

Article

Transformative Potential of Digital Manufacturing Laboratories: Insights from Mexico and Spain

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Abstract

This article presents a comparative analysis of digital manufacturing laboratories (DMLs) in Mexico and Spain. It is argued that DMLs, also known as makerspaces or FabLabs, play a key role in innovation and experimentation, but that their success depends on the relationships they establish with social actors, such as local governments, universities, and firms. Key concepts of the transformative innovation approach such as “protective space” and “embeddedness” are introduced, which allow us to understand how DMLs operate within a complex system. The comparative analysis of a DML in Mexico City (Mexico) and a DML in Valencia (Spain) allows us to identify similarities and differences in their operational contexts. While the Mexican DML faces a lack of government support and dependence on the private sector, the Spanish one benefits from strong institutional support and public policies that facilitate its development. This results in greater stability and capacity for action for the Valencian FabLab VLC compared to the Mexican FabLab. Finally, we reflect on how the embeddedness received from different social actors affects the autonomy and transformative capacity of DMLs, suggesting that while both labs have the potential to innovate, their contexts and relationships determine their effectiveness and sustainability in the digital sociotechnical system.



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Keywords: digital manufacturing laboratories (DMLs); governmental support; transformative innovation; embeddedness

1. Introduction

The democratization of digital manufacturing technologies was an unprecedented opportunity for the emergence of a global maker movement. Digital manufacturing laboratories (DMLs) are not only innovation hubs but also active sites of knowledge production, transfer, and democratization, particularly relevant in contexts marked by social inequality. To understand the systemic dynamics of DMLs, we based our analysis on the transformative innovation approach developed by a group of academics at SPRU/Sussex [1]. This approach is a radically new perspective that disrupts and redefines innovation by embodying a holistic analysis considering the interplay of multiple social actors, resources, rules, and cultural patterns. It fosters empowerment and collective action, involving a multi-actor collaboration geared towards a long-cycle systemic impact on social change and driven by commitment with complex societal and environmental transformation [2].

Digital technology in transformative innovation approach is considered a facilitator of knowledge flows, disrupting existing structures and enhancing organizational changes.

The digital sociotechnical system brings together many social actors that have given rise to a post-organizational configuration which integrates a networked setup of diverse social issues, thus establishing a glocal dynamic [3]. Of all the complexity inherent in this sociotechnical system, in this article we will focus on the role played by DMLs—commonly known as makerspaces or FabLabs—as well as on their relationships with various actors that are responsible for coordinating or supporting the experimental processes that are emerging within this system in multiple ways. This approach allows us to analyze the possibilities of systemic transformation driven by the digital environment, considering the support that these laboratories receive or the barriers they face as a result of the dynamics of the system.

Specifically, we rely on two concepts of the transformative innovation approach that allow us to place DMLs within the complexity of the digital world. The first one is *protective space*, since it is in this experimental space that these laboratories operate. The second concept is *embeddedness*, which accounts for the necessary relations for the flow of resources and collaborations as well as the dependency that these laboratories have with technology firms, universities, foundations, etc. The central question is, how do the types of embeddedness received from other social actors affect the governance of DMLs? And, based on this question, to what extent are autonomy and freedom of action encouraged through the modalities that these relationships take? To answer these questions, we compare two case studies: a DML operating in Mexico City (Mexico) and another in the city of Valencia (Spain).

To this end, we first show the position that DMLs have within the dynamics of the digital sociotechnical system. Then, we present the key concepts of the transformative innovation approach that allow us to analyze the multiple assemblies within the system. In the third section, we briefly present the methodology used to address this phenomenon empirically. Next, we present the similarities and differences of both case studies to finally reflect on the complexity of the relationships that DMLs have within the digital sociotechnical system.

2. DMLs in the Digital Sociotechnical System

The digital sociotechnical system has undergone a major transformation. It began with the construction of a technological infrastructure—hardware and software—aimed at responding to the expansion of large organizations in the public and private sectors and, at present, it integrates a supra-system where multiple technologies converge. These technologies are inextricably linked to virtually all other sociotechnical systems—namely, mobility, health, manufacturing, and services. They have even virtualized everyday activities in all corners of the world.

Key to this article is that this system also reconfigured its structure in a multiform way, resulting in an amorphous space that expands and contracts endlessly and creates new forms of interaction and social processes. In this space, simultaneity and decentralization replace contiguity [4,5]. For example, [6] analyzed the emergence of liberating technologies because of the free flow of information, giving way to unprecedented forms of relationship, which led to less bureaucratic and easily accessible connectivity but also to new forms of production and appropriation of knowledge. The narrative that supports these transformations brings about cognitive and empowerment changes in the people who use digital technology.

Ref. [7] classifies the collective use and universal access to technology into five major trends: the concepts of free software, open access, open source, open data, and open networks account for the development of digital commons, which means sharing knowledge and skills, integrating communities of practice that share a common interest, collaborating

and co-creating in an open inclusive space. In this sense, it can be said that the digital sociotechnical system is organized based on information flows, through which ideas circulate and are shared and produced collectively. Thus, the data flowing on the web is a resource that becomes an asset that, in principle, belongs to society in general.

The digital commons are inspired by the proposal of [8] in recognizing shared digital assets as an alternative form of ownership of knowledge, different from the one that prevails in the logic of the market and the State, and which accounts for a new type of governance of resources that flow virtually. Digital technology builds bridges, weaves common ground, and, in principle, creates opportunities to build networks that foster collective action. These technological transformations are based on a metaculture, or what [9] calls a “global ecumene.” The author defines it as an open and, at the same time, densely interconnected space that gives way to the flow of people, knowledge, and cultures that share a common identity that is appropriated, organized, and interpreted voluntarily and freely by the participants—that is, a collective space in constant movement with a dispersed and porous configuration operating without pre-established rules.

The digital commons are expressed in many ways and respond to countless agendas, both social and political. Despite its decentralization, the participants in this ecumene are in specific physical contexts. The *glocal* dynamic broadens the horizon of action, giving free entry to those who want to propose innovations inspired in their everyday life. Some authors [6] refer to those who navigate this experimental space as the “mass intelligentsia,” for whom DMLs act globally as receptacles of the liberating technologies.

DMLs are co-working spaces that are equipped with machinery and tools for digital manufacturing. This infrastructure is essential for designing and manufacturing prototypes, making them a source of early-stage project ideation. Machines are rented or loaned for a certain time to teams made up of young entrepreneurs. The technologies they offer—printers and programs for 3D design, laser cutters, robots, augmented reality glasses, etc.—turn these laboratories into open spaces for experimenting with alternative operating rules. This stimulates creativity, “thinking outside the box”, and, therefore, the development of self-learning skills that are mostly encrypted in these technologies [10]. There are several types of DMLs; some are the result of the initiative of institutions—especially those related to education, which open extracurricular spaces to provide transdisciplinary environments that are more ludic and allow for complementary professional traditional education. Others arise as part of a public policy to open spaces identified with smart cities. A third type emerges autonomously and relies on donations and user fees.

These laboratories also provide complementary services to entrepreneurship such as accounting or legal support, and promote seminars, social events, and training courses that are not only related to digital technology but to business and management capacities. DMLs are also connecting spaces, as they promote hackathons or crowdsourcing promoted by companies or governments. These events are opportunities to develop their social capital, as they connect them with companies, technology and material suppliers, foundations, funders, and collaborators. On the other hand, Ref. [11] argues that the links between large firms and DMLs represent an organizational model that brings corporations a significant reduction in capital investment for innovation. This makes laboratories a place to launch new ventures, creating the possibility for highly creative young people to access technology that would otherwise be financially unattainable.

Altogether, the above has made DMLs pioneers in more dynamic and flexible ways of managing innovative processes that incorporate open innovation. Ref. [12] puts the latter into perspective by mentioning three phases of the innovation process: generation of ideas, exploration, and exploitation. These phases are implemented in discontinuous spaces. The first phase is the most creative and experimental, since it is where ideas are conceived, and

the first proposals launched. In the second phase, the design of the device or service is fine-tuned. Finally, in the last phase, innovation demonstrates its competitive advantage and opens the possibility to launch innovation on the market. DMLs are the ideal space for generating ideas, eventually becoming a kind of “idea production factory”, a collection center for proposals, a place to outsource the most creative phase of the innovation process. On the other hand, through these experimental spaces, companies and/or governments create bridges and thus co-opt the pulse of consumption needs through technological applications or digitally manufactured artifacts.

In this section, we have outlined how DMLs are positioned within the complexity of the digital sociotechnical system. Below, we present the analytical proposal that allows us to compare the two selected case studies.

3. Key Concepts to Analyze the Links Within the Digital System

Digital commons promote a new social model that modifies the relationships between social actors. To capture this complexity, we apply a systemic analysis through the transformative innovation approach, which advocates a shift from the current economic, social, technological, and environmental model to a more sustainable one. We base our analysis on sociotechnical transitions theory [13,14] and the multilevel perspective [14–16] to understand how such change occurs.

Sociotechnical systems consist of technologies, industries, policies, regulations, markets, users, cultural discourses, and knowledge sources [14]. These components align into systems that co-evolve and often resist transformation. Yet, social and environmental crises demand profound systemic shifts—sociotechnical transitions aimed at fairness and sustainability. Transition analysis examines how societies can initiate and steer these systemic changes [13].

The multilevel perspective identifies three interrelated dimensions: the landscape, regimes, and niches [17]. The landscape encompasses exogenous factors that shape broad trends, like the 2030 Sustainable Development Goals (SDGs) or the convergence of infrastructures essential for the digital system. Regimes legitimize dominant norms, regulations, and cultural practices, supported by both public and private actors [15,18]. Still, they also house resources that support niche-level activities. Niches are protected spaces for experimentation and alternative governance models. Over time, they may challenge the regime and shift the system toward inclusivity and sustainability. Niches allow innovative, sometimes disruptive, approaches to problem-solving. As [6] argues, niches might support market-oriented innovations or foster transformative alternatives thanks to their relative freedom. This is where we locate Digital Media Labs (DMLs), which embody the open innovation model. These labs are only one among many experimental spaces within the niche dimension that contribute to the evolving digital commons.

As can be seen in Figure 1, the multilevel model helps us understand the DMLs’ role and their complex relationships with regime-level actors—governments, companies, and institutions—that influence their direction through norms and resources. These relationships, shaped by interests and commitments, are not always visible but deeply affect system dynamics. Central to these dynamics is data, an intangible yet strategic resource managed through a powerful infrastructure owned mainly by large tech companies. These firms act as data hubs, even absorbing information from niche-level activities.

While these companies might appear to promote alternative innovation pathways, their actions often reinforce existing structures. As [4] notes, they form hybrid institutional arrangements—neither fully hegemonic nor entirely independent. They value unconventional thinking and fund open innovation, connecting with niche actors through calls for

proposals, shared resources (software, training, mentoring), and funding. However, this support does not necessarily indicate commitment to systemic transformation.

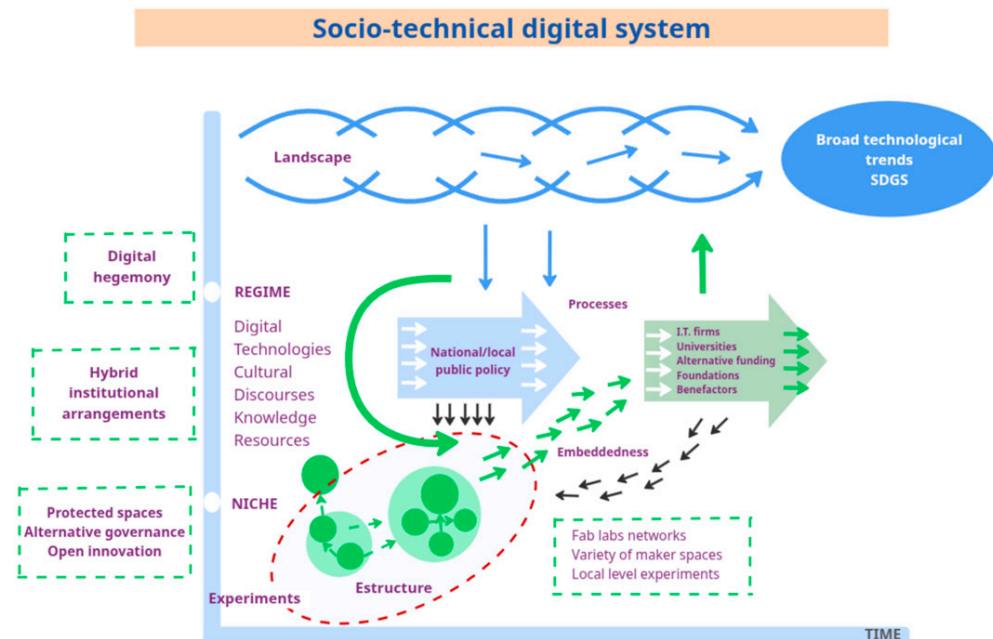


Figure 1. Socio-technical digital system. Source: Own elaboration based on [2,14].

Such arrangements create a protective space where niche experiments like DMLs can develop. Tech firms see these niches as ideal for generating path-breaking innovations that might even reshape regulations and lifestyles [19]. Yet, this dynamic is deeply ambivalent. Ref. [11] critiques this outsourcing of creativity, viewing it as a corporate strategy to appropriate common goods—knowledge, skills, social capital—and gain visibility among younger audiences. These processes fit into what [20,21] describe as “post-capitalism,” where the digital commons are commodified through external innovation.

Despite these contradictions, DMLs could not exist without regime-level support—from corporations, governments, foundations, universities, and funding bodies. This leads us to ask: What is the true scope of the relationship between regime actors and DMLs within this protective space? In order to answer this question, Ref. [19] identified three functional properties of such spaces: shielding, nurturing, and empowering. Shielding protects labs from dominant practices and hostile environments. Nurturing is supported by free-flowing resources and relationships that build capabilities, networks, and expectations. Empowerment occurs when a cluster of niche activities matures, gains autonomy, and influences the regime. However, empowerment is not absolute, data remains accessible to the firms owning the platforms that host these innovations. To understand these dynamics, Ref. [19] describes two types of embeddedness: active and passive. Active embeddedness entails direct regime support—training, technology, funding, or infrastructure. Universities and research centers also play key roles here, sometimes establishing or co-running DMLs. Public agencies at various levels support open innovation spaces for solving urban challenges. Financial institutions and foundations invite proposals to develop localized solutions. Passive embeddedness, in contrast, emerges when DMLs gain autonomy over resources and governance. These labs, now more independent, operate with less reliance on external support. Yet a third type is vital in the digital context: encrypted embeddedness—the way technologies encode rules, norms, and behaviors into platforms and infrastructures. As [22] describes through actor-network theory, digital tools become actants that shape social relations. These forms of embeddedness shape the conducts within the protective

space. Ref. [19] identifies two ideal types: “fit and conform” and “stretch and transform.” The first reflects alignment with existing regime dynamics, especially when labs are still forming and heavily dependent on digital firms. These labs often emulate corporate environments and reinforce the regime’s status quo. The second, “stretch and transform,” only occurs when niche activities consolidate, coordinate, and build a disruptive vision capable of shifting the regime’s rules and structures. However, this trajectory is fraught with obstacles—lack of critical mass, fragmentation, or weak long-term strategies can stall transformative efforts. The notion of embeddedness helps us understand not only the governance structures of DMLs but also how knowledge flows are shaped by institutional, cultural, and technological dependencies.

This theoretical framework helps us understand DMLs as part of a complex digital system where various actors collaborate, appropriate, and contest the use of data as a common good. These dynamics unfold in a hybrid model—controlled yet open—offering both risks and opportunities for democratizing technology.

In this context, we proposed two core concepts: (1) the protective space, enabling niche experimentation under partial regime support, and (2) the embeddedness between regime and niche actors, through which resources, governance, and influence flow. Drawing on [19], we highlighted three functional properties (shielding, nurturing, empowering) and three forms of embeddedness (active, passive, encrypted), all of which shape the type of relationship DMLs have with regime actors—whether they conform to or challenge the dominant digital paradigm.

This framework allows us to explore how dependencies, legitimacy, governance models, expectations, and long-term visions are co-produced. Since these dynamics take different forms depending on the context, we chose to examine two case studies of DMLs: one in Mexico City and the other in Valencia, Spain.

4. Materials and Methods

In order to understand the challenges faced by DMLs in the digital sociotechnical system, we lean toward an ongoing dialogue between the transformative innovation analysis and an empirical approach centered on each case study. To do that, this study applies a qualitative, comparative case study methodology to account for the multiple supports and collaborations that enable DMLs to have an active role in upscaling their position within the system. The methodological approach is grounded in long-term, in-depth field engagement and draws from anthropological traditions of participant observation, informal interviewing, and situated analysis. The research was conducted in two DMLs—one located in Mexico City, the other in Valencia (Spain)—chosen on the basis of the researchers’ extensive familiarity with their respective sociocultural and institutional contexts. Case studies contribute to the holistic orientation of micro-social methods [23].

The selection of these cases was informed by both epistemological and practical considerations. Each of the two researchers is embedded within one of the national contexts studied—one Mexican, one Spanish—which allowed for intimate access to the local DML ecosystems and for longitudinal engagement with their key actors. Rather than being chosen for statistical representation, these cases were selected for their revelatory potential, in the sense that they offer rich insights into the complexities of DMLs functioning in distinct, yet networked, socio-technical environments. One important criterion in the selection was their affiliation to the most prestigious DML network—the FabLab network—which provided a common organizational framework, while their divergent institutional and economic settings enabled comparative exploration of context-specific dynamics.

Fieldwork took place between 2017 and 2024 and combined participant observation, informal interviews, and digital ethnography. The anthropological lens, particularly from

the perspective of one of the researchers trained in ethnography, was essential in capturing the everyday, nuanced interactions of the DMLs with different types of social actors. The research team engaged directly in the daily life of these labs—attending workshops, collaborating on open innovation projects, and supporting activities as participant-observers, exploring how knowledge is constructed and exchanged within DMLs, particularly through daily practices, informal interactions, and localized problem-solving. The most valuable data was collected by informal engagements where spontaneous, informal interviews, often conducted during or around shared activities, which are central to ethnographic inquiry.

After discussion between the authors of some of the findings, we decided to apply 12 semi-structured interviews that were conducted (6 in each location), targeting key figures such as lab coordinators, long-term users, project collaborators, and community stakeholders. Complementary to these interviews were multiple hours of informal conversations, field notes, and direct observations recorded during site visits and events. This immersive presence enabled the researchers to track both visible dimensions of DML activities (e.g., technology use, institutional events, physical interactions) and invisible dynamics (e.g., power relations, emotional labor, informal knowledge flows).

Additionally, digital ethnography was employed through systematic monitoring of each lab's social media presence (Instagram, Facebook, Twitter, communities of practice) and digital platforms. This allowed for the inclusion of virtual interactions, public narratives, and digital community-building efforts that are integral to the “glocal” nature of DMLs.

Data analysis was conducted using thematic analysis, following a hybrid coding process that combined deductive and inductive strategies. The deductive codes were drawn from the theoretical framework on transformative innovation and included categories such as:

- Contextual factors (economic, institutional, socio-technical conditions).
- Resource mobilization (financial, human, material).
- Governance structures (formal and informal decision-making processes).
- Institutional support (policy environment, partnerships, infrastructure).
- Protective space (shielding, nurturing, and empowering).
- Embeddedness (active, passive, encrypted).

These analytical categories structured the fieldnotes, transcripts, and social media content, enabling a systematic comparison across the two cases. Inductive codes were added to capture emergent themes, such as gender dynamics, the emotional dimension of innovation work, and grassroots forms of autonomy.

Finally, to ensure reliability and minimize researcher bias, all data were analyzed collaboratively by both authors. Discrepancies in coding were discussed iteratively, and key themes were jointly validated through reflexive dialogue grounded in each researcher's contextual expertise. The data gathered is kept anonymous to meet the ethical principles of the Anthropological discipline. For this article, we only considered DMLs' relational processes in the digital socio-technical system as data to be published.

Several limitations must be acknowledged regarding the scope and design of this study. First, the comparative nature of the research, while analytically productive, is necessarily shaped by the contextual asymmetries between Mexico and Spain. The two countries differ significantly in terms of key socio-economic indicators, such as GDP per capita and GINI coefficient. The Table 1 below shows that Spain has a higher GDP per capita than Mexico, while Mexico's GINI coefficient is significantly higher. This data confirms that Mexico has a lower average income and a higher unequal distribution. The regional data presents a more dramatic reality; Mexico City's GINI coefficient is much higher than the national average, and its GDP per capita is significantly lower compared to that of Valencia, while

the Community of Valencia presents very similar results to the GDP per capita national average, and also a much better income distribution. This comparison highlights the economic scale differences and the contrasting levels of income inequality between these countries and their respective key urban regions. These figures have a cascading effect, broadening disparities in institutional capacity, public investment in innovation, and access to infrastructure.

Table 1. Comparison of GDP per capita and GINI coefficient between Spain and Mexico and between Valencia and Mexico City.

National and Regional Level	GINI Coefficient	GDP per Capita (2023)
Mexico	43.5 (1)	\$10,242 (5)
Spain	31.2 (2)	\$28,570 (6)
Mexico City	53.2 (3) (data 2018)	\$16,520 (7)
Community of Valencia	30.5 (4) (data 2018)	\$27,800 (8)

Sources: (1) <https://worldpopulationreview.com/country-rankings/gini-coefficient-by-country> (accessed on 18 May 2025). (2) Trading Economics. tradingeconomics.com/spain/gini-coefficient-of-equivalised-disposable-income-eurostat-data.html (accessed on 18 May 2025). (3) Coneval Indicadores de desigualdad por entidad federativa (2020) coneval.org.mx/coordinaci%C3%B3n/entidades/DistritoFederal/Paginas/desigualdad.aspx (accessed on 18 May 2025). (4) Instituto Valenciano de Estadística. Encuesta de condiciones de vida, Comunidad de Valencia. www.pegv.gva.es (accessed on 7 November 2024). (5) Trading Economics. tradingeconomics.com/mexico/gdp (accessed on 18 May 2025) (data from World Bank). (6) Trading Economics. tradingeconomics.com/spain/gdp (accessed on 18 May 2025). (7) Statista+. statista.com/statistics/1289347/gdp-mexico-city-share-total-mexico-gdp (accessed on 18 May 2025). (8) Valencia AC CaixabankResearch. caixabankresearch.com/en/publications/autonomous-community-profiles/valencian-ac (accessed on 18 May 2025).

Rather than controlling these differences, the study embraces them as critical variables that shape the evolution, governance, and potential of each DML. Consequently, this research does not aim to produce generalizable conclusions, but instead to highlight how context-specific conditions fundamentally influence the trajectories and transformative capacities of DMLs.

Second, the study's case selection strategy, while justified in terms of depth and access, is inherently limited in scope. The research focuses on two case studies with which the authors have long-standing relationships, allowing for rich, longitudinal engagement. However, this proximity may introduce risks of researcher bias or “blind spots” in interpretation, despite efforts to triangulate data sources and maintain critical reflexivity throughout the research process.

Third, due to the qualitative and interpretive nature of the study, findings are contingent upon the researchers' situated observations and the perspectives of the selected participants. While the inclusion of informal interviews and digital ethnography offers a nuanced understanding of local practices, some stakeholder perspectives may remain underrepresented, particularly those outside the immediate DML ecosystems (e.g., non-affiliated community members or critical voices).

Fourth, although the study covers a seven-year period (2017–2024), the temporal analysis is not fully longitudinal in a formal, quantitative sense. While major developments and shifts are documented, the research does not systematically follow a cohort or apply time-series analysis. Future work could benefit from a more structured temporal design that tracks specific actors or processes across defined intervals using a statistical approach.

Finally, the rapidly evolving nature of digital innovation ecosystems poses an inherent limitation. Organizational structures, technologies, and partnerships can shift quickly, making it difficult to fully capture the dynamism of DMLs within the confines of a single study. As such, the findings should be understood as a snapshot of ongoing processes rather than definitive outcomes. Nonetheless, this article is meant to inspire future research on this phenomenon.

5. Results: The Similarities and Differences of Two DML Trajectories

To analyze the type of embeddedness in the two case studies, below we present some similarities and differences that address the contextual dynamics of the selected laboratories. Specifically, we present the skills, resources, and purposes that give meaning to the experimental activities of these DMLs and their connection with private and public social actors in the protective space.

Both laboratories belong to the worldwide network DMLs known as FabLabs. The network was created at the beginning of the 21st century, led by the Center for Bits and Atoms (CBA) of the Massachusetts Institute of Technology (MIT) in the United States. Within this network, the Spanish case—known as FabLab Valencia or as FabLabVLC—started operations in Valencia in 2012. Three years later, Fablab Impact—a Mexican laboratory based in Mexico City—emerged. To be part of this network, these laboratories met some basic requirements, such as submitting letters from other FabLabs that support opening the laboratory, having machinery and tools that allow for digital innovation, and being located in or reporting on activities that take place in marginalized urban areas. Also, these labs must be coordinated by professionals who have experience in the digital environment. Both laboratories were created with a clear calling to open themselves to society, with values such as democracy, inclusion, and alleviating socio-economic inequalities.

By belonging to this large and prestigious network, DMLs gain recognition in the innovative sphere, which facilitates collaboration with communities of practice and people who share the same interests. This also allows the disclosure of a wide range of conferences, open competitions, and online courses, as well as offering a platform to entrepreneurs who want to expand their connections for sharing their ideas, receiving recommendations, and even collaborations to launch innovations to the market.

The directors of each FabLab must seek all the resources for its operation: benefactors, foundations, firms, and universities that carry out activities in the area, as well as public policy programs. They are also committed to developing a training program that includes, for example, the use of various technologies, support in registering a venture, and the organization of recreational events to integrate collaborative networks, as well as the diffusion and engagement in open calls.

Both FabLab Impact and FabLabVLC are heavily dependent on resources from the regime's social actors and must cope with tensions and/or vulnerabilities to which they are exposed. It is important to bear in mind that DMLs are production units that operate on a local scale and, therefore, contextual situations have an influence on the routes outlined by each FabLab.

Below, Table 2 presents a comparative overview of two case studies.

As shown in Table 2, the first difference is that the Mexican laboratory was created on an independent and autonomous basis. Its director sought out a space in a poor, inner-city neighborhood to develop all levels of technological skills among young people living in marginalized conditions and to collaborate with small trade workshops to introduce technology into their designs and manufacturing. Total independence represents seeking and selecting funding from the regime's social actors to have a venue to operate, digital tools, and scholarships so that low-income entrepreneurs could access its services. While his decision has made it possible for the laboratory to operate without the bureaucratic red tape that comes with having an institution's support, a constant search for funding has triggered instability and vulnerability, especially in a context like Mexico City, where the DML's presence is diluted in the chaos of a metropole inhabited by more than 20 million people and where technological illiteracy prevails among low-income populations.

Table 2. Comparative overview of FabLab Impact (Mexico) and FabLabVLC (Spain).

Dimension	FabLab Impact (Mexico City)	FabLabVLC (Valencia)
Year of Establishment	2015	2012
Institutional Affiliation	Independent, initiated by local entrepreneur	University-led (Universitat Politècnica de València)
Founding Vision	Social inclusion and technological empowerment in marginalized communities	Academic enrichment and regional innovation support
Funding Sources	Private donors, CSR programs, sporadic public grants	Stable public funding (UPV, local/regional governments, EU), private foundations
Governance Model	Director-led, flexible, vulnerable	Institutional, networked, more stable
Key Challenges	Earthquake (2017), loss of national funding (INADEM), low digital literacy	Early exclusion of non-academic users, dependency on UPV regulations
Crisis Response (COVID-19)	Rapid virtualization, global FabLab collaboration, maker solidarity	Government employment support (ERTE), EU recovery funds, production of PPE
Public Policy Support	Discontinued (INADEM); fragile local partnerships	Continuous, from local to EU-level (Las Naves, Generalitat Valenciana, AECID)
Private Sector Collaboration	Episodic, image-driven (CSR, marketing)	Structured through foundations and university-led agreements
Resilience and Adaptability	High, but precarious and highly dependent on individual leadership	High, supported by stable funding and institutional structures
Autonomy vs. Support Trade-off	High autonomy with limited protection and instability	Lower autonomy, higher institutional support and scalability

Source: Own elaboration from ethnographic results.

The Valencian laboratory was proposed by the Universitat Politècnica de València (UPV); this has given a strong boost to digital manufacturing laboratories, to the point of coordinating the FabLabs Network of Valencia. This organization, based at UPV, has strongly supported DML's project, providing various kinds of resources and negotiating with collaborators from the same university to secure funding and projects. At the same time, it has decentralized its attention to social demands. For example, it promoted opening FABLAB Xabec—located in a working-class area—with the aim of developing technological skills among this neighborhood's youth, as well as Océano Naranja (Orange Ocean), which functions as a coworking facility equipped with technology that can be accessed by anyone who can afford to pay a fee for the use of the infrastructure or the services it offers.

At the beginning some tensions arose, as the original laboratory is located on the university campus, with the aim of complementing the academic programs offered by the institution. This restricted its operation, making it difficult for young people without access to higher education to benefit from it. For example, the intention was to open the FabLabVLC facilities to young immigrants, but the university put up obstacles that prevented their access. This shows that, in having to conform to UPV's bureaucratic parameters, the essence of the laboratories was also restricted. The solution was to organize two off-campus labs: FabLab Xabec and FabLab Oceano Naranja, mentioned above.

For further contextualization of the DMLs, during the period in which this research was carried out, we had the opportunity to analyze their capacity to react in critical moments that were beyond their control. In this sense, FabLab Impact had to overcome two crises: the first was the high-magnitude earthquake of 2017, which left the building they had on

commodatum unusable, with all their machinery and tools inside. This meant canceling all its activities and seeking support from the city government to use an alternative venue temporarily along with basic equipment for the design of computer-based proposals. Thus, they were relocated to a public library, which, because of its proximity to the middle-class population, meant the suspension of projects that had been initially developed. They also received support from another FabLab in Mexico City to lease their machinery for prototyping, although with limited access.

A few months later, this event was followed by the lockdown due to the COVID-19 pandemic. Although they had to close their on-site operations, the director of FabLab Impact refused to give up. He virtualized all the activities with strong support from MIT and the global FabLab network. This network reacted quickly at the international level, diversifying its activities exponentially to address specific issues related to technological expertise, gender, and context. For example, in Central America and the Caribbean—a region that was practically isolated from the world—a significant collaboration was achieved regarding the use of waste materials in the face of the humanitarian crisis. These critical events have demonstrated FabLab Impact's great resilience, where its director, by refusing to give up and adjusting courses of action, played a key role in connecting alternatives.

FabLabVLC responded to the confinement in different ways. The headquarters within UPV operated digitally, while Fablab Xabec and Fablab Oceano Naranja received support from the Spanish government through its special ERTE program (Temporary Employment Adjustment Program), which allowed them to meet certain operating costs. Meanwhile, the Spanish government issued a Royal Decree to help small companies (such as FabLab Oceano Naranja) support solvency during the COVID crisis. These grants were complemented by the European Union's Next Generation Funds. In addition, during the pandemic, many Spanish FabLabs, including those in Valencia, used their facilities to manufacture supplies—such as protective methacrylate screens, gowns, masks, respirators, etc.—which they sold to cope with the crisis.

Another significant difference between the two case studies is the support provided by public policies. In the Mexican case, the fact that government support was initially available and was later withdrawn caused a critical situation. At the end of 2019, the federal government decreed the closure of the National Entrepreneurship Institute (INADEM, for its Spanish acronym). Its role focused on developing ventures with the provision of public resources for purchasing technology and granting scholarships for low-income students to develop their technological and entrepreneurial skills. To date, this program has not been reestablished or replaced by any other public policy. Undoubtedly, this has opened a digital gap, especially affecting young low-income people who saw a great opportunity to develop a technological habitus and demonstrate their creative abilities in this laboratory. It has been noted that the lack of a public policy that supports open innovation creates an environment of high vulnerability that has only been compensated thanks to the support provided by social actors in the private sector.

FabLabVLC has experienced a diametrically opposite scenario. On the one hand, to start the project, it had the support of a public institution, the university, which provided not only the facilities and machinery but also the director's salary. Furthermore, since 2015, it has had the uninterrupted support of both Valencia's municipal government and regional government (the Generalitat Valenciana) to implement a clear policy supporting digital-based entrepreneurship, thus giving rise to an ecumene that allows innovative youth to develop their skills in different spaces and develop their technological capabilities. Also, the Valencia City Council under the Las Naves program stands out, which is responsible for promoting calls for proposals, awards, and competitions to foster new initiatives

and consolidate some existing ones. Finally, the university's support has allowed the FabLabVLC network to channel funding from different public administrations for the organization of courses and conferences.

As mentioned above, in the Mexican case, in the absence of a public policy, the director of FabLab Impact has sought benefactors from the private sector. Among these, Fundación del Centro Histórico, owner of the building affected by the earthquake, took charge of its rehabilitation and, four years later, in 2021, the laboratory was relaunched. As a result of the forced shift in FabLab Impact's mission, during the pandemic this lab promoted circular economy projects to attract young professionals—"makers for good" was born. The director looked for sponsor companies engaged in manufacturing using sustainable materials and participated in fairs of digital manufacturing machinery imported from Europe. These links, in addition to expanding contacts and collaboration networks, have reactivated the laboratory, making it possible to launch some courses and crowdsourcing calls and receive mentoring. For the private sector, these activities are part of corporate social responsibility programs or marketing strategies, and therefore, they do not translate into long-term support but rather have a beneficial tone that gives them a positive image and has an impact on the brand's value. This link between the regime and the experimental space is seen as an ephemeral opportunity for contact—with neither side pursuing a sustained commitment. In conclusion, throughout its trajectory, the Mexican laboratory has experienced tensions and coupling that have led to erratic, changing, and uncertain performance.

The Valencian case, in contrast, not only receives support from public policies and UPV, but this public university has also established agreements with foundations such as Orange, which allow it to channel resources to social projects aimed at training vulnerable young people in digital tools and cross-cutting skills. The university's support has also served to channel aid through public subsidies. This is the case, for example, of the Spanish Agency for International Development Cooperation, which funded several of FabLabVLC's activities through its call for innovation projects for development, including the creation of massive, open, and free courses on topics related to digital manufacturing, as well as a replica based on the FabLab model in the city of Quetzaltenango, in Guatemala.

6. Discussion

This comparative exercise illustrates two totally different contexts, one that has operated in a highly deprived and uncertain environment and another that seems to move within a digital ecumene. Autonomy or dependence are also reflected in the style of governance and the type of relationships that are woven with regime actors. In the Mexican case, the cost of autonomy has been high, since the possibility of collaborating with the regime's actors is very erratic, thus preventing its consolidation. In the case of Valencia, UPV's embeddedness gives continuity to the laboratory network's development plans while also allowing it to develop more stable agreements with large companies and public agencies. This is evident in the FabLabs' expansion process in Valencia, which creates the possibility of diversifying and responding to the needs of the contexts in which it operates.

Comparing both cases allows for an analysis of the complexity of relationships within the digital sociotechnical system. To do this, the concepts of active and passive embeddedness [19] are used. Unlike other systems, the digital system has been structured by regime actors—particularly digital companies—that promote the free flow of innovation from experimental spaces, avoiding the shielding of niche actors. This creates an open environment where ideas circulate widely, even influencing other sociotechnical systems. A multi-stakeholder model supports this openness, with universities, foundations, tech user companies, and governments recognizing the strategic importance of Digital Man-

ufacturing Labs (DMLs) in feeding innovation into the system. Both labs show how the generation and application of knowledge are influenced by their degree of embeddedness and access to digital infrastructures.

“Enabling” or “nurturing” is a key functional property of embeddedness—it gives labs identity and position within the digital landscape. In the case of FabLabVLC, its institutional framework has enabled stability and growth through public and private support. However, this comes with limitations, as it must align with the rules and strategic plans of the university backing it. FabLab Impact, by choosing autonomous governance, faces a different situation but is still dependent on regime actors for resources. This paradox has resulted in unstable, short-term partnerships that weaken the lab’s long-term development.

While FabLabVLC enjoys relatively secure support, FabLab Impact operates in precarious conditions with uncertain funding, requiring significant emotional effort and constant adaptation. Although this environment strengthens resilience, it prevents strategic planning and control over the lab’s future. Thus, active embeddedness fails to empower DMLs to grow autonomously, as the nature of these relationships does not allow them to passively nurture from them and develop self-sufficiency.

This challenge becomes more complex when considering a unique form of embeddedness encrypted into digital technologies. Unlike active or passive embeddedness, which rely on physical proximity, encrypted embeddedness exists in virtual spaces—enabled by digital infrastructures and virtual communities of practice. These environments support flexible development in innovation, management, and entrepreneurship, thanks to the intuitive and recursive use of digital technologies [24].

One example is fablab.io, a high-value encrypted platform linked to a global network coordinated by MIT. Encrypted embeddedness reflects not only the virtualization of infrastructure but also the codification and platformization of knowledge, which shifts epistemic control toward dominant digital actors. This network protects labs from conventional innovation models and encourages open innovation. While it does not offer material resources, it provides legitimacy and visibility, helping labs attract funding from local sponsors. It also builds a recognized identity and multiple channels for collaboration.

DMLs are ideal spaces for launching digitally mediated entrepreneurial journeys, offering tools, training, mentoring, and open digital libraries. Still, they are limited by dependencies on powerful platforms that control data and access to resources. This reveals that access is shaped not only by technology but also by social contexts and levels of digital literacy.

Ethnographic data obtained by direct observations in FabLab Impact and Fablab Xabec show that labs in working-class areas—both in Valencia and Mexico—attract marginalized populations who lack a digital or entrepreneurial mindset. Conversely, labs in wealthier or more educated areas attract young professionals who can fully leverage digital tools. These differences reveal cognitive gaps that undermine the vision of universal digital access and highlight the persistence of social inequalities, even in open-access systems.

The interaction of active, passive, and encrypted embeddedness in both case studies helps assess whether DMLs are merely adapting to the system or have transformative potential. Overall, both labs show a “fit and conform” dynamic. In Mexico, this results in unstable development paths, while in Valencia, public and private actors reinforce the existing system. This raises the question: What factors sustain this fit and conform behavior in a multi-actor context?

Public programs play a central role in orchestrating resources. In Valencia, they contribute to FabLabVLC’s stability through collaboration with private initiatives, indicating a strong public interest in digital development. In contrast, the cancellation of public pro-

grams in Mexico hindered FabLab Impact's mission to empower marginalized communities and pushed it to partner with private companies, which pursue their own interests.

Private support operates on two levels: a visible one that promotes social responsibility and collaborative innovation, and a hidden one that reinforces dependence. The latter is enabled by the digital infrastructure's control over data and knowledge flows. As [11] notes, data generated in DMLs becomes part of a larger system of "mass intelligentsia," appropriated and reused in ways that often benefit powerful actors.

These modes of embeddedness keep labs aligned with regime actors' agendas, routines, and regulations, making autonomy and freedom more illusion than reality. In FabLabVLC's case, ties with the regime have provided stability, resources, and integration into smart city initiatives. FabLab Impact, while proud of its independence, experiences fragile governance and must constantly adapt to survive. Its lack of public support has been replaced by ad hoc partnerships with companies and foundations, which bring resources but little long-term stability.

DMLs, as niche experimental spaces, remain structurally dependent on regime-provided resources, limiting their potential to transform the digital sociotechnical system. Active embeddedness offers little room for autonomy, while encrypted embeddedness, despite its promise, does not disrupt existing power dynamics. DMLs serve as feeders of innovation and training, not as changemakers. While they support entrepreneurship and fresh ideas, they also foster individualized trajectories that weaken collective action. Paradoxically, even in spaces designed to encourage collaboration, we see fragmented and individual mobility paths. These dynamics highlight the absence of governance changes that would enable collective agency or institutional reforms to reduce asymmetrical dependencies. Without this shift, DMLs will remain tools that support but do not reshape the broader digital system.

7. Conclusions

This study has examined the trajectories, challenges, and forms of institutional embeddedness of two Digital Manufacturing Laboratories (DMLs)—FabLab Impact in Mexico City and FabLabVLC in Valencia—through a comparative, qualitative lens. While both FabLabs share foundational principles derived from the global FabLab network, including openness, inclusivity, and technological democratization, their operational realities diverge significantly due to distinct contextual conditions. Rather than pursuing generalizable claims, this research underscores the importance of context in shaping the potential and limitations of experimental innovation spaces.

The findings reveal that FabLab Impact operates under a model of radical autonomy in a precarious ecosystem, relying on short-term funding, personal leadership, and grassroots networks. Its resilience stems from adaptability and creative reconfiguration during crises—such as the 2017 earthquake and the COVID-19 pandemic—but this comes at the cost of institutional vulnerability and limited scalability. Conversely, FabLabVLC benefits from institutional embeddedness within a supportive university and policy framework, enabling it to develop a more stable and diversified network of public and private partnerships. However, this embeddedness also brings certain constraints, including bureaucratic limitations and partial detachment from marginalized populations.

A key contribution of this study lies in demonstrating how DMLs are not merely technological infrastructures but socio-political spaces where innovation, governance, and social inclusion are negotiated. The contrasting trajectories of the two labs exemplify how the protective space offered by institutional or policy actors can enable or constrain experimentation depending on the degree of alignment with grassroots needs and values. The Mexican case illustrates the risks of insufficient institutional support in contexts marked by

inequality and infrastructural fragility. The Spanish case, in turn, highlights the opportunities and trade-offs of operating within a structured policy environment that facilitates funding and growth but may limit autonomy.

Moreover, the research highlights the non-neutrality of innovation ecosystems. It reinforces the idea that “appropriate technologies” in DMLs must be understood not only in technical terms but also in relation to political economy, social embeddedness, and access to institutional support. This reframing challenges the technocentric focus of many innovation policies and calls for more context-sensitive and inclusive frameworks that recognize the diverse realities of labs situated in the Global South and the Global North alike.

It also demonstrates the utility of combining theoretical constructs—such as protective space, embeddedness, and transformative innovation—with grounded empirical insights. The empirical findings of this study offer several important contributions to existing theoretical approaches, particularly in the fields of transformative innovation theory, science and technology studies (STS), and critical innovation studies.

First, this research extends the framework of transformative innovation by illustrating how Digital Manufacturing Laboratories (DMLs) operate as micro-level experimental spaces whose ability to generate social impact is highly contingent on their degree of institutional support, resource availability, and socio-political embeddedness. The existing literature conceptualizes transformative innovation as a multi-level process that seeks to reconfigure socio-technical systems toward more sustainable and inclusive futures. Our findings nuance this framework by showing that such transformation is not uniformly possible across contexts. Instead, DMLs in the Global South (as exemplified by FabLab Impact) must navigate structural vulnerabilities that limit their capacity to generate long-term systemic change, even when they embody transformative ideals in practice.

Second, the concept of protective space—often understood as a shielded environment where niche innovations can emerge free from dominant market or policy pressures—is reinterpreted through the lens of the comparative study. The study demonstrates that the quality and durability of protective spaces vary substantially: in Mexico, such space is precarious and improvisational, while in Spain, it is institutionally stabilized through university and policy alignment. This reveals a need to revisit the assumption of uniform protective conditions in innovation niches and to consider the role of political and economic asymmetries in shaping what “protection” actually entails.

Third, the concept of embeddedness, typically used to describe the relational depth between innovation initiatives and their surrounding social institutions, is expanded to include a multidimensional spectrum ranging from “grassroots embeddedness” (as in FabLab Impact’s ties to marginalized communities) to “institutional embeddedness” (as in FabLabVLC’s integration into public policy and university frameworks). The tension between these two forms suggests that embeddedness must be theorized not merely as a presence or absence, but as a configuration of relationships that differently mediate access to resources, legitimacy, and resilience.

Fourth, the study contributes to technological justice theory by foregrounding the importance of contextual appropriateness and political agency in technology deployment. The contrasting trajectories of the two FabLabs underscore that “appropriate technologies” cannot be understood solely in functional or environmental terms. They must be situated within broader struggles over power, autonomy, and development models, particularly in postcolonial and economically unequal settings. This insight resonates with decolonial perspectives that call for a reframing of innovation as a plural and contested process, rather than a neutral or universal pathway.

Finally, this study invites a more reflexive and situated application of innovation theory, one that takes seriously the uneven geographies of innovation ecosystems and the agency of local actors in adapting, resisting, or reshaping dominant innovation paradigms. By combining analytical categories such as governance, resource mobilization, protective space, and embeddedness with grounded empirical data, the study contributes to a more granular and contextualized understanding of how transformative innovation actually unfolds in practice.

In conclusion, while DMLs have the potential to democratize knowledge and innovation, structural dependencies continue to limit their capacity to shape autonomous knowledge ecologies. DMLs can function as catalysts of transformative innovation, but only if the structural conditions surrounding them—governance, funding, social legitimacy—are conducive to their growth and alignment with local needs. Future research should further investigate how these spaces evolve over time, how power relations shape their agendas, and how their potential can be scaled without compromising their democratic and inclusive ethos. Comparative studies like this one are vital to understanding how different ecosystems generate different models of open, equitable, and sustainable innovation.

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References

1. Transformative Innovation Policy Consortium. Available online: <https://tipconsortium.net> (accessed on 3 June 2024).
2. Boni, A.; Méndez; Ramírez, M. Transiciones y transformaciones sociotécnicas. In *Innovación Para La Transformación Social y Ambiental. Una Propuesta Desde Las Transiciones Sociotécnicas*; Belda-Miquel, S., Boni, A., Eds.; Tirant Humanidades: Valencia, Spain, 2023; pp. 43–72.
3. Schot, J.; Benedetti del Rio, R.; Steinmueller, W.E.; Keesman, S. *Transformative Investment in Sustainability: An Investment Philosophy for the Second Deep Transition*; Utrecht University: Utrecht, The Netherlands, 2022.
4. Meyer, E.L. The Gig Economy: Is the trend toward on-staff employees good for workers? *CQ Res. Press* **2016**, *26*, 265–288. [CrossRef]
5. Bueno, C.; Fernández-Baldor Martínez, A.; Smith, A. Evolución y análisis del sistema digital desde la perspectiva multinivel. In *Innovación Para La Transformación Social y Ambiental. Una Propuesta Desde Las Transiciones Sociotécnicas*; Belda-Miquel, S., Boni, A., Eds.; Tirant Humanidades: Valencia, Spain, 2023; pp. 207–234.
6. Braybrooke, K.; Smith, A. Liberatory Technologies for Whom? Exploring a Generation of Makerspaces Defined by Institutional Encounters. *J. Peer Prod.* **2018**, *12*, 1–13. Available online: <http://peerproduction.net/issues/issue-12-makerspaces-and-institutions/editors-introduction/> (accessed on 3 July 2023).
7. Bria, F. *Growing a Digital Innovation Ecosystem for Europe*; Nesta Publications Office: London, UK, 2015.

8. Hess, C.; Ostrom, E. (Eds.) *Los Bienes Comunes del Conocimiento*; Traficante de Sueños: Madrid, Spain, 2016. Available online: <https://www.traficantes.net/libros/los-bienes-comunes-del-conocimiento> (accessed on 12 June 2021).
9. Hannerz, U. Flows, Boundaries and Hybrids: Keywords in Transnational Anthropology. In *World Watching*; Routledge: London, UK, 2019. [CrossRef]
10. O'Donovan, C.; Smith, A. Technology and Human Capabilities in UK Makerspaces. *J. Hum. Dev. Capab.* **2019**, *21*, 63–83. [CrossRef]
11. Arvidsson, A. Capitalism and the Commons. *Theory Cult. Soc.* **2020**, *37*, 3–30. [CrossRef]
12. Mulgan, G. The Process of Social Innovation. *Innovations* **2006**, *1*, 145–162. [CrossRef]
13. Geels, F.W. *Socio-Technical Transitions to Sustainability: Perspectives on Transitions to Sustainability*; EEA Report 25/2017; European Environment Agency: Copenhagen, Denmark, 2018; pp. 45–69.
14. Geels, F.W.; Schot, J. Typology of sociotechnical transition pathways. *Res. Policy* **2007**, *36*, 399–417. [CrossRef]
15. Geels, F.W. Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case study. *Res. Policy* **2002**, *31*, 1257–1274. [CrossRef]
16. Smith, A.; Voß, J.P.; Grin, J. Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges. *Res. Policy* **2010**, *39*, 435–448. [CrossRef]
17. Velasco, D.; Bernal-Hernández, P. Las políticas de innovación transformativa, marco conceptual e implicaciones prácticas. In *Innovación Para La Transformación Social y Ambiental. Una Propuesta Desde Las Transiciones Sociotécnicas*; Belda-Miquel, S., Boni, A., Eds.; Tirant Humanidades: Valencia, Spain, 2023; pp. 73–100.
18. Geels, F.W. The multilevel perspective on sustainability transitions: Responses to seven criticisms. *Environ. Innov. Soc. Transit.* **2011**, *1*, 24–40. [CrossRef]
19. Smith, A.; Raven, R. What is protective space? Reconsidering niches in transitions to sustainability. *Res. Policy* **2012**, *41*, 1025–1036. [CrossRef]
20. Rifkin, J. *La Sociedad de Coste Marginal Cero: El Internet de las Cosas, el Procomún Colaborativo y el Eclipse del Capitalismo*; Paidós: Barcelona, Spain, 2014.
21. Mason, P. *Postcapitalism: A Guide to our Future*; Farrar, Straus & Giroux: New York, NY, USA, 2015.
22. Latour, B. *Reensamblar lo Social*; Editorial Manantial: Buenos Aires, Argentina, 2008.
23. López Moreno, I. El método del estudio de caso. In *Guía Para la Investigación Cualitativa: Etnografía, Estudio de Caso e Historia de Vida*; Güereca, R., Blázquez, L., López Moreno, I., Eds.; UAM-Lerma: Mexico City, Mexico, 2016; pp. 97–112.
24. Kelty, C.M. *Two Bits: The Cultural Significance of Free Software*; Duke University Press: Durham, NC, USA, 2008.

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