



Open Source Agriculture: A Social Movement?

Abstract The two subcases of the book are examined here under the lens of social movement theory presented in the previous chapter. Each subcase is reviewed individually and then comparatively. Ultimately the chapter synthesises the open source agriculture movement's collective action frame. This frame is an amalgamation of characteristics found in three master frames identified in the movement. The open source frame, the organic frame and the peasant frame. These inform the nature and actions of the organisations active in the open source agriculture movement.

Keywords Farm Hack • L'Atelier Paysan • Collective action frame

4.1 THE SOCIAL MOVEMENT ORGANISATION OF L'ATELIER PAYSAN

L'Atelier Paysan literally translates as the peasant workshop. It emerged in 2009 as a subgroup within an association for the development and promotion of organic agriculture called ADABio in Rhone-Alpes (a region in the south east of France). It all began when the founders of this project Joseph, an experienced organic farmer and a member of ADABio, and Fabrice, a very politically aware carpenter and then agronomist, realised that farmers could genuinely benefit from each other's tool-building experience and creativity. So they standardised, documented and disseminated three

essential pieces of machinery that had been developed by Joseph along with other farmers and were used in raised bed farming (one of the basic methods for soil management in organic agriculture).

This effort was well-received by the farmers in their network so more tool-building knowledge was accumulated over the next three years from farms in the area. Sixteen farmer-built tools were standardised in total. Their designs were then printed in a comprehensive guide-book complete with blueprints and pictures, for more farmers to be able to construct them in their own farm. Prints of the book were sold to support their activities while its digital version is available on the website for anyone to access (along with an invitation for users to translate it into other languages).

Meanwhile, in 2011 the first workshop took place. The tools made by L'Atelier Paysan are, almost, entirely made of metal. Ten farmers attended the workshop to learn how to work metal (basically cut, drill and weld) and attempt to assemble some of the aforementioned tools. The workshop was quite successful with the farmers producing eight tools by the end of a week. At this point, these farmers along with Joseph and Fabrice established ADABio Autoconstruction, which was basically the branch of ADABio that was promoting the self-building of machinery by farmers.

To facilitate the demand for more activity, first using various internship programmes funded by the French state and later through regional state funds, they managed to hire people with specific sets of skills to assist in their endeavour, like for instance engineers and political economy graduates. After that, the first season of workshops began, where farmers learned metal-work and built the first three machines. Initially, this activity was exclusive to their local region but later expanded in others.

While their workshops started attracting more farmers from all over France, the group began developing more tools along with farmers not limited to organic market gardening but included all types of small-scale farming. For instance, they work with wine and fruit producers, cattle farmers and farmers using horse power. As their activity expanded, ADABio could no longer facilitate this work, so in 2014 L'Atelier Paysan was founded. As a legal entity, L'Atelier Paysan is a cooperative whose stakeholders are the individual constituents (mainly farmers) and groups (other farming and solidarity organisations) that belong in the wider network of L'Atelier Paysan. Its base of operations is in the Rhone-Alpes region while one of the first engineers to have worked in the project has established a branch in the region of Brittany (north-west).

4.1.1 *Organisational Structure*

L'Atelier Paysan was initially conceived by a group of farmers led by Joseph and Fabrice. Their activity was institutionalised through ADABio, the organic farming association they were all part of, forming ADABio Autoconstruction. Within ADABio, they managed to secure initially funds for paid internships and later regional funding to employ an engineer and a development officer. This enabled them to expand their activity and the number of farmers involved. Over the years, it became apparent that ADABio could no longer facilitate this operation.

As my key informant Julien, a political science graduate with a focus on social economy, puts it, “We were an association so each farmer trained by us needed to be part of it. We had a core team of farmers elected by the members of the association. This core team did a lot of everyday decision making and ultimately it was not the right way to invest their energy available for this project”. So the decision was made to create the not-for-profit cooperative that was named L'Atelier Paysan, and now the core group engages in strategic planning and general direction while the operational team can make everyday decisions without the explicit consent of the cooperative. The structure of the organisation could be illustrated as an inverted pyramid with the cooperative at the top, the core group in the middle and the operational team in charge of implementing the action plans and day to day decision-making at the bottom.

The constituents, directly involved in the endeavour, were invited to become shareholders in the cooperative to contribute to the decision-making process. They basically form the L'Atelier Paysan network, which includes various active farmers, farming associations, solidarity associations, groups that assist farmers and individuals that are active contributors to the mission of L'Atelier Paysan. Shareholders meet physically at least once per year in their general assembly. Their annual meeting involves discussing what has been achieved the previous year, plans for the next year, voting for the admission of new shareholders and various activities and promotional events.

Furthermore, the core group of L'Atelier Paysan convenes over the telephone, as the constituents are spread all over France, once per month to discuss current issues. This group is comprised of shareholders, but often enough, other people with a special skillset or insight on various current issues are invited to participate. These people may ultimately end up joining the shareholder group if their contribution is considered valuable.

For instance, a farmer with previous experience as a patent lawyer was invited in 2015 to provide counsel for a potential infringement case. He later became a shareholder as well. Similarly, a farmer/web developer working on the L'Atelier Paysan website also became a shareholder.

The cooperative has several full-time employees as well as volunteers (paid) tasked with the various essential activities. While many do not have a background in agriculture, it was made obvious through the interviews conducted with them that they all share the vision of L'Atelier Paysan. Besides Joseph and Fabrice, who act as CEOs of the cooperative, there are a number of engineers, architects, a web developer and other individuals in charge of administration, development and dissemination. Several of these employees (as well as previous ones) have become shareholders in the cooperative over the years.

The size of the operational group of the cooperative is considered ideal, given the available resources, to facilitate the amount of activities decided upon by the cooperative. Should the need for further expansion come up, the group is reluctant to increase the size and complexity of its activities which would in turn reduce their capacity for direct communication and cooperation with farmers. Instead they propose the creation of more groups similar to theirs which would form a network of cooperation and solidarity.

4.1.2 *Economic Model*

L'Atelier Paysan has developed a unique model to secure monetary resources for its activity, tailored to the French socio-economic context. In Julien's words: "We come from the world of associations so we know it is difficult to run a healthy business model with an association because it relies heavily on subsidies. This is not really massive right now, state funds I mean". They needed more autonomy and a way to produce some profit to help the whole project develop, hence their elaborate model to acquire resources.

The L'Atelier Paysan cooperative is non-profit. Its shareholders receive no dividends and the shares are not re-invested. Whatever positive balance the cooperative has every year goes into an indivisible reserve that funds their activities. Acquiring a share will provide the shareholder with the capacity to influence the decision-making of the L'Atelier Paysan network but not much else. By redeeming it, the shareholder will either receive the original value invested or less if losses have occurred. L'Atelier Paysan does

not sell its services to individuals or other companies. Instead, to secure funds for its operations, L'Atelier Paysan has developed a multifaceted support model.

Initially, it relied mostly on the contributions of the founding farmers and some regional funds for rural development. Over time the workshops became established providing important financial resources for the organisation. Contributions by farmers participating in the workshops make up for a large percentage of the budget. These resources are allocated towards the development of new technology, the maintenance of L'Atelier Paysan's equipment and the dissemination of the work, as well as support the participation of farmers who are unable to contribute.

However, by tapping into a special mutualised state fund (in collaboration with a public-interest organisation which is eligible for income tax relief) for vocational training and skill development, L'Atelier Paysan manages to secure reimbursements for most or all of the contribution each farmer makes. Furthermore, they buy raw material and equipment in bulk and then resell them to farmers at below market prices yet still making a very small profit. Nevertheless, they do not manufacture nor sell any of the machines that they produce, besides those produced in the workshops which are then acquired by the farmers that pay for the materials.

Further, financial support comes from crowdfunding as well as various solidarity organisations. For instance, associations for solidarity financing groups from all over France offer their support to L'Atelier Paysan. Last, important financial support comes from national and regional funds for agriculture that have recognised L'Atelier Paysan's contribution to the development of agriculture in France. Though the group feels that it would be best to reduce the percentage of this type of support for reasons that will be further explored later in the book. All the financial activity is made public in the L'Atelier Paysan website to ensure transparency.

4.1.3 *Operational Capacity*

The operational activity of L'Atelier Paysan is two-fold: on the one hand, they engage in research and development of new technology, and on the other, they disseminate technological know-how. These may be considered the main social movement activities L'Atelier Paysan devotes resources to. Resources are allocated in more traditional SMO activities, like organising an annual gathering/festival for dissemination workshops and other activities as well as producing promotional material (like leaflets, posters,

even books). Yet the focus is on the productive capacity of the SMO rather than relying solely on advocacy, absorbing the bulk of their available resources. Providing the farmers with practical solutions is deemed a more effective way to communicate their ideological convictions and achieve the movement's missions.

4.1.3.1 Knowledge Transfer

The first of the two main goals of L'Atelier Paysan is enabling farmers to create their own machines and tools. L'Atelier Paysan is based in the region of Rhone-Alpes along with its branch in Brittany. However, they own three fully equipped trucks that function as mobile workstations that help them to transfer their activity all over France. They conduct workshops that last three to five days in farms, warehouses or any other space that could facilitate them. The nature, location and time of the workshops are defined by the farmers themselves at the end of each year according to their specific needs and time availability.

The farmers attending might have some previous experience but often they do not. They usually tend to be engaging in similar agricultural activity, so the machines built in each workshop target a certain need of the specific group. The farmers that provide the funds for the materials get to keep the machine(s) at the end of the workshop.

4.1.3.2 Technology Development and Dissemination

L'Atelier Paysan started as an attempt to gather, systematise and disseminate essential farm equipment created by farmers. This is still a primary goal for L'Atelier Paysan. For this reason, its people travel across the country, meeting with farmers and gathering information on farming equipment and later farm buildings as well. This information is codified and uploaded to the L'Atelier Paysan forum for anyone to access.

Several groups and individual farmers have been inspired by L'Atelier Paysan and have created machines that were later uploaded in the forum. The forum post includes the design and pictures of the various versions of the machine. There are over 500 posts in the forum containing instructions and conversations regarding farm machines, methods and buildings.

Beyond that, L'Atelier Paysan enables the creation of new technology from farmers. Machines that are either non-existent on the marketplace, too expensive or not suitable for small-scale and organic farming. These machines need to be modular, easy to replicate using materials that can be

upcycled or easily sourced. However, in order for L'Atelier Paysan to engage in a project, the ethical principles of the community must be met.

A group of at least five farmers with a specific need or idea needs to be formed, since L'Atelier Paysan does not work with individuals. Then an engineer-facilitator is assigned to the project and the design process begins. After several meetings and feedback exchanges, a design is finalised and the prototyping process begins.

This process may also take place to improve or modify an already existing machine. Further, L'Atelier Paysan may work with other groups, beyond farmers, that produce tools for farming provided they share the same principles. For instance, the “Aggrozouk”, a pedal-powered tractor, was developed by an independent group of makers called Farming Soul. L'Atelier Paysan was later invited to help improve the machine. All these processes are further explored in Chap. 6 that focuses on technology development.

4.1.4 *Selective Incentives for Participation*

The farmers participating in these activities may be considered constituents of L'Atelier Paysan after having adopted an active role. They potentially were adherents to the L'Atelier Paysan cause before or just bystanders that were exposed to the activity. At any rate, the incentives for joining the cause are multiple and evident. After all, the point of the organisation is to help their constituents while attempting to politically engage them in their cause. As Julien points out, the goal was “to create an organisation that would be a hub of resources, of farmers exchanging knowledge and know-how with the support of a team of workers. This would make the process faster than remaining farm-based which would be limited”, while also being “a good start for them to rethink their practices and have the right tools to change them”.

Therefore, regarding material incentives, these farmers gain valuable skills, in most cases without any significant cost due to the aforementioned vocational training fund. This enables them to support their agricultural activity more efficiently by making their own tools and machinery as well as maintain their already existing equipment. Furthermore, they gain access to materials and manufacturing equipment that they use, with the help of L'Atelier Paysan, to build machinery tailored to their needs with relatively little cost. This enables them to tap into the productive capacities of their peers that also participate, enabling them to form partnerships.

For instance, a group of goat farmers, along with L'Atelier Paysan, created a rather large seeding machine (the prototyping workshop of which I attended) that they would collaboratively use in their fields, instead of having to invest to acquire one each.

As far as immaterial resources are concerned, the general knowledge exchange, the sense of community and working together appear to be strong incentives as was indicated to me by a farmer. He points out that while in the past the term paysan (person that lives in the land) was mostly used to describe farmers, in recent years it has been widely replaced by “exploitant agricole” (roughly translated as exploiter of the land), which according to him indicates the current status of commodification in agriculture. The practical application of L'Atelier Paysan's alternative methods and processes is considered the most convincing argument one can make to promote the movement's goals.

4.1.5 *The Social Movement Organisation of Farm Hack*

Farm Hack emerged as a collaborative effort of farmer activists. It was conceived as a gathering to brainstorm ideas for various tool-related problems in a farm. This first Farm Hack event was a big success, leading to the hosting of several more events in the USA and later all over the world. It also led to the establishment of a large and decentralised community comprised mostly of farmers. From within the Farm Hack community emerged a digital platform that functions as communication, coordination, dissemination and, to some degree, technology development tool. Primarily the platform functions as a database of tools that have been built, modified and shared by the community. The tools are released under a Creative Commons license for everyone to use and modify freely, provided they will release the designs under a similarly open licence.

Farm Hack was established in 2011 after the first event organised by members of the Greenhorns and the National Young Farmers Coalition, non-profits that provide support for young and small-scale farmers in the USA, in collaboration with engineers from the Massachusetts Institute of Technology (MIT). Farm Hack inspired by the open source culture would bring together farmers, designers, engineers, academics and activists in events to engage in dialogue; skill development; tool design, building and demonstration. The results were then documented in the Farm Hack platform for other farmers to access them. Over time the platform was joined and enriched by farmers from all over the USA but also other countries

and to this date features more than 500 tools. The content can be accessed by everyone and is open to improve or modify to whomever joins the platform (along with the platform itself).

4.1.6 *Organisational Structure*

Farm Hack had no legal entity of its own at the time of its conception nor any type of dedicated organisation. Instead, resources were provided by the non-profits, which primarily organised the Farm Hack events and built the platform. It relied on volunteer work from the expanding Farm Hack community to build the platform and run the events. In the early years of the community, the activity was centralised and guided by the participating organisations, specifically the Greenhorns and the National Young Farmers Coalition.

Farm Hack acquired a non-profit status in 2013, when the community grew. Having a legal form, it managed to receive some funding through grants to improve platform and provide resources for the short-term employment of two of its constituents, who worked on community outreach. After this point, the community became more independent and decentralised. It now relies entirely on the support and time of its constituents as well as its partnerships with other organisations rather than attempt to secure its own resources to employ personnel. This has, inevitably, led to reduced momentum, given that everyone is contributing in their free time. Yet the consensus in the community is that it should keep relying on the constituents' voluntary contribution rather than employ workers for its operations, remaining independent and faithful to their principles. This structure allows them to operate in a relatively low risk, low maintenance and distributed mode.

Farm Hack lacks formal structure. As a non-profit, it has a board of directors; however, its role is mostly nominal. Instead, every member of the community is free to contribute to the decision-making process. Practically, this means that the constituents most engaged in Farm Hack end up being the ones most involved in the organisational structure. A do-ocracy of sorts as one of the interviewees with a software development background and a key developer of the Farm Hack platform, puts it. Weekly coordination virtual meetings would take place as well, which are open to whomever desired to participate. The platform has been incrementally improved over the years to provide an easier and more independent service to the users and reduce the effort required for its expansion

and upkeep. Thus making, for instance, the tool documentation process better as well as providing a detailed template for users and affiliated organisations/groups to organise Farm Hack events autonomously.

4.1.7 *Economic Model*

Farm Hack, as a non-profit organisation and a community, does not engage in any type of commercial activity. For its operations, it relies mostly on the contributions of its constituents and initially on the resources of the participating organisations. After acquiring the non-profit status, its collaborations with other groups allow it to use their resources as well. There have been instances where some small grants have been acquired in collaboration with other organisations. These funds were directed towards employing community constituents, who were already volunteering their work to Farm Hack. They would work more intensely for short periods of time, namely on improving and maintaining the platform and community coordination. A topic under discussion within the community is whether acquiring funds to employ individuals for more systematic documentation of tools should be pursued.

Some of the most active farmer-inventors contributing tools in the platform have invested a considerable amount of their time and resources in prototyping and documenting. Another important topic within the community is how to enable a business ecosystem to thrive around the platform that may provide sustainability to individuals and groups dedicated to the Farm Hack principles. Individuals are free to engage in commercial activities. As long as the basic principle is maintained, that of openly sharing, users may add in the description of their contributed tools that they can also sell them or some sort of service to those that would prefer to purchase rather than invest the time and effort to create a tool themselves.

The Farm Hack platform features a commerce component where “businesses and organizations invite other users in to see what they have been working on, the events they have hosted or will host, the tools they’ve worked on, and the conversations they’ve been involved with”. Their goal with this open shop initiative is to provide a simplified toolset for users or groups to sell their tools or parts or even certain services as well as spaces with fabrication or educational capacity. Commerce is considered important according to the Farm Hack ethos as “regionalized manufacturing makes for resilient economies and tools which are customized to a farmer’s particular needs”.

4.1.8 *Operational Capacity*

The operations of Farm Hack revolve around activity in the platform and the events, with documentation from those events resulting in the platform.

During the early years, the Farm Hack events were mostly organised and facilitated by the organisations that invested their own resources on Farm Hack activities. Over time, as the community grew more independent and decentralised, a detailed guide for events was developed and featured in the platform to enable the constituents and affiliated organisations to host events as an attempt to distribute the resource requirements across the Farm Hack network.

In general, these events are problem-solving oriented with various specific goals. For instance, they may involve conceptual meetings to brainstorm new tools; collaboratively design, build or document tools; skill and know-how transfer; and software hackathons. Documentation of results, regardless of the focus of each event, is always encouraged in order for the entire community to benefit from these events. Further, these events are opportunities to attract new adherents and constituents (as well as for existing ones to socialise).

The Farm Hack platform is the second point of operational activity. It has been developed by community constituents with software development skills, and it is based on various other open source tools. The platform serves both as a coordination and collaboration tool for the community and as tool database for the ones that have been individually or collectively produced. While there has been a steady influx of users and tools, the platform has not been very successful as a collaboration tool, with most of the coordination happening “behind the scenes” and the collaborative tool design taking place in physical spaces, like the events, rather than digital. Further, proper documentation of both processes and tools is an issue that the core group is trying to improve, as it is a resource heavy process.

4.1.9 *Selective Incentives for Participation*

Similarly to the L’Atelier Paysan case, several incentives are available here for potential constituents. The Farm Hack platform features hundreds of tools that farmers can adapt to their needs. Moreover, the events present opportunities for valuable knowledge exchange and collaboration. Unlike the L’Atelier Paysan case however, financial resources are much more limited in Farm Hack. Relying almost entirely on individual resource con-

tribution, Farm Hack has enabled commercial activity to be developed around the platform with the hope that constituents/entrepreneurs/tool developers would support the Farm Hack activity while making a sustainable living within the community.

Interviewee A and Tim, two of the farmer/engineers from Farm Hack, exemplify this. Combining engineering and agricultural knowledge, they invest considerable resources in the development of new tools in collaboration with farmers of the Farm Hack community. To maintain their activity, they experiment with various methods to secure resources. These include crowdfunding campaigns, organising workshops similar to the L'Atelier Paysan ones, offering manufacturing services to other farmers, bidding for (the admittedly limited) support grants for agriculture, selling the tools themselves or partly assembled kits. This is an aspect of Farm Hack still under development, and a best course of action has not been determined yet. The difficulties are evident for these individual entrepreneurs, and making their activity in the community sustainable is a constant struggle. However, they recognise that engaging in this activity within the community is preferable to doing so outside it. As interviewee A notes, "It would be a hard business plan for me to take the development costs up to myself for every tool I build. But if there's an ocean of designs on Farm Hack and people come to me to build someone else's design then the one tool I develop and contribute the design for can be amortized over all the other tools I'm building". Further, the platform enables the capacity for feedback to further improve on their tools.

Another, farmer/inventor, interviewee having distanced himself from the community after feeling frustrated by the community's inability to provide enough support for the prototyping of new tools, attempts to continue his activity independently in his own business. He finds though that this too proves quite difficult to achieve without a community to draw support/clients from. He says he would consider engaging with the Farm Hack community again. The open shops feature is a step towards enabling entrepreneurial activity in line with the community's principles. Yet ultimately the community itself will determine how this aspect of Farm Hack is going to evolve, if at all.

4.1.10 Resource Mobilisation in the Movement

Typically SMOs tend to compete for the finite resources within a social movement which in turn influences the tactics adopted to achieve their

goals (Soule and King 2008). In this case however, given this movement's transnational scope, competition, at least between these two cases, does not appear to be a factor. On the contrary, there is collaboration, where possible, with members of either community calling the other "cousins". Cousins because they realise that there are considerable differences amongst them stemming from socio-political as well as cultural differences between France and the USA.

For instance, the fact that the French receive considerable resources from the state allows them to be more active and organised than their American peers. Financial resources mean that L'Atelier Paysan can employ constituents to work full-time in its various activities leading to some degree of professionalisation within the SMO. This professionalisation inadvertently creates a more centralised structure of operations. Consequently, it enables L'Atelier Paysan to provide a lot of support to farmers and have a very productive and standardised output (i.e., machines and tools), but could potentially hinder independent initiative within the community, as evidenced by the low degree of user tool submissions in L'Atelier Paysan forum.

On the other hand, lack of resources for Farm Hack means that the community depends heavily on independent initiative to achieve its goals, hence the desire to provide enough selective incentives, namely the capacity for commercial activity, to elicit participation. This is further enhanced by the lack of mistrust towards market relations in the USA context and the potential impact these might have on Farm Hack's activity, which according to Fabrice is more prominent in France and specifically L'Atelier Paysan community. As a result, Farm Hack's structure is loose and decentralised to be maintained even in periods of high inactivity. Its output is more diverse that way, but less standardised and not as well documented as L'Atelier Paysan.

Despite their differences, the target group of either SMO as well as their broad goals are similar, if not the same. Also, both cases share the conviction that the best approach to achieve their long-term goals is by providing tangible results instead of advocating change like most social movements. Eliciting participation in Farm Hack comes from "cascading networks to find people who would be excited to join us", Dorn, a farmer inventor and leading figure in Farm Hack, points out. Severine, a founding member and farming community organiser, also mentions that the various movements Farm Hack taps into are well networked and offer much dissemination to their work. Similarly in L'Atelier Paysan, the exten-

sive network of farming associations allows the recruitment of farmers that are both partial to the agricultural model L'Atelier Paysan promotes but also conventional ones with the hopes of convincing them to convert.

Each case has developed a unique model to achieve this. Yet the narrative of both shares a strong focus on the utility of tools developed within their activity as a powerful argument to garner the attention of constituents looking to elevate the quality of their work and tackle everyday problems through their engagement in the movement. Furthermore, resource exchange between the two happens on the level of design and know-how, with several instances of knowledge sharing for the development of identical or similar tools. This is especially important considering how “closed off are the information pathways in agriculture across borders” as Kristen, another farmer and active member of the Farm Hack community, says. For instance, the Aggrozouk that was mentioned earlier in the L'Atelier Paysan case was initially inspired by the Culticycle that is developed within Farm Hack. This aspect is key and is discussed in the last two chapters. Next, I attempt to identify the ideological and cultural factors in each case that play into the formulation of a collective action frame for the movement.

4.2 FRAMING THE OPEN SOURCE AGRICULTURE MOVEMENT

Preliminary analysis has indicated three master frames prevalent in the framing of the movement, namely the open source, the organic and the peasant frames. Master frames in the sense that they are not specific to one movement but influence and orient the activities of several, often similar, movements due to their flexibility and capacity for cultural resonance (Benford and Snow 2000).

Identifying them was a relatively straightforward task. Clear references were elicited in texts, early interviews (with people outright mentioning them) and media in either case. Further, the type of farming activity the farmers engage in is also an indicator, meaning most are small-scale, independent and organic farmers. Other, more specialised collective action frames can also be identified, but their influence has been aggregated under these three master frames.

A bibliographical synthesis of each master frame follows as well as a detailed description of how these frames are adapted in each case. Then, I aggregate it to provide the collective action frame for the movement.

4.2.1 *The Open Source Master Frame*

The open source frame encompasses the activity of various social movements that share the principle of “openness”. This section explores its development.

The open source master frame traces its roots in the late 1970s with the free software and its primary proponent, Richard Stallman. As a computer programmer at the MIT, he worked alongside other programmers/hackers under a regime of sharing the code in order to collaboratively develop it (Stallman 2002). However, this environment of openness eroded over the years, with various enclosures creeping in to limit the access to the code. In 1982, he began developing his own collection of free applications, GNU (Gnu is Not Unix) which would emulate the functions of the Unix system. In 1984, Stallman quit his job and devoted his efforts to the establishment of the Free Software Foundation (FSF), an SMO dedicated to the promotion of free software through the use of the GNU General Public License (GPL), a “copyleft” (an inversion of the term copyright) license that enables the creation and free distribution of code, as well as ensures that the code will remain free. Free as in free speech and not free beer as the free software advocates like to put it.

Next, I present three distinct but also intertwining social movements. These are the free software movement and the open source software movement (often presented and researched as one under the acronym FOSS), the open hardware movement and the open source appropriate technology movement. All three share the broad principles of the open source master frame, which can be summarised as (1) collaborative and decentralised development of artefacts that may be software, tools, machines, food, medicine and even houses; (2) the release of these artefacts under licenses that allow free access and redistribution over the internet; (3) a distinct governance model inspired by the open source development model that relies on transparency, open and autonomous participation, and flexible and meritocratic hierarchies.

4.2.1.1 *The Free and Open Source Software Movement*

The free software movement framed its activity through four freedoms that represent the ethos of its proponents. These freedoms were deemed essential for the building of community and consistently represent the values and ethics of the movement and are presented as “the right thing to do”. Elliott and Scacchi (2008) distinguish three transformative periods in the free software movement’s frame, calling this period the freedom frame.

In 1991, Linus Torvalds along with collaborating volunteers over the internet released a free version of the operating system UNIX, called Linux, which used the components of GNU. Linux was developed with the assistance of an online community and quickly it became as reliable as other marketable version of UNIX. The development model of Linux, which was based on a new version released weekly according to feedback by the user community, was quite radical, and over the years its efficiency was widely recognised.

As interest in Linux increased and businesses distributing it emerged, several key software developers, with the support of Torvalds and activist developer Raymond (1998), adopted the term open source software instead of free. The justification for this transformation on the frame was two-fold: first, the term free caused confusion as to what free really means, and second that it would be more pragmatic and friendlier to businesses who would be willing to support the mainstreaming of free software (Raymond 1997). A second SMO, called the Open Source Initiative (OSI), was established along with a set of principles outlining the transformed frame. The “business frame” as Elliott and Scacchi (2008) call it. Its principles relied mostly on pragmatism that focuses on the advantages of the open source development model, like for instance its reliability and low cost, rather than the ethics and freedom of the previous period. New licenses were established to facilitate these principles that embraced the marketing of open source software in the business world but ensured the openness. In other words, these licences provide more liberties, with regards to commercialisation, than the GPL (for instance, they allow the combination of proprietary and free software).

The success of the open source development model has brought about another transformation in the frame, which Elliott and Scacchi (2008) call the “occupational frame”. The emergence of a business ecosystem around open source software, which also incorporates the open source principles in their structures, has expanded the capacity for employment within software communities, amplifying with it the growth of the open source frame beyond its original limited communities of enthusiasts.

The differences between FSF and the OSI created tensions that remain to this day. Yet the fact is that most pieces of open source software are also, in essence, free software and are treated as one and the same by many. In this vein, the open source software frame is viewed as an extension of the free software as it encompasses its goals and draws support from the same pool of adherents and constituents.

4.2.1.2 *The Open Source Hardware Movement*

The open source software movement can be considered a predecessor for the open source hardware movement that became prominent in the first decade of the twenty-first century. This movement appropriates the open source frame but may trace its roots to the hacker community that emerged in the late 1960s. Initially active in the intersection between software and computer hardware, this movement sought to apply the open source principles into hardware.

Several initiatives appeared that aimed to do so in the late 1990s. Perens (1997) launched the Open Hardware certification programme for devices whose programme interface would be open. Similar attempts to frame open hardware followed after, but most disappeared due to inactivity. Nevertheless, over the years, various open source hardware projects appeared like the RepRap 3D printer and the Arduino microcontroller. These projects developed large communities around them, and the open source hardware movement was revitalised. Initially, the open source software licenses were used to protect their openness, but over time several organisations appeared along with dedicated open hardware licenses. The CERN (European Organization for Nuclear Research) for instance created its own open hardware license in 2011 “in the spirit of knowledge and sharing and dissemination” (CERN 2017).

After much debate within the community and the various initiatives the Open Source Hardware Definition was formulated, which is based on the definition of the open source software. The definition frames the movement’s activity under a set of principles which highlight unrestricted access, sharing of all relevant information and ease of modification. These principles are more in line with the framing of the open source rather than the free software. Further, the open source hardware association was formed, an SMO that would promote the movement’s goals and standards, study the movement and disseminate its work, and provide guidance according to the movement’s values and principles.

The open source hardware movement’s frame has encompassed the maker and do-it-yourself communities discourse as well (Hatch 2014), while a growing number of open hardware projects greatly boosted by the proliferation of digital fabrication tools (like 3D printers and CNC machines) and the various spaces that enable making like fablabs, hackerspaces, makerspaces and so on have contributed into its wider dissemination (for more on these spaces, see Smith et al. 2013; Kostakis et al. 2014; Niaros et al. 2017). Similarly, action in these communities is framed

around empowering individuals and communities to experiment, create locally and share globally artefacts or services to address their needs (Nascimento and Pólvara 2016).

4.2.1.3 *The Open Source Appropriate Technology movement*

The appropriate technology (also termed intermediate technology) movement's roots go back into the 1960s and was later popularised by the influential work of economist Ernst Friedrich Schumacher *Small Is Beautiful* (1973). Appropriate technology was initially conceived against the importing of western industrial level technology in developing countries, which were not suitable for the local socio-economic conditions. Hence, they ended up being either idle infrastructure or even detrimental to local communities. This technology would be located somewhere in the middle of traditional, labour-intensive technology and capital-intensive, industrialised technology.

While there are various definitions in the literature, the movement framed its activity around the development of technology that can be summarised as of low cost; locally and collaboratively designed and produced using local materials; small in scale and complexity yet suitable for groups of people and mindful of environmental and social concerns (Willoughby 1990; Hazeltine and Bull 1999).

For two decades, until the mid-1980s, several SMOs, state and private, were established in both developed and developing countries to promote the movement's goals. Yet by the end of the decade, activity was significantly reduced and most SMOs ceased to exist. The reasons were multiple. First, the movement emerged in a period of disillusionment with the industrialisation programmes of the 1950s and 1960s which resulted in a lot of support in the form of resources that over time were severely diminished as neoliberal policies and market-based development were established (Morrison 1983). Second, there was not enough opposition against those benefiting from the incumbent technological systems, like large construction and manufacturing companies, agribusiness, large private utilities (Pursell 1993). Third, the very definition of the appropriate technology was so broad that it created inconsistencies and technical difficulties in its applications as well as too much external engagement with little involvement of the people for whom this technology was supposed to be for (Zelenika and Pearce 2011).

However, in 2000s, the appropriate technology movement frame has been transformed due to the proliferation of ICT and the emergence of

the open source movement. The open sharing of designs using open source licences and the collaborative development are brought to the front in the open source appropriate movement. The framing of the movement is extended to include the efficiency of the free and open source software development model into appropriate tools and machinery; its acceleration of innovation due to easy and patent-free access to information; as well as access to technology that has been developed elsewhere and is accessible over the internet (Pearce and Mushtaq 2009). SMOs that develop appropriate technology have embraced the open source model and are sharing knowledge openly.

4.2.1.4 The Open Source Master Frame in L'Atelier Paysan

L'Atelier Paysan appropriated the open source frame soon after becoming active. They have engaged with the open source movement and adopted a Creative Commons license (typically used for openly sharing music, photographs, films, etc.) to make the design files of the machines available. They have been vocal about the merits of collaborative designing and manufacturing machines and then sharing their effort with other farmers. Pointing out the collaborative nature of the tool development procedure rather than just focusing on the open availability, the machine design files indicate a strong influence from the open source frame and the open source development processes it promotes. As the L'Atelier Paysan platform states: "We would like to create an open source Encyclopedia, where people can freely contribute and make use of resources available. We believe that farming skills are common goods, which should be freely disseminated and adapted".

The farmers I interacted with during my field work in the various L'Atelier Paysan events approved of the open source approach with a few noting that a strong reason for their attendance was the joy of sharing and producing something together. A topic of discussions during the cooperative's general assembly (and open annual gathering of L'Atelier Paysan) was the use of open source software like design software for the tool blueprints. The operational team of L'Atelier Paysan explained that while they would prefer free and open source software, the proprietary one (Solidworks) they use allows them to illustrate the design in a much more comprehensive way. No open source alternative can do that currently. It was decided to, at least, export the designs in open source formats rather than the proprietary one of Solidworks. Another discussion, about patents, had the largest attendance in the gathering. All attendees felt strongly

against them with the consensus being that while patents were originally introduced to protect the livelihood of creators, nowadays it is an issue of profit making for big companies.

In the interviews conducted with the members of the cooperative, use of the open source vocabulary is also evident. Joseph, a prolific inventor farmer and the soul of the whole initiative, says, “My capacity (to build tools) comes from other people, family; friends; farmers I met from traveling around the world, it is only natural to give it back”. With regards to open source licences, he adds, “The machines we built all those years ago are a lot better today because people have adapted and modified them. That would not be possible with patents. It is just logic; natural”. The feeling is mutual for Gregoire, one of the engineers in the group. He says, “Open source seems logical to me, to share without barriers”, and adds, “when the prototype is ready we need to protect the idea fast, so we make it available with the creative commons license and we specify that this is a prototype at the moment and we don’t know if it is ok for every use”. Meaning to ensure its openness from potential third parties that would appropriate and patent on it.

Fabrice, the second founder of the initiative, shares this view. He says, “All my career has been about giving somebody else the information that I have” which is why he created a couple of publications about ecology. He continues, “I didn’t have any political conviction about open source hardware. But then I became specialised in organic agronomy, and I met hundreds of farmers. I saw that many were adapting and creating their tools like Joseph”. After this creative friction and their first attempts to assist farmers, they initiated their “political project about autonomy and open source in agriculture”. With regards to the movement in agriculture, he believes that the movement about open source seeds is strong, but not tools. He says, “Tools influence the lives of farmers. The agronomy—how they organise their day. So tools are important, as important as seeds”.

He continues, “Our goal was to insert ourselves in bigger movements” including the open source and commons movements. This is how they were exposed to other open source tool initiatives like Farm Hack and Open Source Ecology (an initiative that has received wider media coverage). Although he quickly notes regarding the latter that “it is not the same experience because users are not included in the creative process. It’s a top to bottom approach. It is a big concept, like a teaser for a movie but users are not involved”. An opinion shared amongst some of the Farm Hack people I talked to as well (this was partly the reason why this particu-

lar project was not selected as a case for this book, despite its very ambitious and relevant scope).

Julien, while describing the development process, says that keywords like “collaborative, participatory, user innovation, open source” often appear. He says that these terms are fashionable, so their use could help them secure state funding in the uncertain future of the newly elected right-wing government. Further, the tools that end up in the platform are the “appropriate” ones to satisfy “collective needs”, and besides that they also openly publish the various photographs, videos, documents and notes on the forum in order to spark “inspiration”. All in accordance with the open source frame.

Though while he thinks it is good if people are inspired by their work, he is a bit sceptical of many of the actors in the wider open source movement, echoing Fabrice’s sentiment. As Julien words it, “We would like to tell them that there are other ways to promote open source and develop technology. Their promotion and their methodology for development is often demagogique (grandstanding). They are so desperate to find real applications for the, very good, idea of open source that they endorse any project without filtering. That is not a good methodology and is doing a disservice to the movement”. Meaning that a lot of these projects are not collectively developed and often do not correspond to real needs. He attributes this to entrepreneurship with the drive of the start-up culture, which is blooming within the open source movement, to create something new whether it is for the social good or not.

L’Atelier Paysan has appropriated the more radical “free” elements of the open source frame rather than simply treating it as an alternative development model. Focus is placed on the collaborative way of designing and producing tools that ultimately tackle the real needs of farmers. It is also placed on the critique of the patent system that is viewed as outdated, preventing farmers from accessing affordable and appropriate tools and enabling big companies to control how agricultural production is evolving.

4.2.1.5 *The Open Source Master Frame in Farm Hack*

Farm Hack has adopted the open source master frame in a more prominent way. Several aspects of the frame are highlighted both in all of the interviews and the Farm Hack platform, forum and other material. For instance, the Farm Hack culture section in the platform critiques the patent system as “most agricultural tools are built in a framework of proprietary knowledge generation—companies invest money in research and

development, and license their design in a way that does not allow others to replicate it, or even know how it is made” and offers the open source way as the solution: “the open source community believes that everyone benefits from freely sharing knowledge and working together to create new tools to fit our needs”.

Similarly to L’Atelier Paysan, they have adopted a Creative Commons license for all the tools uploaded in the platform. They also use solely free and open source software acknowledging the division between the terms open source and free software which, according to an interviewee, finds Farm Hack somewhere in the middle (the practical application of open source and the political implications of free).

As far as the development process of hardware itself is concerned, Farm Hack has adapted the design principles outlined within the open hardware movement and expanded them to fit the agricultural production context. Hence, the Farm Hack principles may be condensed into an open source design model that is prioritising solutions that come from biological systems; includes personal gratification besides utility; uses standardised components or measurements and systems that simplify alterations and replication; is “transparent” (regarding the visibility of the tools’ components); has modular components; is adaptable (tools to be used for more than one functions) and suitable for “disassembly”, “replicability” and “affordability”. Another set of Farm Hack principles, the community principles, feature several references to the open source frame such as a commitment to openly sharing knowledge and know-how; a lack of strict hierarchical forms of organisation and of the flexible open source structures; the use and promotion of collaboratively produced tools. These indicate strong commonalities with the open source development model promoted by several of the aforementioned movements under the master frame.

The interviews with members of the Farm Hack community reflect these views. According to Dorn, a strong motivation for the project “was to build a platform for knowledge exchange and a community that embraces the open source history of agrarianism” and “of course introducing the idea of copyleft right from the beginning”. The community itself “has a strong framework and experience with the open source community functionalities” ranging from open source biofuel applications to software development according to Severine.

As Dorn points out, the decision to build the platform on Drupal was made due to several members’ experience with the software. As for the

tool developers contributing in the platform, their views also share the open source frame's principles. Interviewee A reflecting on the notion that humans have been sharing knowledge throughout history says that “the idea of withholding information for profit is new. It had a great run for 250 years where everyone hoarded their secrets trying to maximise their personal benefit but probably that’s not going to be a permanent situation. All the open source movement is doing is to revive that previous state”. Interviewee C, another farmer inventor, also points out that open source has been commonplace in history and while he would consider marketing his tools, he would never patent them. He believes that appropriate, reproducible, non-high technology is ideal for agriculture and that Farm Hack facilitates “open source, appropriate technology that can be skilled out in many places”.

In general, the interviewees agree that Farm Hack has managed to bring attention to the application of open source in agriculture. In Dorn's words, “The original idea was to have a diversity of talents supporting agriculture. Roboticists; open source software community and really excellent farmers. To this extend we have been successful”. But it did not end there. He adds that they were successful in “extending the idea of open source in agriculture from something really novel or odd into being not only accepted but expected. If you're not doing it you have a bit of explaining to do—there's a little bit of a social stigma, like you might be being greedy or short sighted. There has been a shift”. Severine shares this view: “As a cultural project Farm Hack is very successful in normalising open source as desirable and empowering people to view themselves as potential designers”, adding, “we were successful in making a cultural story about how a more open culture is an ancient tradition and proprietary, controlling uses of technology is ahistorical in agriculture”.

However, she is critical of the way this story is framed: “the language and culture of software in the open source community has defined what the rules of open source are. It has limited the extent to which open source can penetrate the real world”. Instead she argues for more focus on “the culture of a peasant—based movement, which is also open source. The passage of seeds and breeding technologies differs significantly from the way code migrates. Code and seeds are not the same thing”. In a similar vein, interviewee C is somewhat critical of the strong focus on the open source software and its philosophy which potentially reduces the experience in the platform. He feels the focus of open source should be placed in the tool output rather than the notion of “open source everything”.

It is evident that the open source master frame has been more prominent in Farm Hack with elements from all open source movements present, touching upon the development methods of open source software, the design principles of open source hardware and the appropriateness of tools. While it appears that some of these framings might be in conflict, the overarching belief that knowledge should be freely accessible and technology should be appropriate and adaptable forms a unifying narrative.

4.2.2 *The Organic Master Frame*

Before industrial agriculture, all agricultural systems could be considered, in one way or another, organic in nature. Scientific applications for the manufacturing of farming inputs proliferated around Liebig's "Law of the minimum" (van der Ploeg et al. 1999). This is basically the notion that growth in plants is mainly determined by the scarcest element in the soil (like phosphorus and nitrogen). This sparked the establishment of the conventional agriculture science and industry with the synthetic creation of nutrients that dramatically increased the productivity in crops (Goodman and Redclift 1991).

The organic agriculture movement became prominent in the 1920s with the work of Albert Howard in the UK and Rudolf Steiner in the German-speaking countries. Steiner developed a set of lectures on biodynamic farming, a system of organic agriculture, in response to the deterioration of soil health and crops due to the use of off-farm inputs like fertilisers (Paull 2013). He further established the "Agricultural Experimental Circle of Anthroposophical Farmers and Gardeners of the General Anthroposophical Society" to experiment with his methods which greatly contributed to the emergence of organic agriculture (ibid.). Steiner's work is akin to that of the Life Reform movement (Lebensreform) which appeared in the late nineteenth century. Its activity focused on the promotion of environmentalism, vegetarianism and rural living (Vogt 2007).

Howard was an agricultural adviser in India where he was exposed to various farming methods, mainly composting, which he then developed further and promoted in the UK. Howard was critical of agricultural research that aimed at profits rather than sustainability and practical farming (Hershey 1991). Howard's work inspired many, amongst which was Lady Eve Balfour, an organic pioneer. In 1943, Balfour published her seminal work *The Living Soil and the Haughley Experiment* that was the

first comparative study between organic and conventional farming (Balfour 1976). Following the success of her book in 1946, she cofounded the Soil association in the UK, an SMO dedicated to the goals of the organic movement which is still active today (Conford and Holden 2007).

Another important figure for the movement, Jerome Irving Rodale from the USA was so inspired by Howard's work, even though he was not a farmer himself, that he bought a farm to experiment with organic farming. Rodale published extensively, through his own publishing house, on the benefits of organic and the dangers (often unsubstantiated) of conventional methods (Kelly 1991). He also established an SMO, the "Rodale Institute", to promote the movement in the USA. The term organic agriculture itself is attributed to Lord Northbourne who first framed the farm as an organism in his book *Look to the Land in 1940* and soon came to be used extensively to describe non-conventional farming (Paull 2014).

During the 1950s, organic farming fuelled by its success in the UK and Germany was also popularised in France as "agriculture biologique" by Claude Aubert's work and the subsequent establishment of the "Nature et Progrès" association in 1964 (Vogt 2007). Over the next years, the movement successfully expanded in a global scale, and a multitude of local organic organisations emerged in the 1970s. In 1972, the International Federation of Organic Agriculture Movements (IFOAM) was established, an SMO coordinating the various independent initiatives and promoting the principles of organic agriculture.

The efforts of individuals, like the aforementioned, but also of farmers to provide alternative farming conceptualisations (for instance approaches like agroecology; permaculture; sustainable/biodynamic/regenerative agriculture) to the conventional ones led to the proliferation of communities and organisations promoting and developing these conceptualisations further. All these initiatives are aggregated in a movement under the organic moniker. It is hard to attribute a robust set of beliefs in the organic movement over the years, as there are various tensions and contradictions amongst the various approaches. The latter may range from a mere set of ecologically friendly methods to proposing a complete overthrow of the incumbent food production system (Guthman 2004). Yet the belief that agricultural activity within the profit-driven industrialised production is responsible for a range of unwanted effects constitutes a unifying force within the movement (Conford 2001; Guthman 2004).

This overarching critique of industrialisation in agriculture and subsequent turn into organic agriculture can be broken down into four move-

ments and ideological framings that formulate the organic frame: (1) the agricultural production through alternative means, (2) the food and health movements, (3) environmentalism (4) and the counterculture movement that became prominent in the 1960s (Guthman 2004).

In 2005, the IFOAM published a set of principles revolving around health, ecology, fairness and care that frame organic agriculture. The principles were formulated through participatory processes by the members of the federation and were finalised in its general assembly (Luttikholt 2007). A brochure was produced and translated in several languages to disseminate the principles. The principles encapsulate the essence of the movement's history and influences as they were previously discussed here and may be viewed as motivational framing. After all, they have been labelled as the "ethical principles to inspire action" (IFOAM 2005).

Widespread market demand for organic food after the 1980s led to the adoption of organic methods and distribution systems globally (Aschemann et al. 2007). Originally sold in specialised vendors, soon major retail chains offered organic options boosting their popularity further. Organic regulations were established regionally to provide uniform rules for producers, notably in the EU, USA and Japan. These, however, led to increased costs to a developing industry, with the acquisition of an organic certification soon becoming a costly affair. Several European countries offered subsidies to support their national organic production as a result, though that is not the case with the USA where organic development is mostly market driven (Lohr and Salomonsson 2000; Uematsu and Mishra 2012). Further, market activity led to a concentration in production and consequently distribution. A result of both a dramatic growth of pioneering organic firms and the involvement of large conventional companies like McDonalds and Heinz (Aschemann et al. 2007). This meant that organic no longer meant local and fresh food necessarily. It was to tackle these rising concerns about the globalisation effect in organic farming that the IFOAM established the aforementioned principles.

Despite these efforts and the strict enforcement of regulations, there is evidence of what is called conventionalisation of organic agriculture. The organic farms are converted into the form of conventional ones since while their practices comply with regulations, they are not aligned with the principles of organic agriculture (Darnhofer et al. 2010). This conventionalisation takes place in various ways (Buck et al. 1997): through extensive marketing and the end of local food by distribution channels in a global scale; the abandonment of sustainable practices and adoption of intensive

mono-cropping methods; substitutionism, the process of accumulating other food processing activities like packaging; appropriationism, meaning the process of externalising the various organic inputs traditionally developed in the farm like organic compost. This leads into a bifurcation between farmers, who are faithful to the organic principles, and organic producers, who engage in agricultural activity in the scale of conventional practices. This book explores communities whose organic farmers are squarely placed in the former category.

4.2.2.1 *The Organic Master Frame in L'Atelier Paysan*

The appropriation of the organic frame from L'Atelier Paysan is obvious. After all, as stated in the platform, it is “born out of an activist network of organic farmers in the Rhone Alpes region”. Further, the platform states as a goal the promotion of organic practices through their tools: “the development of tools and self-built machinery adapted to small-scale farming is a technological, economic and cultural instrument which has been little explored within agricultural development in France, although it can provide a significant impact on the growth of organic farming and contribute to improving organic farming practices... For us, organic and small-scale agriculture go hand in hand. We cannot promote a model of organic farming which does not have a wider social vision behind it. Similarly, we believe that the principles of small-scale farming lead naturally to a chemical free approach”.

The interviews illustrate the elements of the organic frame within L'Atelier Paysan. Indeed, the whole project began when Joseph adopted permanent raised bed technics more than 20 years ago. He says, “There were no machines in the market for this kind of system so we built them”. Fabrice considers L'Atelier Paysan as part of the organic movement and in broader scale the ecology movement. He wants to engage in the debate for healthy eating and food systems as he believes that the conversation “should include tools for producing food as well as the open source agenda”. Julien shares that belief and claims that his primary reason for his engagement in the project is “to tackle the challenge of how to feed humanity”. He prefers the term agroecology over all other because it is more clearly defined and it reflects the practices they promote which are a step beyond organic, citing the use of green manure (a type of plant that nurtures the soil) as an example.

He continues, “If conventional farmers want to use our tools then that is very good but we will not adapt to their practices. These are practices of

the past, not relevant at all for the future. We cannot afford them on an environmental or humane level”. Instead, he says, their goal is to get them to convert into organic practices. Jonas, another member of the team, agrees: “Any farmer can join but our activity is quite specific and most of it is for small farms and organic agriculture”.

Nicolas, whose background is in organic agriculture, is interested in collaborating with the various networks for organic agricultural development. Expanding on Julien’s proposed practices, he says, “We have to choose a different agricultural model and we are trying to create it... we try to show farmers that our model is more accurate, relevant and diverse considering how agriculture and alternative agriculture work”. He welcomes conventional farmers since he believes that if they want to use their tools then that means they, at least, are considering changing their practices. He says he wants to “make people think about how they farm through their machines... make them realise that there are other ways to do things”. Etienne, one of L’Atelier Paysan’s engineers who has become a peasant farmer himself, says that the very act of organic farming is political, meaning respecting the land rather than exploiting it, and he believes that most farmers working with them share this view.

Everyone agrees that the tools themselves carry the principles of the organic frame. According to Fabrice, they assist farmers in the making of simple and appropriate tools “but with a high level of agronomy”. Joseph also prefers cheap, simple tools which are important for resilience. Because, while complex technologies are efficient, he thinks that “one day they might not be accessible. It is a possible scenario that one day we might not even have access to electricity. We need to diversify”. He considers modern agriculture unsustainable because of its dependence on external inputs. This reflects the more radical environmental concerns within the organic frame.

The organic frame is adopted in a straightforward way by L’Atelier Paysan with a focus on the environmental benefits of these practices. While the term organic itself is used extensively, the group makes use of more precise language (like agroecology) to indicate approaches they promote which are deemed the most efficient and environmentally appropriate.

4.2.2.2 The Organic Master Frame in Farm Hack

The appropriation of the organic frame in Farm Hack is not as prominent, yet its elements are easily identified. According to the Farm Hack culture material, “Farm Hack aims to nurture the development, documentation,

and manufacture of farm tools for resilient agriculture... By documenting, sharing and improving farm tools, we can improve the productivity and viability of sustainable farming". Resilient and sustainable practices are cited for a "healthy land" and "successful farms and local economies". The term organic agriculture is not employed even though, according to Dorn, the majority of farmers participating are organic producers.

A reason for not using the term organic is because Farm Hack is not limited to organic farmers but, according to Dorn, is "a community where the tools are a reflection of our understanding of the environment". Acquiring an organic certification is an expensive and complex process to navigate, and some farmers do not have it despite engaging in agriculture that could be considered organic. In fact, interviewee C suggests that organic standards are not enough. For instance, he says that the accepted rate of soil depletion considered sustainable is shockingly low. His critique goes further: "in the USA everything is about commercialisation and marketing and a lot of it gets green washed. There is a lot of co-opting and half-truths in that story- organic agriculture is sort of managed by the USDA (the federal agency for agriculture) and industrial organic has become pervasive. You can buy organic milk coming from a CAFO (concentrated animal feeding operation) that somehow manages to meet organic standards".

Interviewee B, a political science graduate and farmer, agrees that the USDA organic is usually problematic: "On the consumer level when people say organic they mean ecological but on the production level it does not necessarily mean so". He continues, "I am not against organic certification by any means but I do think it's only telling a part of the story, so I see the need for more precise definitions of sustainable agriculture". So, they deliberately use more precise language about what practices they promote which may include "strictly carbon farmers or permaculturalists". This he says comes from "a desire to create an alternative system, a way to interact with the environment that is against the way industrial agriculture does". Interviewee C argues that for this reason "regenerative has emerged as agricultural methodology which might be better for earth but does not necessarily meet organic standards or actually surpasses them... we are trying to regenerate the soil and land base not just be 'sustainable' and depleting at a marginal rate".

Like L'Atelier Paysan, the tools themselves here also carry the organic frame, as Severine says, "Farm Hack is making clear the organic community's shared understanding of technology" since "there is this perception

that if one is against farm inputs like pesticides and GM [genetically modified] then they are against technology and progress. Our point was to be more discerning—we are evaluating technology based on its cultural and ecological impact”. “Ultimately it is not about the tool, it is about the agronomy”, she concludes. Dorn adds that “it is about accessibility, ownership and scale with a discussion towards moving to biological systems rather than steel underlining it”.

Interviewee A and his farmer brother believe that to create a sustainable food network, there will also need to be a local network that makes machines and solves problems for these farmers. That is because according to interviewee A, “Farming is a unique application of tools to environmental conditions, meaning that every farm has different conditions like soil type, altitude, rain fall etc. That means that every farm has unique technology problems that they need to fix”. In a similar vein, interviewee C, who experiments on farm-scale perennial crops, builds the appropriate tools for the particularities of his approach. He says he leverages this technology to create an agricultural ecosystem which humans can maintain without the need of technology in the long-term. An approach similar to that of Joseph’s which assumes a future worst-case scenario.

Several elements of the organic master frame have been adopted by Farm Hack, like the goals for environmental protection as well as sustainable and locally adapted practices, to tie together the various visions for alternative agriculture within the community. Institutionalised organic agriculture and mainstream organic narratives are criticised for their lack of substantial impact, focusing on scale and efficiency, and difficulty to navigate regulation-wise which limit adoption.

4.2.3 *The Peasant Master Frame*

While the organic movement evolved and expanded, ranging from promoting simple alternative farming methods to the conventional ones to suggesting the complete overhaul of the incumbent food system, the peasant movement pursued more politically focused goals framing its activity against the effects of neoliberalism.

The term peasant (amongst the equivalent terms are yeoman, campesino in Spanish and paysan in French) has been framed in numerous ways with further variations amongst geographical areas, yet often it carried a derogatory meaning. The term may signify social groups in the preindustrial industrial era that were legally bound, socially and economically inferior

and considered subservient and “simple”, while even today peasants in several areas in the planet lead deeply disadvantaged and precarious lives (Edelman 2013). The term may also describe communities with certain characteristics. For instance, peasants could be distinguished from farmers since the latter view their activity as an entrepreneurial project to be expanded, whereas the former aim merely to sustain themselves (Wolf 1966).

Even here, the definitions seem quite diverse and often interchangeable. A third way the term may be used is in an activist context, which is the connotation explored in this book. Having appropriated and empowered the term peasant, social movements give it a wider meaning to attract the maximum amount of constituents and adherents (Edelman 2013). La Via Campesina, arguably the largest transnational peasant movement which encompasses organisations from across the globe, defines peasants as people of the land (Desmarais 2007). Those that depend on and care for it, including those with little or no private land.

While contemporary peasant and agrarian movements rose into prominence in the late 1980s, they trace their roots further back, in the diverse and revolutionary attempts of peasants across the planet in a struggle to secure basic human rights and rural reform. Like the village population during the Mexican revolution in the 1920s that identified themselves as *campesinos* and demanded rural reform (Boyer 2003), or similarly the Bolivian revolution after 1952. In Europe, the peasant uprisings and agrarian parties were much grander in scale and activity. While their ideologies were quite different and often competing, there was common ground on the shared pursuit for the removal of landed groups and general land reform (Borras Jr. et al. 2008).

Jumping forward into the 1980s, we witness the rise of the several contemporary movements following a major food crisis in a global scale. The reasons for this crisis were multiple: the massive increase in prices of fossil fuel (and fuel-based inputs) as well as other inputs like fertilisers during the late 1970s; the consequent rise in interest rates in combination with policies aiming to reduce inflation; the collapse of the Bretton Woods system which allowed the liberalisation and explosion of the globalised food trade; and as a result the fast decline of crop and livestock prices (McMichael 1998).

The domination of agribusinesses in all key agricultural sectors through chemical, mechanical and later biological inputs and the processing, storing and exporting of basic food products enabled them to control a large part of the food market and influence agricultural policies in a global scale

(Edelman 2003; Kneen 2002; Lewontin 1998). These neoliberal reforms and the attempts to transfer the industrialised model of production, which would replace traditional systems in poorer countries (especially in the Latin America), has had a highly adverse effect in local peasant populations (Desmarais 2007).

It is within this socio-economic climate that peasant movements emerged in multiple regions across the globe. I discuss the movement of La Via Campesina, due to its role as an umbrella organisation, and the Confédération Paysanne, a French peasant SMO and leading actor in the peasant movement, both in France and globally, and a founding member of La Via Campesina.

The Confédération Paysanne emerged in 1987 out of leftist farmer groups that were unhappy with the French farmer's union (Fédération Nationale des Syndicats d'Exploitants Agricoles) and opposed the government's reform to modernise the agricultural sector which they claimed was marginalising small farmers. The Confédération Paysanne presented industrialised farming and globalisation as problematic and offered "peasant farming" (agriculture paysanne) as an alternative model of producing farm goods (either for commercial use or not) for the benefit of society (Morena 2015).

Peasant farming is framed as the opposite of entrepreneurial farming whose goal is profit maximisation and does not offer a specific set of practices to follow. It is not limited to certain farm size and could be organic or otherwise, yet it should respect the environment, food health and worker rights (Bove 2001). While originally the focus was set on criticising industrial farming for its obsession with productivism (deemed destructive for peasants), over time a more positive connotation was given to peasant agriculture that called for non-competitive, adaptive and autonomous activity (Morena 2014).

The Confédération Paysanne manifesto provides three principles attached to peasant farming: "it has a social dimension centred on employment, solidarity among peasants, among regions, among the world's peasants; it must be economically efficient by creating added value, in accordance to the means of production employed and volumes produced; it must be mindful of consumers while preserving the natural resources that it uses" (as cited in Morena 2014, p.3). This lack of specificity allows them to attach different meanings to match the various groups they are attempting to approach. According to the Confédération Paysanne, "peasant farming is neither a technique nor a model to follow or create, but an

overall enterprise that involves all of a peasant's life and transcends the simple act of production" (as cited in Morena 2015, p.66).

In 1993, Confédération Paysanne cofounded La Via Campesina (translated as the peasant's way) along with several other peasant movements from Europe, Asia, Africa, Latin and North America. While cooperation existed before amongst the various movements, La Via Campesina was formed to offer global peasant coordination. It grew out of the previously discussed conditions in the last decades first by movements from third world countries, where rural populations experienced the worst side-effects of neoliberal and industrialisation/modernisation policies, and later from Europe and North America.

La Via Campesina uses a human rights frame to present their demands in various struggles, like land and resource enclosures, seeds, international trade and investments, in a common language that encapsulates the varying ideological, political and cultural flavours in the movement (Claeys 2014). These demands are distilled in the right to food sovereignty frame which was established in 1996 and over the years has been enriched, to address new issues like global warming and land grabbing, and are presented as the focal point of peasant struggle (ibid.).

Reports of La Via Campesina advocated ecologically resilient and autonomous practices applied by small, family and community-run farms (La Via Campesina 2010, 2013). A 2010 report states that there are multiple examples of peasant and family sustainable practices which might be called "agroecology, organic farming, natural farming, low external input sustainable agriculture, or others. In La Via Campesina we do not want to say that one name is better than another, but rather we want to specify the key principles that we defend" and "sustainable peasant agriculture comes from a combination of the recovery and revalorization of traditional peasant farming methods, and the innovation of new ecological practices" (La Via Campesina 2010, p.2). While in a following report, it is clarified that organic practices are imbued with the peasant ethos as "peasant based sustainable production is not just about being "organic"" (La Via Campesina 2013, p.9) since "industry is also appropriating so-called "organic food", so we need to differentiate between "industrial organic" and "peasant" or "family-farm organic"" (ibid., p.16).

4.2.3.1 *The Peasant Master Frame in L'Atelier Paysan*

Given that it is even in the title, the peasant frame is the most prominent one in L'Atelier Paysan. The organisation is also part of the La Via

Campešina and Confédération Paysanne networks. The critique of the agribusiness is evident in the platform: “In France, technological practices in agriculture are mainly driven by the agro-industry and correspond to its particular needs. This complex process is likely to continue, until farmers using these technological practices which are not tailored to their real needs, reassert ownership of the system-wide design of their farms”. The solutions offered aim to enhance farmer autonomy and efficiency through the dissemination of farmer created tools: “we identify and document inventions and adaptations of tools, created by farmers who have not waited for ready-made solutions from experts or the industry, but have invented or tweaked their own machinery”.

But also the collaborative development of new solutions: “we provide advice and guidance for small-scale farmers on agricultural tools tailored to their needs, and accompany them through their trials and tribulations in their farming journey, individually or collectively, whatever their area of production”, and the training of farmers to achieve the capacity to manufacture themselves since “building a tool, farmers gain in autonomy as they learn metal work. A farmer who has built rather than bought his/her tool is better placed to repair or adapt it in future”.

Adapting and expanding the narrative of food sovereignty, L’Atelier Paysan encapsulates their activity in what they call “technological sovereignty” for peasants. According to their advocacy documentation: “by promoting peasant autonomy through the reappropriation of knowledge and know-how around the farm production tool, L’Atelier Paysan promotes technological sovereignty of the countryside. We argue that it is the responsibility of the farmers to question their tools of work, machines and buildings, their financial, agronomic and ergonomic impact”. This critique lies in the heart of the initiative and is reflected upon the tools they create: “we are careful with the tools that we agree to develop, and ensure that they respect the ethical principles of L’Atelier Paysan. We want to develop agricultural machinery which supports small scale organic farming, and which can be appropriated and modified by farmers” (translated from the French language by myself).

The L’Atelier Paysan members reaffirm this goal. Fabrice, while critiquing the agribusiness sector, says “I consider half of the industry tools inefficient. Their purpose is to support a financial system and often farmers buy tools they don’t need because someone told them to... Unlike seeds and where their products are sold, there is no political critique about machinery in agriculture, yet historically the farmer is the machinery engi-

neer and is sharing with other farmers... Now industry has taken over everything". Julien is also concerned about the concentration of equipment and seed markets in the hands of just a few big companies which are driven by their business models rather than the needs of the farmers. He expands his criticism to the supposed user innovation culture within the industry: "Even if it is contaminating big companies their goal is to make profit. This is not our goal, we don't pay our shareholders. We are not accountable for that—the only thing we are accountable for is our social goals".

Instead Julien says their goal is to promote technology that is affordable and easy to recreate, use and repair. Nicolas expands on that thought: "We promote, and help farmers build tools that are simple in conception and reproducible in the farm, with few materials and equipment. That is how we promote low investments, autonomy. That is how we make farmers independent from banks, agroindustry and make sure that they own their tools". Jonas views this as a highly political project. He says, "Self-construction means something politically. That you are not part of the commercial system and that's how you get more autonomy". He considers the type of technology they promote as important for farmers "because they have needs and with it they can cover them themselves". They have been quite successful in creating a positive view on self-construction according to Joseph, who cites a law passed in the French parliament that recognises it as the best way for farmers to be efficient. He says this development was heavily influenced by L'Atelier Paysan's activity.

As far as the workshops are concerned and the resonance they have had with the farmers in France, Fabrice believes the reason is the competitive nature of modern farming. The success of L'Atelier Paysan is partly explained by its appeal to new farmers who have no heritage in farming and are eager to learn. He says, "It is a nice metaphor of them constructing themselves as farmers". Gregoire, whose job is to assist the farmers in the creation of the tools and conduct the workshops, aims to remove barriers of competence and confidence "It is important for me to demystify the work of metal and machines themselves. A farmer that can work metal will be able to transform tools into something new. It is important for a farmer to have the confidence, if they have an agronomic idea and some knowledge of mechanical systems, to pursuit it". In the long term, he hopes that farmers will not require his expertise and L'Atelier Paysan will merely be providing logistics support while the "transfer of competence will be from farmer to farmer".

The peasant master frame provides substantial context for L'Atelier Paysan with strong references to farmer autonomy and sustainability. While the goals of contemporary peasant movements are fully embraced by L'Atelier Paysan, the food sovereignty framing has been extended to include technological sovereignty as the group deems it is often omitted in the debate within larger transnational peasant SMOs.

4.2.3.2 *The Peasant Master Frame in Farm Hack*

The peasant master frame is less prominent in Farm Hack than in L'Atelier Paysan even though according to Severine “Farm Hack is only possible because of the existing peasant network”. However, she claims that the peasant language is not widely used in the USA. This partly explains the heavy focus on open source language software within Farm Hack despite the many similarities between the two approaches with regards to collaborative endeavours and open knowledge dissemination. Interviewee C believes that peasant mobilisation in the USA is small, underfunded and often defeatist. Regarding state support, he says, “It can be clunky as far as small scale agriculture is concerned because they’re basically bought and paid for by large agribusiness interests”. Interviewee B continues this critique: “It’s a political analysis of where power lies in the system. In saying that power is held by giant manufacturers who can afford investing in research and development and lobby in the government”.

Similarly, Kristen says that while engaging in small sustainable agriculture, “it became clear that farm technology is focused on industrial scale agriculture and there is a gap between what small farmers need and that is available on the market”. So she and other farmers create their own creative solutions to their needs, yet she says, “It shouldn’t just be up to farmers to solve their problems. Food is fundamental to our society and farming is a high-risk and challenging profession. I think the resources of our society should serve the purpose of growing food better and more effectively... and that is the case, but at one scale of agriculture only” (referring to industrial scale agriculture). Severine’s views are even more radical. There are converging monopolies around basically four large companies with established innovation hubs, university accelerator programmes and government grants she says and concludes that “the militarisation of agronomy is the next phase in totalitarianism”!

While these peasant frame-driven views are held by people within the community, they are not voiced and featured prominently in the Farm Hack framing. According to interviewee C, a reason for that is that USA

farmers suffer from “tall poppy syndrome” regarding their opinions and are afraid of being outspoken. Tim, who during our interview almost used a Marxist quote but did not quite complete it, says he does not use this type of language because people tend to think that it does not have practical applications. On not finishing the quote he says, “I guess I stopped myself because if you use that language here, the immediate response is ‘so how are you going to make any money’ and then you need to backtrack and say ‘look, I’m not making any money anyway—I will never make any money because the market system does not allow it’”. With Farm Hack, they are trying to “break out of the system and make something that should have been made before us and not ruining the planet at the same time”. And the language used instead is based on rational arguments and examples that work with people Tim says, as illustrated by the Farm Hack platform.

The initiative is defined within the historical context of agrarian activity but with a focus on new farmers and new approaches developed in collaboration with allied social groups. Dorn feels there is a sense of continuity that comes from embracing the history of agrarianism which was open source: “It’s not something we invented; we are continuing. We are part of something that has a much larger lineage... learning from the past but looking at the future”, or “peasants of the future” as Severine calls it. According to Dorn, it goes back to the yeoman farmer ideals, the granges and agrarian politics which is “not class politics and it’s not libertarianism”; he says, “It has the elements of independence and mutual aid, a non-commercial and a non-competitive market approach”. On this continuity, Kristen compares the USA to Europe and says that the small farms never went away in Europe, while “in the USA it feels like we’re re-inventing a lot of things”. Dorn says they are imagining a yeomen’s agriculture that is “diverse, direct to the market, with equipment that can be owned by the farmer or the community”, yet like Kristen he thinks that to achieve this they need to invent the tools for it. But it is a big challenge with the greatest potential “to shift the mentality in order to have more empowerment at the farmer level” as Dorn says referring to convincing farmers to learn to build tools themselves or in the community rather than seek to buy them.

In general, there is a lot of overlap between the Farm Hack community and other collaborating organisations like those of the greenhorns and the National Young Farmers Coalition according to Dorn. So their politics spill over, like access to land, funds for education and healthcare and all

things relevant to farmers being more successful and “having a more level playing field”. The peasant frame is adopted in a wider, less obvious way in Farm Hack to appeal to as many constituents as possible. Hence, it focuses on the historical context of peasant agriculture and the capacity of the model in the modern world to address farmers’ needs which functions as the driving factor for the wide range of views within the community.

4.2.4 *Formulating the Open Source Agriculture Frame*

I have distilled the various framing processes each of the case engage in into three master frames, which embody the common elements in the various social movements that produce them. The cases tap into these grander narratives and engage in frame alignment to concisely articulate their elaborate goals and various activities. While the individual case frames are not identical, there are commonalities to be systematised in order to articulate the new collective action frame shared by communities and individuals engaging in open source agriculture. A visual representation follows (Fig. 4.1), which illustrates the basic elements emerging from the data collected by either case. Combined they offer the central narrative of the frame.

To systematically represent the data, I employ three framing tasks, namely diagnostic, prognostic and motivational. Diagnostic framing involves the identification of a problematic situation and the attribution of blame. In this case, the three master frames are bridged to offer a multidimensional critique of the modern, conventional agriculture and the technology supporting it. The agribusiness sector is deemed responsible for the elimination of small- and mid-scale farms and traditional farming methods through the implementation of technology and practices that detach farmers from the land and cause great resource depletion and environmental destruction. The technology, supposed to assist the farmers into tackling their problems, is developed without their input and serves the interests of large companies. Farmers are either devoid of appropriate tools or unable to purchase the ones available in the market, due to patents that instead of protecting creators’ rights are now perceived as a tool for profit maximisation. Governments and knowledge institutions, like universities and research centres, are often viewed as complicit in this hostile system.

The prognostic framing is also a synthesis of solutions promoted by each of the three master frames. Due to the nature of the open source

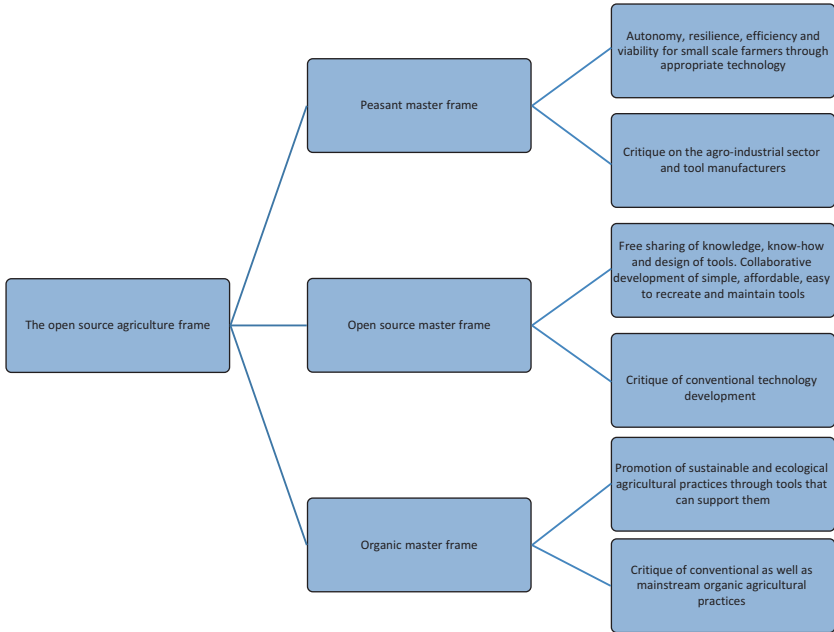


Fig. 4.1 The elements of the open source agricultural frame. (Source: Author's creation)

agriculture movement, that is, it being a technology and product-oriented movement rather than exclusively oppositional, the solutions offered are not in the form of demonstration and direct opposition but rather as alternative approaches to tackling their problems: technology developed by farmers for farmers with the assistance of designers, engineers and software developers. This type of technology is portrayed as truly suitable for enabling small-scale farmers to engage in alternative agriculture. The collaboration, the sharing of resources, knowledge and know-how amongst farmers is also promoted as a way of increasing viability and efficiency.

The motivational framing features the vocabularies of motive that are socially constructed to justify the movement's activity and spark further mobilisation. I have observed three motivational frames corresponding to each master frame. These are openness, sustainability and autonomy. Openness framing amplifies the merits of the open source model and collaborative processes as opposed to proprietary approaches that appear

ahistorical and incompatible with agriculture. The open source model is presented as a natural continuation of ancient agricultural practices which were collaborative rather than antagonistic, while modern ICT technologies allow for such collaboration in a scale never before possible.

The sustainability framing pertains to the severity of the environmental and health concerns over conventional agriculture which for some is leading to certain collapse. Instead, it promotes systems that are good for the environment and provide healthier food. Or in the worst-case scenarios, “lifeboat” systems and tools which may be effective even under the most adverse conditions. These systems, while diverse in methods and approaches, are all viewed as radically different both in scale and philosophy from conventional ones since they refuse to treat the aforementioned concerns as externalities and they affirm the conviction to work with nature rather than impose on it.

Last, autonomy is presented as concerned with securing independence and resilience for farmers who are potentially contingent on a system that is beyond their control and does not cater to their needs and interests. Worse still, large companies are viewed as powerful enough to influence public institutions in order to assume control and manipulate the entire sector according to their own interests. The perceived solution is to break free from this system and operate as independently as possible. This may be achieved through minimising external inputs, self-creating machines and tools, diversifying the activities and skillsets of farmers and establishing collaboration and support networks.

In conclusion, the open source agriculture movement offers a critique of the incumbent system and a vision of technology attuned to socially and environmentally conscious agriculture which, according to its adherents, is posed to eventually replace it. The critique is distilled down to the essence of technology. In Fabrice’s words, people in the agricultural production usually “are not interested in tools. I mean they are not thinking about the political implications of tools. But technology is political, it is not neutral. They see it as not political. Just technology, just progress. In this way nobody questions the technology. Talking about what we do opens another door as it is lack of visibility that allows this to happen. One piece of technology paves the way for one political goal, and another piece leads to another goal”. The vision then is an amalgam of the elements from each master frame appropriated by the movement constituents which may be encapsulated as open source sustainable technology geared towards autonomy and resilience. Next I further explore this technological aspect

of the movement to identify how the ideological proclivities and beliefs of the constituents, as well as the availability of resources and socio-political opportunities inform the nature and development process of the technological artefacts.

BIBLIOGRAPHY

- Aschemann, J., Hamm, U., Naspettiand, S. and Zanoli, R. (2007) “Organic Markets”, in Lockeretz, W. (ed) *Organic Farming: An International History*, Wallingford: CABI
- Balfour, E.B. (1976) *The Living Soil and the Haughley Experiment*, New York: Universe Books
- Benford, R.D. and Snow, D.A. (2000) “Framing Processes and Social Movements: An Overview and Assessment”, *Annual Review of Sociology*, 26, pp. 611–639
- Borras, S. Jr., Edelman, M. and Kay, C. (2008) “Transnational Agrarian Movements: Origins and Politics, Campaigns and Impact”, *Journal of Agrarian Change*, 8(2/3), pp. 169–204
- Bove, J. (2001) “A Farmers International?”, *New Left Review*, 12, pp. 89–101
- Boyer, C.R. (2003) *Becoming Campesinos: Politics, Identity, and Agrarian Struggle in Postrevolutionary Michoacán, 1920–1935*, Stanford, CA: Stanford University Press
- Buck, D., Getz, C. and Guthman, J. (1997) “From Farm to Table: The Organic Vegetable Commodity Chain of Northern California”, *Sociologia Ruralis*, 37, pp. 3–20. <https://doi.org/10.1111/1467-9523.00033>
- CERN. (2017) *CERN Open Hardware Licence*, Available at: <http://www.ohwr.org/projects/cernohl/wiki>, accessed 17 May 2017
- Claeys, P. (2014) “Food Sovereignty and the Recognition of New Rights for Peasants at the UN: A Critical Overview of La Via Campesina’s Rights Claims over the Last 20 Years”, *Globalizations*, Advanced online publication, <https://doi.org/10.1080/14747731.2014.957929>
- Conford, P. (2001) *The Origins of the Organic Movement*, Edinburgh, Scotland: Floris Books
- Conford, P. and Holden, P. (2007) “The Soil Association”, in Lockeretz, W. (ed) *Organic Farming: An International History*, Oxfordshire, UK and Cambridge, MA: CAB International (CABI), pp. 187–200
- Darnhofer, I., Lindenthal, T., Bartel-Kratochvil, R. and Zollitsch, W. (2010) “Conventionalisation of Organic Farming Practices: From Structural Criteria Towards an Assessment Based on Organic Principles. A Review”, *Agronomy for Sustainable Development*, 30(1), pp. 67–81
- Desmarais, A. (2007) *La Via Campesina: Globalization and the Power of Peasants*, London: Pluto

- Edelman, M. (2003) “Transnational Peasant and Farmer Movements and Networks”, in Kaldor, M., Anheier, H. and Glasius, M. (eds) *Global Civil Society*, London: Oxford University Press, pp. 185–220
- Edelman, M. (2013) “What is a Peasant? What are Peasantries? A Briefing Paper on Issues of Definition”, *Prepared for the first session of the Intergovernmental Working Group on a United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas*, Geneva
- Elliott, M.S. and Scacchi, W. (2008) “Mobilization of Software Developers: The Free Software Movement”, *Information Technology and People*, 21(1), pp. 4–33
- Goodman, D. and Redclift, M.R. (1991) *Refashioning Nature: Food, Ecology, and Culture*, London: Routledge
- Guthman, J. (2004) *Agrarian Dreams: The Paradox of Organic Farming in California*, University of California Press
- Hatch, M. (2014) *The Maker Manifesto: Rules for Innovation in the New World of Crafters, Hackers and Tinkerers*, New York: McGraw-Hill
- Hazeltine, B. and Bull, C. (1999) *Appropriate Technology: Tools, Choices and Implications*, Academic Press
- Hershey, D.R. (1991) “Sir Albert Howard and the Indore Process”, *Proceedings of the Workshop History of the Organic Movement*, pp. 267–269
- IFOAM. (2005) *Principles of Organic Agriculture Preamble*, Available at: http://www.ifoam.bio/sites/default/files/poa_english_web.pdf, accessed 19 July 2017
- Kelly, W.C. (1991) “Rodale Press and Organic Gardening”, *Proceedings of the Workshop History of the Organic Movement*, pp. 270–271
- Kneen, B. (2002) *Invisible Giant: Cargill and Its Transnational Strategies*, London: Pluto Press
- Kostakis, V., Niaros, V. and Giottsas, C. (2014) “Production and Governance in Hackerspaces: A Manifestation of Commons-based Peer Production in the Physical Realm?”, *International Journal of Cultural Studies*, 18(5), pp. 555–573
- La Via Campesina. (2010) *Peasant and Family Farm-based Sustainable Agriculture Can Feed the World*, Available at: <https://viacampesina.org/downloads/pdf/en/paper6-EN.pdf>
- La Via Campesina. (2013) *From Maputo to Jakarta: 5 Years of Agroecology in La Via Campesina*, Available at: <https://viacampesina.org/downloads/pdf/en/De-Maputo-a-Yakarta-EN-web.pdf>
- Lewontin, R.C. (1998) “The Maturing of Capitalist Agriculture: Farmer as Proletarian”, *Monthly Review*, 50(3), pp. 72–84
- Lohr, L. and Salomonsson, L. (2000) “Conversion Subsidies for Organic Production: Results from Sweden and Lessons for the United States”, *Agricultural Economics*, 22(2), pp. 133–146
- Luttikholt, L.W.M. (2007) “Principles of Organic Agriculture as Formulated by the International Federation of Organic Agriculture Movements”, *NJAS—Wageningen Journal of Life Sciences*, 54, pp. 347–360

- McMichael, P. (1998) "Global Food Politics", *Monthly Review*, 50(3), pp. 97–111
- Morena, M. (2014) "Words Speak Louder than Actions: The 'Peasant' Dimension of the Confédération Paysanne's Alternative to Industrial Farming", Conference paper for at: *Food Sovereignty: A Critical Dialogue*
- Morena, M. (2015) "Words Speak Louder than Actions: The 'Peasant' Dimension of the Confédération Paysanne's Alternative to Industrial Farming", *The Journal of Peasant Studies*, 42(1), pp. 45–71
- Morrison, D.E. (1983) "Soft Tech/Hard Tech, Hi Tech/Lo Tech: A Social Movement Analysis of Appropriate Technology", *Sociological Inquiry*, 53, pp. 220–248, <https://doi.org/10.1111/j.1475-682X.1983.tb00035.x>
- Nascimento, S. and Pólvara, A. (2016) "Maker Cultures and the Prospects for Technological Action", *Science and Engineering Ethics*, 24, pp. 927–946
- Niaros, V., Kostakis, V. and Drechsler, W. (2017) "Making (in) the Smart City: The Emergence of Makerspaces", *Telematics and Informatics*, 34(7), pp. 1143–1152
- Paull, J. (2013) "A History of the Organic Agriculture Movement in Australia", in Mascitelli, B. and Lobo, A. (eds) *Organics in the Global Food Chain*. Ballarat: Connor Court Publishing, pp. 37–61
- Paull, J. (2014) "Lord Northbourne, the Man Who Invented Organic Farming, a Biography", *Journal of Organic Systems*, 9(1), pp. 31–53
- Pearce, J.M and Mushtaq, U. (2009) "Overcoming Technical Constraints for Obtaining Sustainable Development with Open Source Appropriate Technology", *2009 IEEE Toronto International Conference Science and Technology for Humanity (TIC-STH)*, Toronto, ON, pp. 814–820. <https://doi.org/10.1109/TIC-STH.2009.5444388>
- Perens, B. (1997) "The Open Hardware Certification Program", *Debian Mailing List*, Available at: <http://lists.debian.org/debian-announce/1997/msg00026.html>
- Pursell, C. (1993) "Address Presidential: The Rise and Fall of the Appropriate Technology Movement in the United States, 1965–1985", *Technology and Culture*, 256(3), pp. 629–637
- Raymond, E.S. (1997) *Goodbye, "Free Software"; Hello, "Open Source"*, Available at: <http://www.catb.org/esr/open-source.html>, accessed 16 May 2017
- Raymond, E.S. (1998) "The Cathedral and the Bazaar", *First Monday*, 3(3)
- Schumacher, E.F. (1973) *Small is Beautiful: Economics as If People Mattered*, New York: Harper & Row
- Smith, A., Hielscher, S., Dickel, S., Soderberg, J. and van Oost, E. (2013) "Grassroots Digital Fabrication and Makerspaces: Reconfiguring, Relocating and Recalibrating Innovation?", *SWPS 2013-2*, Brighton: SPRU
- Soule, S.A. and King, B.G. (2008) "Competition and Resource Partitioning in Three Social Movement Industries", *American Journal of Sociology*, 113(6), pp. 1568–1610

- Stallman, R.M. (2002) *Free Software, Free Society: Selected Essays of Richard M. Stallman*, Cambridge, MA: GNU Press
- Uematsu, H. and Mishra, A. (2012) “Organic Farmers or Conventional Farmers: Where’s the Money?”, *Ecological Economics*, 78, pp. 55–62. <https://doi.org/10.1016/j.ecolecon.2012.03.013>
- van der Ploeg, R.R., Bohm, W. and Kirkham, M.B. (1999) “On the Origin of the Theory of Mineral Nutrition of Plants and the Law of the Minimum”, *Soil Science Society of America Journal*, 63, pp. 1055–1062. <https://doi.org/10.2136/sssaj1999.6351055x>
- Vogt, G. (2007) “The Origins of Organic Farming”, in Lockeretz, W. (ed) *Organic Farming: An International History*, Wallingford: CABI
- Willoughby, K.W. (1990) *Technology Choice: A Critique of the Appropriate Technology Movement*, London: Intermediate Technology Development Group Publications
- Wolf, E.R. (1966) *Peasants*, Englewood Cliffs, NJ: Prentice Hall
- Zelenika, I. and Pearce, J.M. (2011) “Barriers to Appropriate Technology Growth in Sustainable Development”, *Journal of Sustainable Development*, 4(6), pp. 12–22