to assess their innovations on the ground.

Our study is relevant at a theoretical-conceptual level because the concept of grassroots innovation has barely been explored in the case of alternatives to development. In addition, our work is timely because it may lead to a better understanding of the processes that drive the creation and cross-scalar diffusion of the surge of alternatives to development that have emerged around the world in the wake of the socially and environmentally negative effects of neoliberalism and globalization (Dunlap 2021; Tornel 2021).

Methods

We first reviewed the academic literature on grassroots innovation to identify the elements that characterize it. Next, we reviewed the literature on post-development, alternatives to development and Zapatism to identify and analyze direct and indirect references to grassroots innovation. Finally, we adopted a heuristic approach to complement our review based on our ethnographic fieldwork experience to assess grassroots innovation in rural communities, including a Zapatista community where we have been working over the period 2019–2021.

We systematized our review to be explicit, reproducible, and transparent by using the framework of search, evaluation, synthesis and analysis (Berger-Tal *et al.* 2018; Grant & Booth 2009). We also applied some elements of the systematic review to increase procedural objectivity, consistency, and reduce potential biases in the results and synthesis, and favor the possibility of repeating, evaluating, or updating the review (Haddaway *et al.* 2015). We searched academic literature in Scopus and Web of Science and gray literature in Google Scholar. We reviewed literature in English and Spanish for the period 1994–2021. We chose that period because the Zapatista rebellion began on January 1, 1994. In addition, the first texts radically questioning development began being published around the mid-90s (Sachs 1992; Ferguson 1994; Escobar 1995), and they are the main sources of the subsequent literature on post-development and alternatives to development.

Our literature review consisted of three phases: (1) planning and application of the protocol; (2) synthesis of the analysis of the review processes; and (3) interpretation of the findings and conclusion. The three phases cover all the sections of the IMRAD structure of scientific articles (introduction, methods, results and discussion) and consist of eight consecutive steps applied during the review process (Wong *et al.* 2013) (Table 1).

Phase 1 refers to the planning and application of the review protocol, defined by the introduction and methods of the review, which are integrated by the processes of selection, search, extraction and evaluation of the literature. Selection and extraction are based on the inclusion and exclusion criteria (Table 2). We performed a content analysis in Atlas.ti by integrating and reading the references selected for their relevance and quality. This process involved the creation of codes (Hwang 2008; Lewis 2016). Such codes provided information on the main categories of analysis through theoretical elements and concrete experiences on grassroots innovation, which served to identify direct and indirect references to this type of innovation.

We used a set of six questions to assess the relevance (1) and quality (2–6) of the literature reviewed: (1) Does it meet the inclusion criteria of the literature review? (2) Is the general argument of the research and contributions clear? (3) Are the objectives or questions of the research clear? (4) Are the materials and methods for data collection and analysis adequately described? (5) Are the implications and limitations of the research presented? (6) Is there coherence between the results, discussion and

Table 1. Phases, structure and steps adopted during the systematized literature review process.

Phases	Structure and steps
	Introduction
	1. General statement of the problem and objectives. 2. Contribution and academic relevance.
1. Planning and implementation of the review protocol	Methods
	3. Process of literature search, selection, extraction and evaluation: 3.1 Design of inclusion and exclusion criteria for literature selection and extraction. 3.2 Literature searches and extraction in scientific platforms (search terms or strings and download in Excel). 3.3 Evaluation of the relevance of the literature in title and abstract. 3.4 Content review and analysis in Atlas.ti. 3.5 Evaluation of the relevance and quality of the literature in Atlas.ti.
2. Synthesis of the analysis of the review processes	Results
	4. Synthesis of the search, extraction, selection, evaluation and analysis process (document flow chart). 5. Narrative synthesis by categories of analysis of the review process by central themes in Atlas.ti.
3. Interpretation of findings and conclusion	Discussion
	6. Summary and interpretation of the main results. 7. Implications and limitations of the analysis of the literature reviewed.
	Conclusion
	8. Contributions, implications and future lines of research.

Table 2. Inclusion criteria used in the selection and extraction of literature.

Criteria	Reasons for inclusion
Search period 1994-2021	Since 1994, publications on post-development and alternatives to development have increased and publications on Zapatism began to appear.
Academic and gray literature in English and Spanish	The production of literature on grassroots innovation is predominantly done in English and in the global North. The literatures on post-development, alternatives to development and Zapatism are found in Spanish and English and are produced both in the global North and South. Grey literature and other sources of information on Zapatism produced by the own Zapatista movement is primarily available in Spanish and local indigenous languages.
Sectors (social, ecological, alternative economies, educational, political-organizational)	For their role in building innovative grassroots initiatives, processes and practices that solve social needs or problems and for their contributions to sustainability.
Authors	Researchers, academics, and activists who produce knowledge and publish on relevant issues to this study, both in the global North and South.
Scientific disciplines (social and ecological economics, geography, sociology, anthropology, psychology)	The role in the construction of multidisciplinary, interdisciplinary, and transdisciplinary knowledge of grassroots innovation and the fields of post-development, alternatives to development in general, and Zapatism in particular.
Theoretical and empirical studies	Theoretical or empirical case studies on the areas of interest for this study.

conclusion sections? We carried out the assessment through a weighted score of 1 to 5 (1 being the lowest vs 5 being the highest relevance and quality).

As shown in Figure 1, we extracted 1519 articles from our literature search and selected 598 for their relevance. We then incorporated them into Atlas.ti for preliminary reading and evaluation of quality. As a result, we selected articles with a value of 3–5, which left a total of 397 documents for review, coding, analysis and synthesis of results.

The literature selected for its relevance and quality was integrated into large groups of documents, for example, theories on grassroots innovation, post-development, specific alternatives to development, Zapatism, among others. To design the codes, we considered relevant notions, arguments, definitions, elements, and empirical examples at the level of ideas, processes and outcomes that can be considered as grassroots innovations.

Finally, we complemented the findings of our review with a more heuristic approach based on our own experience working with communities in Mexico to assess their innovations, how and why they produce such innovations, how they conceptualize innovation, among similar issues (e.g., Bucio-Mendoza *et al.* 2018; Solis-Navarrete *et al.* 2021). This approach was particularly useful to better interpret our findings regarding grassroots innovation in Zapatism, as we have conducted ethnographic fieldwork in a Zapatista community over the period 2019–2021 to assess their agency
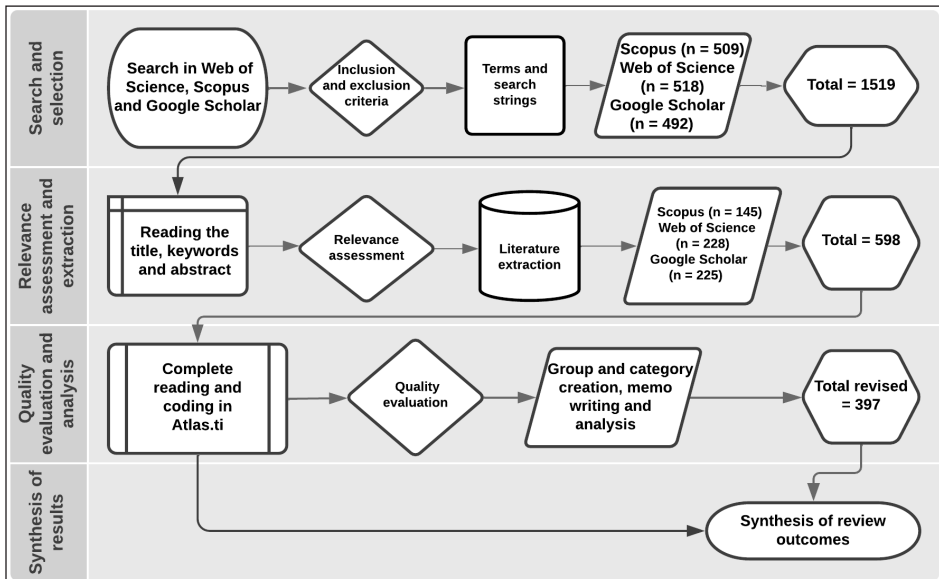
Figure 1. Flow diagram of the processes of literature review, analysis and synthesis.

and motives to produce innovation across several dimensions that are key to building their alternative to development (e.g., education, politics, territorial autonomy).

Theoretical strands, focal areas and examples of grassroots innovations

The study of grassroots innovation has come mainly from innovation economics and theories of the new economics of sustainable consumption (Smith 2007; Seyfang & Haxeltine 2012). However, there are also contributions from other disciplines and sub-disciplines such as sociology, geography, social economics and management (Fressoli *et al.* 2014; Kumar & Bhaduri 2014; Gupta 2016). We identified two main theoretical strands of grassroots innovation in the academic literature: (1) Grassroots innovation in Europe, which consists of networks of activists, organizations and movements that are focused on the creation of collective spaces for experimentation, for the co-production of knowledge and technology to solve social and environmental problems (e.g., effects of climate change, unsustainable use of fossil fuels in energy and food production, marginalization and poverty in rural communities and peri-urban neighborhoods) (Hargreaves *et al.* 2013; Seyfang & Smith 2007; Seyfang & Longhurst 2013); and (2) Grassroots innovation in India, which is oriented toward the identification and support of social and ecological ventures developed in and for marginalized rural communities; this innovation is based on traditional local knowledge, the transfer and appropriation of scientific knowledge, and the registration of patents to commercialize the technologies invented in these communities (Gupta *et al.* 2003; Gupta 2012; Kumar & Bhaduri 2014). Both strands have spread to other geographical areas like Latin America (e.g., Smith *et al.* 2014; Smith *et al.* 2017) and Africa (e.g., Gupta *et al.* 2019).

The main focal areas identified in both theoretical strands and the case studies that have analyzed grassroots innovation are associated with (a) new grassroots organizations, (b) specific sociocultural and geographical contexts, (c) alternative motivations and values, (d) the co-production of knowledge, social learning and the use of alternative technologies, and (e) social networks, linkages and spatial scaling. Each focal area entails designing and deploying new, innovative processes from grassroots organizations and communities. The transformational changes generated are oriented toward more just and ecologically sustainable societies. We describe each focal area below and present a synthesis of our results for this section in Table 3, including examples.

1   New grassroots organizations. They emerge around the motivations, values and common objectives of collectives within the civil society, e.g., social movements, communities and cooperatives in rural or urban areas. They act as laboratories and spaces where new, alternative knowledge, practices and values are produced and experimented collectively (Martin & Upham 2016; Dias & Partidário 2019). The *Foundation For Intentional Community* is a representative example of rural or urban intentional communities with different architectures, ownership schemes and governance models; some experiences organized around the commons are *Alpha Farm* in Oregon, United States or *Atlantis Ecological Community* in Huila, Colombia. Another novel type of organization is the *Student Housing & Student Co-ops,* e.g., *EcoReality Co-op* in British Columbia, Canada or *Conscious Culture Cooperative* in Washington, United States.

2   Specific sociocultural and geographical contexts. These contexts provide insights into the prevailing conditions for innovation, which motivates the creation of alternative directions and effective novel solutions to the problems that grassroots movements and communities want to solve. Depending on the context, knowledge and ingenuity can be used in the generation of inclusive technologies and their transferability to grassroots communities (Smith *et al.* 2014; Smith *et al.* 2017). For example, *The Transition Towns Movement* is a grassroots response to the great challenges facing the world by creating sustainable urban communities and neighborhoods in the United Kingdom and other countries in Europe, North America, Australia, and Brazil.

3   Alternative motivations and values. They arise from social needs, environmental challenges and conflicts, but also from ideologies or beliefs that inspire the co-creation of novel practices toward more just and sustainable life transitions that break with the dominant values in western capitalist societies (Seyfang & Smith 2007; Smith *et al.* 2017). For example, the *People's Science Movements* in India were created in the 1960s and motivated by discussions between scientists, technology developers and civil society organizations that focused on updating traditional techniques by applying science alternative values to the dominant ones (Martin & Upham 2016). Another example is the *Global Ecovillage Network*, which was created in Denmark but then expanded to five regions across the globe. At present, this network is made up of ecovillages that can be seen as "laboratories" that test new ideas, practices and technologies, as well as best practices, learned in other ecovillages within the network (e.g., *Zambia Greening Schools*, *Youth Social Innovation for Resilient Communities*). Its main motivations and values are the promotion of education, human rights, conflict

resolution and reconciliation through the empowerment of local communities, and the protection of the global environment and citizen and community participation in local decision-making.

4   Co-production of knowledge, social learning and alternative technologies. The co-production of new knowledge and learning generates open information and promotes appropriate technologies to design new sustainable systems (Hargreaves *et al.* 2013; Kumar & Bhaduri 2014). For this reason, it is essential to learn from communities that deal with social-environmental problems such as droughts, floods or food production by inventing new techniques or by restoring or updating old but effective solutions (Gupta *et al.* 2003; Gupta 2006; Gupta *et al.* 2019). One example from *The Honey Bee Network* is the creation of life shelters for the displaced population of northern Iraq, which is a durable, environmentally friendly, and affordable modular solution; another innovative initiative in the COVID-19 context is teaching through conference calls to students who do not have smartphones at home in Satara, India. The steps involved are to listen, type, speak and record.

5   Social networks, linkages and spatial scaling. They involve the co-creation of new networks that help mobilize resources, promote diffusion through spatial scaling, and expand to higher scales of new practices, processes or products, which involves changes in existing institutions (Smith & Raven 2012; Hermans *et al.* 2016). Success can be measured by considering social ties within communities, contribution to environmental improvement, social connectivity, and innovation trajectories (Feola & Nunes 2014). For example, in *The Honey Bee Network,* the main activities consist in exploring and documenting innovative practices through the *Shodh Yatra* (journey of exploration) and sharing knowledge or inventions found in grassroots communities with a wider audience through the institutionalization of grassroots innovation (Ustyuzhantseva 2015; Gupta 2016; Gupta *et al.* 2019).

Table 3. Theoretical strands, focal areas, and examples of grassroots innovation.

Theoretical strands	Important authors	New grassroots organizations (examples)	Specific sociocultural and geographical contexts	Alternative motivations and values	Coproduction of knowledge, social learning and technologies	Networks, linkages and spatial scaling
Grassroots innovation/grassroots innovation movements (originally developed in Europe but then it has been applied to other geographical contexts in the global North and South). It refers to networks of activists and grassroots organizations that generate novel bottom-up solutions for sustainable development; also to the results of collective action for the creation of experimentation spaces focused on knowledge and technology (co) production to explore alternative scenarios for social change (e.g., Seyfang & Smith 2007; Smith et al. 2018).	Boyer, Dias, Ely, Feola, Fressoli, Hargreaves, Haxeltine, Hermans, Longhurst, Nunes, Pansera, Partidário, Raven, Seyfang, Smith.	Global Ecovillage Network (1991, Denmark to present) https://ecovillage.org/	- Intentional communities, traditional or urban, designed through participatory processes and sustainability. - Ecovillage network regions: Latin America (CASA), North America (GENNA), Africa (GEN Africa), Europe (GEN Europe), and Oceania & Asia (GENOA).	- Innovative and sustainable solutions to the global problems of poverty, environmental destruction and climate change. - Holistic approach integrated by social, economic, cultural and ecological areas.	- Ecovillage projects as educational centers: e.g., Center for Alternative Technology (Wales). - Renewable energy and appropriate technology: e.g., portable electricity microgrid and creation of cleaner coal (Tanzania). - Natural construction and climate-friendly architecture: e.g., Sandele Eco-Retreat and Learning Center in The Gambia and EarthWorks Construction.	- Five regional networks and the youth branch, NextGEN, which spans the globe. - The network consists of some 10,000 communities and projects.
		People's Science Movements (India, 1960s to present)	- The development of the economy centered on heavy industries and machine tools was in crisis in the early 1960s. - All India People's Science Network: Kerala, Delhi, Himachal Pradesh, Puducherry, Maharashtra, West Bengal, among others.	- Rural energy challenges, experiments in technological alternatives, development of didactic material for science, and innovations in health systems. - Values: knowledge transfer, stimulating creativity, science and technology as a tool for political struggle.	- Science communication and education: science publications, science outreach conferences, street plays, and innovative science teaching methods. - Alternative technology and development: local loop wireless for telecommunications, biomass as a replacement for cement, windmills and biomass-based energy systems.	- Increased interaction between scientists, academics, engineers, technicians, artisans, farmers and the use of technologies for grassroots innovation experiments. - Grassroots communities and regions that integrate the popular science movement.

Grassroots innovation (originally developed in India and then spread to other places in the global South, particularly in Africa and Asia). It refers to grassroots communities and collaborative networks that aim to activate innovations that stimulate the creation of new products and technologies in marginalized indigenous or tribal communities and the informal sector (e.g., Gupta 2006, 2012).	Bhaduri, Gupta, Kumar, Martin, Upham.	The Honey Bee Network (India, 1988-89 to present) http://www.honeybee.org/	- Anil Gupta is the founder of the network and is interested in identifying, documenting and protecting the knowledge of grassroots innovators. - Marginalized or vulnerable indigenous and tribal communities in India, Asia, and Africa.	- Response to the growing interest in disseminating inclusive and environmentally friendly innovations. - Principles: sustainable, fair and equitable knowledge system, protection of intellectual property rights.	- National/Regional/Honey Bee Club chapters have been started in institutions and new clubs can be created. - A local village Panchayat may come out with a new way of resolving conflicts. - Tawa (mud) machine, Mitticol cooler, Clay non-stick tawa in Gujarat, India.	Locally and between regions in Asia, Africa and Latin America.

Grassroots innovation in post-development and alternatives to development

The post-development current of thought emerged in Latin America and is based on the critical deconstruction of development, a decentering of capitalism and liberalism in the definition of society, and the revaluation of autochthonous cultures and their relational ontologies to move toward more just and ecologically sustainable ways of life (see Escobar 2005, 2012). In Europe, *degrowth* is one of the theoretical and practical positions that emerged in the sphere of post-development, and which today is analyzed in interdisciplinary fields such as ecological economics and political ecology. This alternative to development is considered not only a slogan, but also a social movement composed of activists, ordinary citizens and academics, who propose a critique of economic growth and want to reduce the acceleration of social and technological change to minimize the damage to other human and non-human beings (D´Alisa *et al.* 2015; Kallis *et al.* 2020).

We identified in the literature on alternatives to development some concrete examples in the Latin American region, e.g., the *urban movement of the piqueteros* in Argentina, which emerged to recover state-owned factories that had been shut and reopen them under collective management, or the *Landless Movement in Brazil* and the creation of organizational methods and political formation (Zibechi 2007; Hopkins & Pineda 2021). In the specific case of Mexico, we found some local/regional alternatives to development like the *Council of Agrarian Authorities* against mining exploitation in the Montaña de Guerrero region, the community of *Cherán* in Michoacán and its struggle to protect their forests and territory by constructing a new political autonomy, or the *Movement for the defense of life and territory* in the Northern Zone of Chiapas (Gasparello 2021). Likewise, *Zapatism* is an exemplary alternative to development because of its way of doing politics—very different from the conventional politics of the nation-state— and because of its control of the territory and its expansion through self-government and autonomy in various spheres of everyday life (Zibechi 2004; Aguirre-Rojas 2007; Baronnet 2019).

Indirect references that are closer to grassroots innovation in the literatures of post-development and alternatives to development can be found in Escobar (2016, 2017), who addresses new paths of design for societal transitions like autonomous design or participatory co-design for social innovation. In addition, we find more indirect references to grassroots innovation and examples in literature that analyzes initiatives such as time banks, local currencies, solidarity networks, fair trade and agroecological food networks, new permaculture designs, new products and services (e.g., Wikipedia, ecotechnology), Mother Earth rights in the Ecuadorian and Bolivian political constitutions, intercultural indigenous education initiatives or new forms of organizing and claiming territorial autonomy, among many others (Svampa 2012, 2015; D´Alisa *et al.* 2015; Kothari *et al.* 2019) (Table 4).

Grassroots Innovations in Zapatism

Since the armed uprising in 1994 of the Mayan indigenous people of the Zapatista Army for National Liberation in Chiapas, Mexico, its members have designed and materialized in everyday practices their demands[6] that were neither heard nor respected

by the Mexican State. For these reasons, the construction of autonomy underpins all fields of Zapatista action; for example, education, learning and exchanges of traditional and local knowledge, collective work, organic agricultural production and national and international fair trade (Zibechi 2004; Aguirre-Rojas 2007; Baronnet *et al.* 2011). To analyze the innovations that are (co)produced in Zapatism, it is important to do so from a decolonial point of view[7], trying to deconstruct Western thought and the dominant hegemonic discourse (Mora 2014). The realms where we found more grassroots innovations in Zapatism—from indirect references made by the authors in their empirical studies—were political organization and territorial autonomy, justice, and autonomous education (Zibechi 2007; González-Casanova 2009; Pinheiro-Barbosa 2013; Lang 2015; Baronnet 2019); and, to a lesser extent, health, gender, free media and economic resistance (EZLN 2013; Baschet 2018).

What can be considered as grassroots innovations within the Zapatista communities are related to radical transformations (e.g., design of an educational system that is an alternative to the education provided by the Mexican State), forms of territorial political organization (e.g., self-organization and self-management through *Good Government Councils*, *Caracoles* and Municipal Committees)[8], and the development of the Zapatista political and social movements design of autonomous justice (e.g., laws, regulations, redressing damage with community work), defense and management of the territory (e.g., collective surveillance and monitoring of territories, sustainable management of natural resources) (Esteva 2002; Baronnet *et al.* 2011; Basquet 2017). Empirical studies of Zapatism also indirectly refer to some grassroots innovations, for example, new territorial delimitations (*Caracoles*, municipalities and base communities of support), new forms of struggle (cracks in capitalism and the word as a weapon), new relationships between women and men (sharing of chores), new networks of international solidarity and resistance (e.g., 1st Intercontinental Meeting for Humanity against Neoliberalism, EZLN (1996), Declaration of meetings and caravans of the Zapatistas in five continents (2021), Zapatista International Meetings of Women who Fight (2018, 2020)), among others (Stahler-Sholk 2010, 2016; Pinheiro-Barbosa 2013, 2015; Baronnet 2015, 2019; Pleyers 2019) (Table 5).

Table 4. Examples of grassroots organizations and some of their innovations in the literature of post-development and alternatives to development.

Theories and alternatives to development	Key authors and some references	Examples of grassroots movements or organizations	Examples of grassroots innovations	Main countries or regions of examples
Post-development (North), e.g., Degrowth Movement	D'Alisa et al. 2015; Demaria, Kallis and Bakker 2019; Kothari et al. 2019.	- Consumer and production cooperatives, e.g., Cooperation Jackson (Mississippi). - Eco-communities e.g., Phoenix Commons, self-managed housing community (Oakland, California). - Open source agricultural machine building for small-scale farming e.g., L'Atelier Paysan (France) and Farm Hack (USA and UK).	- Community Production Initiative, an innovative center for sustainable manufacturing and fabrication (Cooperation Jackson). - Cohousing Community and its senior community practices and cross-cultural blending experiments (Phoenix Commons). - Cocreation of farmer-to-farmer innovations, open source, farmer autonomy, creative commons, technological sovereignty (Farm Hack).	Spain, United Kingdom, Portugal, India, Germany, Holland, USA.
Post-development, post-extractivism, post-growth (Latin America), e.g., alternatives to development, to capitalism, to modernity, to extractivism.	Acosta and Brand 2017; Escobar 2017; Gudynas 2011; Lang et al. 2013; Pinheiro Barbosa 2016; Zibechi 2007.	- Buen vivir (Bolivia, Ecuador, Chile). - The Landless Movement (MST), e.g., itinerant school, pedagogy of work (Brazil). - Zapatism, e.g., Autonomous education, agroecological production cooperatives, self-government, territorial autonomy (Chiapas, Mexico). - Universidad de la Tierra (Unitierra), e.g., open weekly seminar "Pathways to autonomy, Alternatives to education and health, From informality to communality" (Oaxaca, Mexico).	- Influences for ecological justice transitions, e.g., rights of Nature, drafting of the new Constitution of Bolivia and Ecuador (Buen vivir). - Political formation, social organization, and construction of an own educational system (MST). - Food sovereignty, new pedagogy of Caracoles, community assembly as a laboratory, construction of territorial autonomy (Zapatism). - Use of technological innovations and recovery of tools (dry toilets, homemade greenhouses, solar energy devices, bike-machines, eco-wood) (Unitierra).	Argentina, Mexico, Uruguay, Ecuador, Bolivia, Chile, Peru, Colombia, Brazil.
North-South Dialogue, transnational networks of alternatives to development (collaborative identification of alternatives to development at global and regional levels between researchers and activists from the North and South)	D'Alisa et al. 2015; Kothari et al. 2019; Pansera 2013.	Buen vivir, economy of permanence, feminist economies, Ubuntu, indigenous autonomy, agro-ecology, communality, eco-anarchism, permaculture.	- New regional and global collaborative networks. - Transitions to more sustainable livelihoods.	Morocco, Australia, India, South Africa, Rwanda, Kurdistan, Mexico, South America.

Table 5. Grassroots innovations identified both in the literature about Zapatism and in their own Zapatista sources.

Examples of realms of action	Key authors and some references	Grassroots innovations identified		
		Practices	Processes	Outcomes
Territorial organization and political autonomy	Aguirre-Rojas 2007; Baronnet et al. 2011; EZLN 2013; González Casanova 2009; Stahler-Sholk 2010, 2016.	- New practices of self-sufficiency and reproduction of community life, e.g., subsistence agriculture, organic coffee fair trade networks, artisan and production cooperatives, agroecology workshops. - New practices of empowerment and participation of women in the movement's decision-making, e.g., truck drivers, militias, education and health coordinators.	- Constitution of new territorial delimitations with Caracoles and Good Governance Councils. - Definition of new governance spaces, e.g., assemblies and participatory committees, deprofessionalization of the political sphere. - Implementation of another *Mandar Obedeciendo* policy or new alternative policy to the State.	- Self-government through five *Caracoles*, 2003 and territorial expansion with eleven current *Caracoles* and 43 autonomous municipalities, 2019. - Organic coffee, handicrafts and collective stores, e.g., Mut-vitz, Yachil Xojobal Chu'lchan, Yochin Tayel Kinal and Ssit Lequil Lum cooperatives. - More horizontal cross-cultural community relations.
Autonomous justice and resistance	Baschet 2017, 2018; Lang 2015; Leyva-Solano 2019; Zibechi 2004, 2007.	- New practices of autonomous administration of justice according to the ethnic context, e.g., application of the *Caracol La Garrucha* Regulations in cases of drunkenness, robbery, attempted rape. - New functions and positions of community and direct democracy, e.g., representatives of the Clandestine Revolutionary Indigenous Clandestine Committee-General Command of the EZLN, Good Government Councils, Municipal Autonomous Council, Community Support Bases.	- Codesign and implementation of strategies based on repairing harm and restoring social equilibrium. - Cocreation and application of normative basis. - The community assembly as an experimental collective space for problem solving.	- Revolutionary Agrarian Law. - Zapatista Revolutionary Women's Law, 1993. - Revolutionary Laws, 1994. - Publication of the text "Read a Video", 2004. - Sixth Declaration of the Lacandon Jungle, 2005. - Tree Care Law. - Law prohibiting the cultivation, trafficking and consumption of drugs.
Autonomous Zapatista education	Baronnet 2015, 2019; Baronnet and Stahler-Sholk 2019; Esteva 2014; Pinheiro Barbosa 2015, 2016.	- New critical and decolonial pedagogical practices, e.g., regarding the transmission of knowledge and new indigenous Mayan teaching methods. - New alliances and expanded organizational networks, e.g., A Declaration for Life, 2021, *Semillita del Sol* educational project as an interface of Zapatista solidarity networks.	- New decolonial intercultural autonomous codesign of autonomous education, e.g., new teaching methods, pedagogies geared towards everyday construction of resistance and autonomy. - Definition of decentralized and participative autonomous education, e.g., indigenous autonomy, horizontal relations, democratization of school management, place-based, culturally and politically contextualized education.	- Escuelita's first grade textbooks "Freedom according to the Zapatistas". - Free media, e.g., short films, documentaries, *Radio Insurgente*, the voice of the voiceless. - Specific purposes of the Zapatista school (https://www.serazln-altos.org/) - Construction of school materials e.g., local history and mathematics, reading and writing manuals in eleven indigenous Mayan languages, educational manual What Zapata fought for and Workbook Lum (*Por lo que peleó Zapata* and *Cuaderno de trabajo Lum*).

Discussion

Regarding the grassroots innovations that are analyzed by researchers and scholars in Europe (Seyfang & Haxeltine 2012; Smith *et al.* 2014; Smith *et al.* 2017), we know that they have spread to the rest of the continents through local, regional and global networks (e.g., the *Global Ecovillage Network*), and are oriented toward cultural diversity, ecological sustainability and mutual support. These innovations are sometimes motivated by a better satisfaction of fundamental needs—not provided by the state or the market— but mostly by the ideology of individual grassroots movements and communities in Europe in their pursuit of finding ways to achieve transformative change and transition to more just and sustainable societies (Seyfang & Smith 2007; Seyfang & Longhurst 2013). In addition, the production, dissemination and use of technologies played a key role in the design and implementation of innovative initiatives and the creation of experimental spaces for the co-production of local and scientific knowledge (Smith 2007; Smith & Raven 2012; Hargreaves *et al.* 2013).

As for the grassroots innovations that have been identified and documented in India by *The Honey Bee Network*, they have spread to poor communities in African, Asian and Latin American countries and arise from social, productive or ecological needs or problems (e.g., obsolete tools and machinery in agricultural production, access to safe drinking water, hygiene and women's health). In these innovations, local and traditional knowledge is fundamental, as it is combined with technological and social innovation, allowing them to generate new products that are cheaper and ecologically sustainable for the local and regional market in India (e.g., mud fridge, bicycle and motorcycle adaptations, pedal-powered washing machine) (Gupta *et al.* 2003; Kumar & Bhaduri 2014; Gupta *et al.* 2019). The practice of *Shodh Yatra* promoted by Professor Anil Gupta is very innovative and could be replicable in terms of on-foot exploration to identify and recognize grassroots innovators in communities across marginalized areas of the global South (Gupta 2016; Gupta *et al.* 2019).

Regarding the post-development literature, there are theoretical variants more oriented to the sociocultural context and socio-environmental or territorial conflicts, but with the same logic, criticizing and overcoming neoliberal capitalist developmentalism (e.g., post-growth in India and South America, post-extractivism in South America or post-development in an alliance between the North and the global South) (Gudynas 2011; Kothari *et al.* 2019). Regarding references that allude to grassroots innovation in the literature of alternatives to development, we find the case of degrowth (mainly in Europe, USA and Canada) through experiences such as *Cooperation Jackson*, *Phoenix Commons*, *L'Atelier*, *Farm Hack*, which are articulated to cultural diversity and the democratization of knowledge, creativity of the commons and the use of social technologies (Kothari *et al.* 2019; Kallis *et al.* 2020). In the case of Latin America, a greater focus is on transitions to sustainability (Escobar 2012; Gudynas 2015) or radical transformations toward new, more sustainable ways of life through autonomous design based on indigenous relational ontologies in contexts of environmental and territorial struggle against neoliberal developmentalism (Esteva 2002; Escobar 2016, 2017) (e.g., practices of ecological justice and the rights of Nature, organizational reconfigurations and political autonomy, new spaces for dialogue of knowledges and collective learning) (González-Casanova 2009; Gudynas 2011, 2015; Esteva 2014).

A key point that emerges from our review is whether the concept of grassroots innovation should be reconceptualized and analyzed from non-Western rationalities, at least in the case of alternatives to development in the global South. Perhaps this

would help recognize and learn what is new or novel in publications written by scholars of alternatives to development like Zapatism (e.g., Aguirre-Rojas 2007; Pinheiro-Barbosa 2013; Baronnet 2015; Baschet 2017), but are not coined as "grassroots innovation". It would also avoid confusing some processes and practices of grassroots movements, organizations and communities as innovations (e.g., ancestral knowledge and pedagogies, indigenous' communal institutions, traditional indigenous technologies). Therefore, the definition of grassroots innovation we provide in the introduction tries to be comprehensive based on the main elements and values that alternatives to development have in common, and also integrate the characteristics of what is innovative when identifying and analyzing new ideas, initiatives, processes or practices created by grassroots movements and communities in the global South. As a follow-up, it is necessary to begin analyzing the transformative changes performed by grassroots movements in Latin America (e.g., Zapatism in Mexico or the Landless Workers Movement in Brazil) under the theoretical lens of grassroots innovation using our definition or another one as it fits. We can assume that such innovations have emerged driven by social actors involved in historical struggles and resistance through forms of self-government and who are at present engaged in the everyday construction of autonomy in the face of neocolonialism and extractivism. In general, the radical transformations that social agents are imagining and struggling to push ahead are aimed at the defense of life and their territories.

Studies of Zapatism show indirect references where innovation is addressed as new instances of regional coordination (*Caracoles*), new political subjects, or as innovative political and pedagogical practices (González-Casanova 2009; Baronnet 2019; Baronnet & Stahler-Sholk 2019). However, when contrasting the innovations produced by the Zapatistas with grassroots innovations identified in India, they do not refer to artifact inventions aimed at the local and regional market, but rather at new knowledges, practices, institutions and programs that can strengthen the Zapatista struggle and resistance to the neoliberal state, new interethnic community relations, and novel organizational processes that contribute to the construction of collective autonomy, for instance. In that sense, grassroots innovations in Zapatism have more similarities with the goals of grassroots innovation movements from the North (Smith *et al.* 2014; Smith *et al.* 2017) because they are more oriented to an ideology and commitment to social and environmental transformations that are manifested in everyday life, such as the sense of community or the construction of territorial autonomy. Furthermore, the distribution of power relations in the Zapatista movement is quite horizontal, with particular attention to gender equity as shown in various facets of their daily life and the organization of international women meetings. Another important element is the creation of a global alter-globalist network (Esteva 2002; Zibechi 2004; Pleyers 2019).

Conclusion

In this study we have identified and synthesized existing knowledge of the main two theoretical strands on grassroots innovation in both the global North and South, illustrating each of them with several examples. We have also identified and analyzed direct and indirect references to grassroots innovation in the literature on post-development, alternatives to development and Zapatism. Finally, we have provided a

brief discussion on the review's main findings, particularly in terms of their conceptual and theoretical implications.

Our analysis has unraveled part of the conceptual confusion that exists around the concept of grassroots innovation, which is used in very different ways according to several factors such as the geographical and sociocultural contexts where such innovation unfolds, the social agents that carry it out, their values and motivations, or the own cultural and academic background of the researchers who theorize about grassroots innovation. Moreover, our study has shown that neither of the two main theoretical strands on grassroots innovation is well suited to analyze how this type of innovation is realized in the specific context of alternatives to development. In addition, through a thorough review we have verified that there are barely direct or indirect references to innovation in the literature of post-development, alternatives to development and Zapatism, and that the concept of grassroots innovation has hardly been used to analyze innovation. However, our findings suggest that grassroots innovation has a potentially very important role in designing and constructing alternatives to development. We have thus provided a preliminary characterization of how grassroots innovations may look like and occur in the design and everyday construction of alternatives to development (particularly in contexts of the global South—e.g., Zapatism—, which are possibly the most fertile grounds for putting them into practice). With this characterization, we have sought to generate a conceptual and theoretical contribution that may allow for the operationalization of the analysis of grassroots innovations in alternatives to development.

Future research is needed to improve the conceptualization of grassroots innovation around different alternatives to development, particularly in contexts of the global South where it is most numerous and diverse. Developing an adequate theoretical-conceptual framework of grassroots innovation tailored to the specific case of alternatives to development is a necessary goal to better understand the potential role of innovation in the design and construction of such alternatives. To that end, it is essential to conduct empirical studies that document and analyze grassroots innovations carried out by grassroots movements, organizations and communities in both rural and urban areas. In addition, it is essential to identify the processes and outcomes of grassroots innovation and understand how innovation is planned and realized by different grassroots groups in different case studies. We acknowledge that this sort of analysis will require a different research design that is not based on a literature review but on ethnography, grounded theory or participatory action research, for instance. Hence, we suggest that is the way forward to produce empirical evidence from case studies that can contribute toward developing a comprehensive theoretical-conceptual framework of grassroots innovation in alternatives to development.

Acknowledgements

Endnotes

1. Post-development proposes that development ceases to be a central organizing principle of social life and means a decentralization of capitalism in the definition of the economy and State forms of power (see Escobar 2005, 2012).

2. In the context of Latin America, autonomous design refers to design that is based on the autonomy of indigenous, mestizo and Afro-descendant communities. It is based on the following criteria: 1) Every community practices the design of itself, 2) Throughout the design process, people are professionals of their own knowledge, 3) What the community designs is a system of learning about itself, 4) Every design process implies an approach to problems and possibilities that allow agreeing and deciding alternative actions, 5) The concrete result is a series of tasks, organizational practices and criteria to evaluate its performance (Escobar 2017: 184–185).

3. Escobar (2017) refers to Manzini's (2015: 62) definition of social innovation: *Design for social innovation is everything that expert design can do to activate, sustain, and orient processes of social change toward sustainability.* In this definition, expert design depends on cultural facilitators, strategists, activists or promoters, who have a highly technical training to solve complex problems.

4. The term "global South" is not geographical. It rather refers to a "positionality in power relations and domination of the West over the non-Western world" (Grosfoguel 2016: 128). The term arises from post-colonial theory.

5. The term "commons" refers to shared natural resources that are collectively managed by communities of users through local norms, rules and institutions that promote cooperation and collective action to access and benefit from such resources in an equitable and sustainable way (Villamayor-Tomas & García-López 2021).

6. They fight for new politics, policies and laws that take into account the demands of the Mexican indigenous people: housing, land, work, food, health, education, information, culture, independence, democracy, justice, freedom and peace (EZLN 2005: 18).

7. Decoloniality has been an important political component of local struggles and social movements in Latin America, whose actions are often driven to resist and reject the power relations and social and institutional patterns established by neocolonialism (Mignolo & Walsh 2018: 16).

8. The *Caracoles* combine and integrate in practice the construction of power by networks of autonomous peoples and the integration of organs of power as self-governments that struggle for an alternative within the system (González-Casanova 2009). The *Good Governance Councils* function as true networks of power from below and articulate the municipal autonomous councils, which in turn group community authorities (Romero 2019).

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