UC Santa Cruz
UC Santa Cruz Previously Published Works

Title

Setting data free: The politics of open data for food and agriculture

Permalink

Journal

New Media & Society, 25(8)

ISSN

1461-4448

Authors

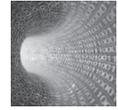Fairbairn, Madeleine
Kish, Zenia

Publication Date

2023-08-01

DOI

10.1177/14614448231174520

Copyright Information

Peer reviewed

Setting data free: The politics of open data for food and agriculture

Madeleine Fairbairn [iD]
University of California, Santa Cruz, USA

Zenia Kish
Ontario Tech University, Canada

Abstract
Open data is increasingly being promoted as a route to achieve food security and agricultural development. This article critically examines the promotion of open agri-food data for development through a document-based case study of the Global Open Data for Agriculture and Nutrition (GODAN) initiative as well as through interviews with open data practitioners and participant observation at open data events. While the concept of openness is striking for its ideological flexibility, we argue that GODAN propagates an anti-political, neoliberal vision for how open data can enhance agricultural development. This approach centers values such as private innovation, increased production, efficiency, and individual empowerment, in contrast to more political and collectivist approaches to openness practiced by some agri-food social movements. We further argue that open agri-food data projects, in general, have a tendency to reproduce elements of "data colonialism," extracting data with minimal consideration for the collective harms that may result, and embedding their own values within universalizing information infrastructures.

Corresponding author:
Madeleine Fairbairn, Department of Environmental Studies, University of California, Santa Cruz, Santa Cruz, CA 95064, USA.
Email: mfairbai@ucsc.edu

What to make of a concept championed by all walks of political life? When conservative liberals, libertarians, liberal democrats, postautonomous Marxists, and left-leaning activists all claim the open as their own and all agree that openness is the way forward?

Nathaniel Tkacz, *Wikipedia and the Politics of Openness*

"Openness" is precisely the kind of concept that wavers between end and means. Is openness good in itself, or is openness a means to achieve something else—and if so what? Who wants to achieve openness, and for what purpose?

Christopher Kelty, *Two Bits: The Cultural Significance of Free Software*

Introduction

In 2016, nearly 800 people assembled in a Manhattan Hilton to discuss possibilities for transforming the world's food system. This summit, hosted by the Global Open Data for Agriculture and Nutrition (GODAN) initiative, opened with the screening of a short video. "Over 7 billion humans inhabit planet Earth," says the narrator, as the camera pans across urban slums, patchwork farmland, and parched deserts. "Experts tell us we collectively produce more than enough food to feed everyone. But why do 800 million people still go to sleep hungry every night?" Food insecurity, the narrator continues, is a "complex," "growing" problem that has "many causes." But here, the somber keyboard music begins to brighten as if to accompany a dawning revelation. "Perhaps the solution is right before our eyes if only we could see the entire picture. The solution is breathtakingly simple. The answer to zero hunger lies within existing agriculture and nutrition data." The contours of the agricultural landscape transform into a series of smiling faces as the narrator concludes, "Together, we can be the generation that takes the most important step to end world hunger by setting agriculture and nutrition data free."[1]

This sleek public service announcement presents one facet of a growing movement to expand the use of "open data" in food and agriculture. According to a widely used definition from the Open Knowledge Foundation (2022), open data is that which "anyone can freely access, use, modify, and share for any purpose (subject, at most, to requirements that preserve provenance and openness)." As the film suggests, some in the international development community hail open data as something of a panacea, celebrating its ability to bring transparency to government and market operations, reduce duplication of effort among researchers and non-profits, foster private sector innovation, and empower smallholder farmers with actionable information. Open data policies and initiatives are rapidly multiplying, sponsored by such international research and development organizations as the United Nations' Food and Agriculture Organization (FAO), the Consultative Group on International Agricultural Research (CGIAR), the Bill and Melinda Gates Foundation, and the US Department of Agriculture (USDA).

Within the growing body of literature on "digital agriculture" (Bronson, 2022; Klerkx et al., 2019; Rotz et al., 2019), this well-funded push to open agri-food data remains under-examined. Perhaps because scholarship on digital agriculture has tended to focus on developments in the Global North (Klerkx et al., 2019), it has largely overlooked growing calls for "open data," which is one of the primary ways that digital agriculture is promoted for the Global South. When open data does arise within this literature, it is frequently positioned as a liberatory foil to comparatively "closed," proprietary systems

that characterize mainstream approaches to digital agriculture (Carbonell, 2016; Wolfert et al., 2017). A handful of progressive, grassroots openness initiatives are profiled repeatedly (Bronson, 2019; Carolan, 2017, 2018; Fraser, 2022), while the mainstream of open data projects receives little attention. The cumulative, though unintended, effect is to project a halo around all things open within digital agriculture.

Scholars working in critical data studies take a more skeptical approach to open data (Gurstein, 2011; Johnson, 2014). Highlighting the diverse ways in which openness is deployed (Pomerantz and Peek, 2016), they demand that we reject the "openness fetish" (Morozov, 2013: 89) or "openness fundamentalism, whereby 'openness' is seen as a failsafe solution to virtually any problem" (Morozov, 2013: 90). Instead, they suggest the need to look closely at "the specific projects that operate under [the name of openness]—at their details, emergent relations, consistencies, modes of organizing and stabilizing, points of difference, and forms of exclusion and inclusion" (Tkacz, 2015: 38). In other words, they argue that, rather than treating openness as an inherent good, we should scrutinize individual initiatives and the power dynamics that contour them.

To this end, this article critically examines the international development community's recent embrace of open agri-food data, a topic that has so far received relatively little attention from either researchers of digital agriculture or of open data for development (though see Gamage et al., 2020). We begin with a literature review on the history and politics of "openness," highlighting its political flexibility and context-dependent outcomes. Openness, scholars have shown, can enhance sovereignty, expand the commons, and increase community control over productive resources; it can also, however, render up new domains for enclosure, extraction, and private accumulation. After briefly describing our methods, we next delve into a document-based case study of GODAN, the most prominent international initiative promoting open agri-food data to date. GODAN, we find, exhibits the kind of neoliberal anti-politics observed in some other open data initiatives (Bates, 2014; Birchall, 2016; Tkacz, 2015). It touts open data as a politically neutral good, but its efforts are couched in a discourse that is largely market-oriented, individualistic, and productivist. Next, we draw from events and interviews with development sector actors beyond GODAN to examine the broader implications of open agri-food data when it is promoted as a development tool in postcolonial contexts. We find that the push to use open data for agricultural development in the Global South shows elements of what scholars have termed "data colonialism" (Couldry and Mejias, 2019; Thatcher et al., 2016). Our analysis focuses particularly on two dynamics of open data for agricultural development: a data extractivism that fails to adequately consider the collective harms that may result from data collection and sharing, and a data universalism that erases the social contexts within which data are produced. While these tendencies remain, we argue, the push for open agri-food data risks deepening the entrenched structural inequalities that lie at the root of many of the problems it aims to solve.

The politics and possibilities of open agriculture

Situating openness: a malleable concept and its many critics

The concept of "openness" has been widely adopted in recent decades by tech companies, governments, civil society organizations, scientific institutions, and more. In part, this

widespread adoption arises because openness is so ideologically malleable. Kelty (2008: 148) describes the concept of open systems as "hopelessly plural," while Gray (forthcoming) describes open data as inherently "multivalent" and "compatible with a wide range of different imaginaries and objectives." Openness is theorized and institutionalized differently within every field of practice that adopts it—from urban planning (Barns, 2016) to education (Hegarty, 2015) to the sciences (Mirowski, 2018)—sometimes with multiple visions of openness co-existing or competing within a single field. The trajectory of assorted openness movements shows this ideological multivalence in action.

The embrace of openness by the tech sector dates back to the emergence of *free and open source software* (F/OSS) in the 1980s. The first iteration of F/OSS was the free software movement. In reaction to the spread of restrictive corporate software copyrights, this movement created a new type of "copyleft" software license that sought to increase programmer freedom (Kelty, 2008). These licenses codified the right to "run, copy, distribute, study, change and improve the software," as well as requiring that any derivative software adopt the same type of license (Free Software Foundation, 1996). In the late 1990s, however, a group of developers broke from the free software movement and instead began promoting what it called "open source software." Whereas the free software movement equated its demands with the political right to free speech, open software advocates instead promoted open source on "pragmatic, business-case grounds" as a better tool for software development (Open Source Initiative, 2018). The open source software movement favored more "permissive" licenses than "copyleft," with minimal rules about the use of derivative software—gone was the requirement to share the source code of all derivative works, allowing for their potential release as proprietary software (Gray, forthcoming). In short, while free software was framed as a rejection of the corporate enclosure of code, open software packaged some of the same approaches in a way that was compatible with corporate profit-making. Open source was quickly embraced by such tech giants as Google, IBM, and Intel (Tkacz, 2015).

During the early 2000s, scientists and other scholars increasingly took up the idea of *open access*, calling for unimpeded public access to the research publications they were already producing free of charge (Suber, 2012). For many of its originators, the goal of this movement was to create a commons of scientific knowledge by wresting control of the publishing process from for-profit academic presses. But, as with F/OSS, what began as a social movement quickly became a business model, as those same presses discovered in open access a means to capture new revenue streams within academic publishing (Mirowski, 2018). It also spawned a host of for-profit online paper-sharing platforms and "predatory" open access journals (Schöpfel, 2018).

Finally, also in the early 2000s, *open data* became a popular concept within tech and public policy circles. A wide range of public entities adopted open data policies, including the US and UK governments, European Union, World Bank, and United Nations. Nonprofits were founded to advocate for open data, such as the Open Knowledge Foundation and Sunlight Foundation (Kitchin, 2014). Governments, public agencies, and multilateral organizations in the Global South have also engaged data sharing initiatives, including open government data portals in India, Kenya, Ghana, South Africa, and elsewhere (Bello et al., 2016). However, like F/OSS and open access, open data is subject to divergent political agendas (Morozov, 2013). On the one hand, by allowing citizens to interpret

government data directly, it can foster the development of "alternative social imaginaries" (Baack, 2015: 8), fueling vibrant grassroots activism. It opens new channels of civic engagement that journalists and "civic hackers" can use in their efforts to "improve community life and infrastructures of governance" (Schrock, 2016: 583). On the other hand, in the absence of parallel capacity-building efforts, it can end up enabling only those with the education, capital, and social status to make use of the data, effectively "empowering the empowered" (Gurstein, 2011).

While open data can, under the right conditions, undoubtedly serve as a catalyst for contestation and counter-hegemonic change, open data projects have also been repeatedly critiqued for their compatibility with neoliberal politics. Openness has long been associated with the traits of classical liberalism: individualism, liberty, equality, competition, and free-market exchange (Tkacz, 2015). These values resonate within the libertarian culture of Silicon Valley, and found fertile ground in the open source faction of the F/OSS movement (Coleman, 2013). Likewise, the rapid and widespread adoption of open data is doubtless due in part to its conformity with reigning neoliberal visions of good governance. Two of the main selling points for open government data are that it generates value by making public data available to private sector actors who can use it to create new products and services, and that it increases government transparency and democratic accountability by allowing citizens to discover and denounce inefficient spending and ineffective policies (Janssen et al., 2012). These promises dovetail with the neoliberal imperative to downsize government through the privatization of public assets, outsourcing of public services, and decentralization of public decision-making (Bates, 2014). The ideal "data subject" envisioned by such open data initiatives is, according to Birchall (2015), the "citizen–auditor–consumer–entrepreneur" (p. 191), tasked with buying products created with open data, using it to monitor government action, and transforming it into profitable innovations but *not* using it to organize collectively for genuine political change.

In the international development context, open data initiatives have also been critiqued for their tendency to impose solutions from the Global North in ways that can exacerbate structural inequalities. Scholars have noted that while openness is compatible with a myriad of development approaches, those that dominate tend to be the technocratic, neoliberal models that equate openness with productivity and efficiency (Bentley et al., 2021). Often imported wholesale from the Global North, such approaches have limited utility across diverse global contexts, particularly as they rarely acknowledge the (Northern) values they embody or adequately address barriers to digital access at sites of implementation (Smith and Seward, 2020). Like other data for development (D4D) initiatives, open data projects often prioritize extracting local data for multinational humanitarian, research, or economic uses over public access or domestic partnerships for local development (Mann, 2018), sometimes without full consideration of the risks posed to data subjects (Taylor, 2016). In worst case scenarios, a failure to acknowledge the power imbalances structuring local contexts can mean that open data becomes a direct pathway for dispossession (Benjamin et al., 2007).

The emergent framework of "data colonialism" offers critical points of departure for grappling with open data's epistemological and political complexities (Dutta et al., 2021). Data colonialism critiques the digital underpinnings of the "contemporary and evolving" dynamic between capitalism and colonialism, particularly the intensified

extraction of value from data and the reproduction of a universalized conception of big data, as central to a "*new form* of resource appropriation on a par with the landgrab" that initiated "historical colonialism" (Couldry and Mejias, 2023). Both digital extractivism (Segura and Waisbord, 2019) and universalism (Milan and Treré, 2019) grow out of modernist European epistemologies and expansionist market capitalism, and tend to reproduce a data-driven rationality that serves the interests of private capital accumulation (Ricaurte, 2019). As in previous iterations of colonial extraction, those who benefit most from data collection and digital infrastructures are most often data extractors—frequently powerful state, corporate, and even humanitarian actors—rather than local populations (Abebe et al., 2021; Madianou, 2019).

Overall, though "openness" is frequently treated as an apolitical good, it is in fact a highly mutable concept whose effects are context-dependent and rarely ideologically neutral. Openness is applied to a great many initiatives, affixed equally to projects that are adamantly anti-proprietary and to those which simply make use of available open data or software to create proprietary products. Sometimes, it is applied so loosely as to deserve the title of "openwashing" (Pomerantz and Peek, 2016: 9). It is therefore crucial to treat openness as an instrumental rather than an intrinsic good (Morozov, 2013) and examine the political implications of open data projects on a situated, case-by-case basis. This is our intent in closely examining the GODAN initiative below. But first, it is instructive to consider how openness has so far been applied to the agri-food system.

Openness comes to agriculture

Within food and agriculture, the more anti-proprietary and pro-commoning form of openness has been eagerly adopted by movements seeking to counter corporate enclosure. Since the early-twentieth century, successive rounds of technological innovation have made agriculture increasingly input- and capital-intensive. While these shifts have greatly boosted agricultural yields, the benefits have not always accrued to farmers, who increasingly find themselves on a "technological treadmill" (Cochrane, 1993) and dependent on an ever-shrinking number of multinational corporations for patented and purchased inputs (Goodman et al., 1987; Howard, 2016). Digital agriculture—while it could hypothetically be deployed in support of alternative agricultural approaches (Carolan, 2017, 2018; Rotz et al., 2019)—has thus far primarily followed the same trajectory of corporate-led intensification (Bronson, 2022; Rotz et al., 2019; Wolf and Wood, 1997).

For some agri-food social movements, openness has provided a way to resist this pattern of corporate enclosure in agriculture. For instance, plant breeders are using the principles of F/OSS to foster alternatives to patented seed, developing and releasing new seed varietals under a copyleft license or pledge, with the goal of fostering the creation of an ever-expanding "protected commons" of plant germplasm (Kloppenburg, 2014; Montenegro de Wit, 2019). Groups using this open source model to keep seed in the public domain include the United States' Open Source Seed Initiative and India's Navdanya, as well as similar initiatives in Germany, Ethiopia, the Netherlands, and elsewhere (Montenegro de Wit, 2019). Many of these groups explicitly align themselves with the international, peasant-led movement for "food sovereignty," which seeks to reclaim peoples' right to control their own food systems.

Another group of initiatives seeks to foster farmer independence from agricultural venders through open source farm machinery. Farm machinery manufacturers increasingly deploy various digital and legal "locks" (Carolan, 2017) that prevent farmers from accessing information that would allow them to modify or mend broken "smart" farm equipment (Carbonell, 2016). In response, grassroots networks of farmers and engineers, such as the US-based Farm Hack and Gathering for Open Agricultural Technology (GOAT), have arisen to share designs for open source farm hardware and software (Bronson, 2022; Carolan, 2017). Like their counterparts in the open source seed movement, these organizations mine the more radical tradition of openness, frequently aligning themselves with the kind of "collectivist ontologies" (Carolan, 2018) characteristic of the food sovereignty movement.

Finally, since the early 2010s, open data initiatives have also been gaining traction in food and agriculture globally. In contrast to the relatively grassroots movements for open source seed and farm machinery, open agri-food data initiatives are often led by international development agencies, research centers, and national governments. Also in contrast to other open agriculture movements, the political orientation of open agri-food data initiatives can be difficult to discern. This ambiguity is reflected in the varied treatment of open data within the digital agriculture literature. Carbonell (2016) hails the movement toward open agricultural data, saying that it "may help farmers to reclaim their data ownership and regain some autonomy" (pp. 2, 7). Wolfert et al. (2017), meanwhile, posit that,

> The future of Smart Farming may unravel in a continuum of two extreme scenarios: 1) closed, proprietary systems in which the farmer is part of a highly integrated food supply chain or 2) open, collaborative systems in which the farmer and every other stakeholder in the chain network is flexible in choosing business partners. (pp. 69)

While in the former, "farmers become franchisers" with limited autonomy, in the latter, they are "empowered by Big Data" (pp.78). In counterpoint to these celebratory accounts, Carolan (2018) and Rotz et al. (2019), caution that open data will not automatically result in more just or equitable outcomes, and may even exacerbate injustices. Fraser (2019), meanwhile, argues that opening agricultural data primarily benefits large agribusinesses with sophisticated machine learning capabilities. None of these articles, however, takes open data for agriculture as its primary focus or considers its political implications in detail. It is this lacuna that we hope to fill in the remainder of this article.

Methods

In what follows, we begin with a case study of GODAN before zooming out to examine some of the dynamics that structure the broader development sector push for open agri-food data. The GODAN case study is document-based. We conducted a critical discourse analysis (Fairclough, 2012) of 21 publications produced by GODAN and its partner organizations between 2015 and 2018. This set of texts was produced for various audiences and included brochures, white papers, and progress reports. We coded these texts using an inductive thematic coding process (Charmaz, 2014) that began by open coding

a subset of the documents before consolidating, defining, and grouping codes for focused coding of all documents using the qualitative analysis software Dedoose.

Our broader analysis of open data for agricultural development is based on interviews and participant observation. Between 2016 and 2018, we conducted 39 semi-structured interviews with practitioners in the development community whose work involves bringing "digital" or "data-driven" agriculture to farmers in the Global South. Interviews, which generally lasted between 30 and 60 minutes, were recorded with participant permission and professionally transcribed. Although we were initially interested in digitalization of agriculture more broadly, open data became a prominent theme in our interviews as over half of our research participants were working on projects that used or promoted the use of open data (some affiliated with GODAN or its partner organizations, others not). While informed by the larger study, this article draws primarily from this subset of 21 interviews. In line with a growing body of scholarship that views meetings as key sites at which to observe the material and ideological orientation of communities of practice (Campbell et al., 2014), we also conducted participant observation at four international development sector conferences or workshops relating to data-driven agriculture, one broader open data for development conference, and one broader agri-food data conference.

Importantly, portions of our research data can be viewed as essentially promotional. Some of GODAN's publications quite explicitly bolster its organizational mission to build international support for open data, while event speakers are sometimes publicizing their company or non-profit initiative. We view these publications and presentations not so much as faithful representations of the state of open agri-food data efforts, but rather as a kind of performative practice. By actively envisioning and advocating a certain type of agri-food future, they help conjure that future, while their silences may also serve to sideline or foreclose alternatives (Bronson, 2022; Fairbairn et al., 2022). Interview participants, however, often gave us more candid and nuanced assessments of the possibilities and limitations of open data for development, including describing their various experiences of success and failure with open data projects.

GODAN: open data as neoliberal anti-politics

GODAN is the most prominent international initiative promoting open food and agricultural data to date. It was launched in 2013 as a result of the G8's New Alliance for Food Security and Nutrition (Schaap et al., 2019), a "cooperation framework" that has been critiqued for its embrace of technology-intensive production and for taking a reductive, scarcity-based view of hunger (Nally, 2016). GODAN positions itself as a global umbrella organization, with over 1000 members including government organizations, non-governmental organizations (NGOs), research entities, and private sector actors. It "focuses on building high-level policy, and public and private institutional support for open data" as well as encouraging "co-operation among existing agriculture and open data activities" (GODAN, n.d.). GODAN was most active on the international stage between 2014 and mid-2019, convening meetings, publishing reports, hosting hackathons, developing assessment tools, and advising on policy. These years corresponded with what the organization terms its "inception phase," a period when it was jointly funded by the UK, US, and Dutch governments and administered by a secretariat

coordinated by the Centre for Agriculture and Biosciences International (CABI) out of Oxford, England (Clark et al., 2020). As of this writing, it is in a period of transition, moving its headquarters to McGill University in Montreal, Canada, restructuring its operations, and seeking out new sources of funding (GODAN Steering Committee, 2020; McGill University, 2019). In this section, we begin by briefly canvassing the diverse types of open initiatives profiled in GODAN's published documents, before analyzing the politics of openness suggested by these texts.

Championing diverse initiatives

One of GODAN's major advocacy activities is the production of material showcasing open data use cases. What is striking about these "success" or "impact stories" is their incredible diversity—open data, it seems, can bring benefits to virtually any endeavor. Some of the initiatives highlight *producers* of open data. These are, predictably, mostly government initiatives or public–private partnerships: the Rwandan government has opened up its digital land registry, for instance, and the European Space Agency's Copernicus satellite produces a widely used source of open agricultural data. Other profiled initiatives do not generate open data, but are rather *facilitators* of openness. These are primarily public or, sometimes, non-profit initiatives such as the FAO's International System for Agricultural Science and Technology (AGRIS), a repository of agricultural open datasets and open access publications. Finally, the majority of case studies profiled by GODAN are *users* of open data, encompassing a large range of types of initiatives and economic models. These include non-profit initiatives offering agricultural extension advice to farmers, such as the Dutch government-funded Scaling Up Micro-Insurance (SUM) program which uses open satellite data to develop index-based crop insurance for smallholder farmers in Mali and Uganda. They also include companies that create commercial products, such as the UK-based ag-data startup SMART Fertilizer Software, which uses open data to tailor fertilizer mixing recommendations.

The projects showcased by GODAN also have widely divergent political implications. Consider, for example, some of the short films from the "docuseries" commissioned by GODAN. One profiles farmOS, an open source farm management software produced by a non-profit, non-hierarchical innovation community that creates tools for alternative farmers (Bronson, 2019, 2022). The film captures this ethos: from the opening shots of a farmer cycling a homemade "pedal-powered tractor" to the emphasis on farmOS's ability to "democratize" data access by serving small and diversified operations at very low cost. Other films are quite different. One features AgSpace, a British precision agriculture company that uses open satellite data in its suite of management tools. The featured farm is a capital-intensive, conventional operation, and the technology is extolled for increasing yields by optimizing fertilizer applications. Beyond the use of open data for agriculture, these initiatives have almost nothing in common. They will create very different beneficiaries and promote very different types of agricultural systems. That they are classed together in this video series is a testament to GODAN's desire to present open data as ideologically neutral and universally beneficial. By showcasing initiatives that relate to open data in diverse ways (as input, output, throughput) with diverse motivations (governance, philanthropy, profit-making) and to different

agri-food ends (small-scale agroecological production vs input-intensive monoculture), GODAN signals that it views open data as an apolitical good.

GODAN's discourse

A close examination of GODAN texts, however, reveals an approach to agricultural development which is perhaps better understood as "anti-political" (Barry, 2002; Ferguson, 1990). Ferguson (1990: 270) deploys the concept of "anti-politics" to describe how development interventions tend to "squash political challenges to the system . . . by insistently reposing political questions of land, resources, jobs, or wages as technical 'problems' responsive to the technical 'development' intervention." In this vein, and consistent with the dominant neoliberal approach to development (Bentley et al., 2021), GODAN treats food system problems as governance or market challenges rather than social issues rooted in structural inequalities. A GODAN (2018b) brochure titled *Harnessing Open Data to Achieve Global Food Security* hints at this neoliberal approach in its opening definition of open data:

> Open data is data that anyone can access, use and share. It means using licenses that allow anyone to reuse the data for anything. Open data can help shape solutions by enabling more efficient and effective decision-making at multiple levels across the agricultural value chain. It can foster innovation via new services and applications, and drive organizational change through transparency.

This definition has an implicit ideological orientation. It appears to envision the "permissive" licenses favored by the open source software movement, rather than the free software movement's "copyleft" licenses. The rationale for openness, meanwhile, exhibits no trace of the anti-enclosure sentiment motivating the open source seed and open source farm machinery movements. Instead, we are presented with openness as a means to foster efficiency, innovation, and transparency—all watchwords of neoliberal "good governance."

GODAN publications suggest that good governance will be achieved, in part, through public sector improvement, including assisting, reforming, or even replacing government agencies as data are opened. An early report co-produced by GODAN titled *Data Revolution for Agriculture*, for instance, discusses the shortcomings of government data collection in the Global South at length (CTA et al., 2016: 5–7), and suggests that agricultural extension services will improve as they cease to be the purview of governments alone. In place of traditional "linear, top down" government extension services, open data allow for the emergence of "pluralistic, networked extension and rural advisory services" more suited to today's "market-oriented agriculture" (CTA et al., 2016: 17–18). Here, as in some other GODAN publications, underperforming government agencies provide an implicit foil to highlight the "transparency" and "accountability" that will be brought by open data. According to the same report, "Open access to reliable information allows citizens . . . to hold governments to account and to better participate in democratic processes." This framing suggests that governments, though generally well intentioned, will only do their job well if "held to account" by vigilant citizens.

In contrast, private sector actors appear throughout GODAN publications as a dynamic force for value-generating innovation. A report produced by GODAN and the

Open Data Institute (Carolan et al., 2015) titled *How Can We Improve Agriculture, Food and Nutrition with Open Data?* explains that

> As a raw material for creating tools, services, insights and applications, open data makes it inexpensive and easy to create new innovations . . . Open data provides SMEs [small and mid-sized enterprises], startups and other organisations with a level playing-field, exposing gaps in markets and helping them compete against established market players to deliver new products and services. It also benefits established companies, who learn from and react to innovation in their sector—they might invest in these new products and services being delivered, acquire new talent and adjust their own business practices. In the agricultural sector, large open datasets have stimulated business creation and provided farmers with advisory services that boost their productivity.

In short, while governments have often made ineffective use of their own data, private sector actors—irrespective of their size or market position—will, almost inevitably, make better use of these data resources. It is assumed that innovation is "easy" for them, and their actions will necessarily assist farmers.

These promised public and private sector benefits flow largely from open data's expected contributions to efficiency, a conceptual mainstay of neoliberal discourse (Birch and Siemiatycki, 2016). A 2016 compilation of open data use cases, titled *GODAN Success Stories Issue 1*, illustrates the myriad ways in which open data is expected to enhance efficiency. Of the 15 use cases profiled, "efficiency" is mentioned as a primary benefit in seven of them. Open data is touted, for instance, for its ability to "efficiently deliver relevant [agronomic] information" to South African farmers, provide "the most efficient way of trading" agricultural commodities in Ethiopia, improve "the efficiency of water used to grow strawberries, grapes and potatoes in the Western Nile delta," and facilitate the "efficient sharing and discovery of foodborne diseases information" globally, to name a few (Compton, 2016: 16, 12, 28, 26). Thanks to open data, agricultural inputs (e.g. fertilizer, water) and outputs (e.g. food) will be distributed more efficiently, as will financial resources, as open data facilitates informed decision-making by farmers, traders, development donors, and countless other economic actors.

Benefits are also expected to stem from increases in productivity. Early GODAN publications, in particular, reveal a "productivist" logic, which assumes that increased production is inherently socially desirable and broadly beneficial (Buttel, 1993). One, for instance, quotes the World Bank to assert that "increasing smallholder farmers' productivity and access to markets can have 'a profound impact on the livelihoods and general prosperity of literally millions of the world's poor'" (Carolan et al., 2015: 7). While such productivist thinking dominates mainstream approaches to digital agriculture (Bronson, 2022), it is thrown into doubt by actual histories of agrarian change (Cochrane, 1993), particularly in the Global South, where imported technological "advances" have often resulted in indebtedness and dispossession for the poorest farmers (Patel, 2013). Later GODAN publications have been more sensitive to this fact, acknowledging that

> there is no prior certainty that the poor will be able to benefit from commercially developed applications, indeed there is a significant risk that they will be further marginalized and disadvantaged as the last in line to benefit from the data revolution. (Maru et al., 2018)

GODAN hired data justice non-profit The Engine Room to write a report on *Responsible Data in Agriculture* that drew attention to the power inequalities within digital agricultural value chains (Ferris and Rahman, 2016), and by 2018, a GODAN status report admitted that ensuring a positive impact for farmers remained one of the key ongoing challenges faced by its partner organizations (GODAN, 2018a). Nonetheless, the idea that the benefits of open agricultural data will ultimately "trickle down" to farmers of all sizes—whether through increased yields, more transparent pricing, access to formal markets, or simply the improved food security attributed to greater productivity— remains a legitimizing cornerstone of the argument for opening up agricultural data.

This neoliberal orientation extends to the "antipoliticized data subjects" (Birchall, 2016: 6) GODAN envisions. GODAN publications frequently assert that farmers and rural communities will be "empowered" by open data. Empowerment, however, is generally understood in the limited sense of allowing for increased productivity and enhanced market decision-making, rather than other modes of empowerment, such as collective organizing for political change. Open data, according to GODAN, "empower[s] the poor with knowledge" (Maru et al., 2018: preface); by giving small farmers access to big data, it "empowers rural communities around the world to improve their lifestyles" (Compton, 2017: 4); and by helping educate rural women in Southeast Asia about nutrition, it "empowers them to improve the health of millions, village by village" (p. 18). Sometimes, farmers are listed as just one of the empowered parties, alongside others who one might reasonably expect them to need empowering *against*: "By making agricultural data accessible and unrestricted, we can help tackle food security issues by promoting innovation, empowering farmers, processors, traders and consumers" (GODAN, 2018b). It is unclear how open data can empower farmers while also empowering the—already comparatively powerful—traders, processors, and other agribusinesses who largely determine the prices farmers receive for crops and the costs they pay for inputs. Treating empowerment as a simple matter of delivering information not only ignores the complex political-economic causes of agri-food system problems, it simultaneously devalues the extensive traditional and experiential knowledge already held by farmers (Fairbairn and Kish, 2022). It is an anti-political form of empowerment that contrasts greatly with the collectivist, justice-oriented forms of empowerment envisioned by the open source seed and machinery movements (Carolan, 2017).

Overall, GODAN publications reveal an anti-political, trickle-down vision of open data primarily as a means to increase productivity and profits within the existing food system, rather than as a means to significantly alter the power relations that structure that system.

Open data for agricultural development: elements of data colonialism

The 2017 African Open Data Conference took place in the cavernous Accra International Conference Center in Ghana's capital. Hundreds of participants traveled from across the continent and beyond, and VIP delegates included the president of Ghana, Nana Akufo-Addo. They encountered a vibrant event, including an exhibit hall packed with the presentation booths of myriad public and private sector organizations and mainstage

speakers punctuated by traditional Ghanaian drumming and other live music. Keynote addresses and panels argued that open data should become a cornerstone of development in all sectors, with one NGO representative declaring "when you hold data back, you hold development back." The conference included an agricultural development track prominently featuring GODAN members alongside representatives from the FAO, African agriculture ministries, agribusinesses, ag tech startups, and agricultural research centers. However, one group was barely evident: African farmers. In fact, farmers, and other purported beneficiaries of agricultural open data, were strikingly absent from all of the conferences and workshops we attended, including the GODAN 2016 summit, where we spent two days fruitlessly searching for one Kenyan farmer we were told was in attendance.

We have so far argued that the dominant model of open data for agriculture embodies a *neoliberal* politics in which the problems of poverty and hunger are depoliticized and their solutions privatized and individualized. The application of open data in the context of international agricultural development, however, also raises concerns about its *neocolonial* dimensions. Even as the official discourse of open data for agriculture touts the potential for farmer empowerment, our interviews with agricultural development actors highlight that, in practice, open data often appears as a set of imported, top-down policies and technologies. This approach, we argue, threatens to reproduce North—South power imbalances by enacting structures of "data colonialism" (Couldry and Mejias, 2023; Thatcher et al., 2016). We focus particularly on two dynamics of open data for agriculture that fit the mold of data colonialism: the frequent prioritization of data extraction over farmer data rights, and the universalizing pursuit of data interoperability.

Data extractivism

The push for open data, whether applied to opening up existing datasets or collecting data with the intent to share it, raises profound questions around data extraction, rights, and control (Borgesius et al., 2015). During the period of our fieldwork from 2016 through 2018, however, we found that these concerns were frequently sidelined in pursuit of openness and the value it would presumably produce. For Thatcher et al. (2016: 991), data colonialism is rooted in the "asymmetrical extraction of value" in which relatively powerful actors extract data from those with less power, and in the process, "previously private times and places are commodified and privatized as a new terrain for capital investment and exchange" (Thatcher et al., 2016: 991). In line with this description, we observed a widespread presumption that the value of farmer data as a resource for agricultural development ultimately trumped concerns about the power relations structuring extraction. To the extent that asymmetrical power relations were acknowledged by our interviewees, the focus was generally limited to seeking greater privacy protections for individual farmers, rather than grappling with the collective risks and harms that could stem from pervasive data collection and sharing.

For some, addressing farmer data rights even through the relatively narrow lens of individual privacy constituted an unreasonable obstacle to improving the lives of smallholder farmers. One interviewee, for instance, noted that governments sometimes deploy privacy as an "excuse" to avoid opening up their data. Several others discussed data

privacy as a low priority in cases where food security is in danger, evoking the kind of "emergency imaginary" (Calhoun, 2004) that is often instrumentalized to justify (neo) colonial data extraction (Crawford and Finn, 2015; Madianou, 2019). An executive at a US ag-data startup that combines open government data and user-supplied data to provide free information services to smallholder farmers was blunt on the subject during a 2017 interview. Explaining that her company can only offer smallholders free access to their platform because they sell their data to third-party clients, she said, "the thing will not work if we protect the guy's privacy, essentially . . . So yes, [it] sucks. But there you have it." Her company's primary client at the time was a major international seed-chemical company that needed more granular data to improve their ability to target smallholders for input sales. Addressing only the individual-level risks that might come from such a business model, she pointed out the popularity of companies such as Facebook and Amazon, despite their intensive collection of user data, concluding,

> Privacy is such a naughty thing and you as a sociologist can write about it and it'll be lovely. But from my perspective, I would much rather make them [farmers] more money, give them more control, give them more options, connect them to better offtake contracts, and better input options than to protect their privacy.

Although she put a finer point on it than most of our interview participants, it was clear that many shared her perspective that prioritizing even the basic minimum of individual farmer data rights could threaten the viability of both private business models and non-profit development projects.

Many of our interview participants did consider farmer data rights important but were not yet actively working to protect them. As a representative of one prominent funding organization explained when asked about data privacy in 2018, "I think that the biggest concern is that people kind of know it's a problem, but there are no practices in place for anybody at this stage." Her foundation, which helped develop and promote open data platforms for farmers, dealt with this issue by trusting their implementing partners to ensure their own privacy safeguards. The foundation did not, however, independently verify if any such policies or practices were in place. Other interview participants deferred a more thorough reckoning with farmer data rights to an indefinite future, with several mentioning that they intended to add a data ethics specialist later, once projects were already planned and underway.

The tendency to treat data rights as an afterthought was by no means universal, and occasionally caused friction among development practitioners. This issue came to a head at a 2018 workshop held by a major development funding organization where participants, who consisted primarily of development practitioners and researchers (farmers were again notably absent), took part in activities intended to envision how farmer data could be more effectively used across the value chain. A handful of workshop participants, however, interrupted the discussion to redirect it toward data rights, insisting that they had to be central from the beginning. Workshop organizers responded that data rights were not the focus of the event and would be addressed at a later date. However, this tension continued to simmer throughout the workshop, with the lead facilitator forced to issue repeated reminders that participants should focus on developing a "blue

sky" wish list for farmer data rather than getting distracted by the "practical or ethical considerations" involved.

Since we began our research in 2016, funders and development organizations have increased attention to data rights. This has been particularly true since 2018, which saw both the Cambridge Analytica-Facebook scandal and the implementation of the European General Data Protection Regulation. The need for improved data rights and protections is now routinely cited in high-profile development reports, including USAID's Digital Strategy 2020–2024 and the US Government Global Food Security Strategy for 2022–2026, and has led to the development of several voluntary agricultural data codes of conduct, including the American Farm Bureau's *Privacy and Security Principles for Farm Data* and New Zealand's *Farm Data Code of Practice*. GODAN, too, increasingly acknowledges that data sharing may pose risks to farmers (see, for example, Maru et al., 2018), an issue it sought to address in 2020 by launching an online "Code of Conduct Toolkit," which allowed entities to create their own voluntary code of conduct for responsible handling of farmer data.[2]

Like other voluntary guidelines, however, open data principles and codes have major limitations as a form of agri-food system governance (Clapp, 2017). Indeed, a 2019 GODAN-sponsored review of these codes found that they prioritized the interests of agribusinesses and ag tech companies over those of farmers and farmer organizations, especially smallholders (Wiseman et al., 2019). Such codes also tend to rely heavily on obtaining farmer consent for data collection and sharing, an approach called into question by some interviewees who work closely with farmers. One digital development entrepreneur explained some limits of informed consent in practice:

> How do I explain to that farmer the concept of depersonalization? How do I explain anonymization? How do I explain that their data is put into the cloud with others' and then shared with researchers? How do I explain to him the concept behind data aggregation analysis, data privacy, data security, all in the context of the two, maybe three, minutes I have talking with him before he loses interest and goes back to plowing his field?

This entrepreneur's critique suggests that data rights issues associated with open data cannot be easily accommodated in practice with individualistic, purely procedural solutions, particularly where digital literacy is limited. Such consent protocols, like other common code of conduct provisions (Wiseman et al., 2019), generally modify open data practices only in limited ways that remain consistent with the neoliberal framing of transparency, voluntary self-regulation, and individualistic data ethics. They may therefore simply serve to legitimate and enable existing organizational agendas by winning farmer trust for data sharing, while neglecting the collective risks that come from further concentrating data in the hands of agribusinesses and development institutions based in the Global North.

Data universalism

Another significant tension between the promise and practice of open data for agricultural development arises with the creation of universal ontologies and the pursuit of

interoperability more broadly. In information science, "ontologies" refers to the semantic systems of standardized names, categories, and relationships between concepts within disciplinary knowledge domains. Proponents of open agri-food data frequently argue that data interoperability is an urgent priority for food security and agricultural development in the Global South. They assert that better data integration would improve operational efficiency, reduce duplication of labor within the development sector, and yield novel research insights. Speaking at a 2019 San Francisco conference focused on agri-food ontologies, one biologist described ontologies as "force amplifiers for data," while another agricultural researcher claimed that the "semantic web of food" could solve the food system's greatest challenges. However, our research also suggests that agricultural ontologies may entrench uneven power relations within global agricultural development by decontextualizing agricultural knowledge and universalizing Northern modes of knowledge production (Milan and Treré, 2019). As Dutta et al. (2021) observe, "life experiences and knowledge claims at the global margins are not legible to the universalizing frameworks of whiteness" (p. 812) that structure most open data systems and fuel accumulation through data extraction.

Shared ontologies are deemed essential to the usability of open agri-food data because agricultural terms can have very different meanings in different contexts. As the chief technical officer of an ag-tech startup explained to us, in the United Kingdom, a cow shed "literally that is a shed," whereas in New Zealand it refers to a "milking parlor," a difference in meaning great enough to produce data incompatibilities even between these two English-speaking countries with a shared colonial history. Agricultural ontologies seek to solve such incompatibilities by establishing a shared vocabulary across different datasets, permitting easier aggregation, comparison, and analysis while ensuring that data are machine readable and interoperable across platforms (Baker et al., 2019). There are a few widely accepted agri-food ontologies already in existence, and many more under development (Arnaud et al., 2020; Jebaraj and Sathiaseelan, 2017). Some ontologies map crop-specific breeding traits, such as the Oat Ontology developed by the public–private research partnership Oat Global at the University of Minnesota; some are geographically anchored, such as the nationally oriented ontologies developed by the Agriculture Ontology Service Research Group in the Chinese Academy of Agriculture Sciences; while others catalog agronomic practices and techniques, such as CGIAR's Agronomy Ontology (AgrO). As ontologies proliferate, several international organizations have undertaken to integrate diverse conceptual vocabularies into larger semantic systems, most notably CABI's CAB Thesaurus, the USDA's National Agricultural Library (NAL) Thesaurus, and the FAO's AGROVOC. As the number and specialization of agricultural ontologies grows, GODAN has positioned itself as a knowledge coordinator by supporting the creation of the VEST AgroPortal, which functions as a library of openly available ontologies relevant to agricultural knowledge domains.

In order to be incorporated into this emergent semantic infrastructure, data must be abstracted from the agricultural contexts in which it was collected. Ontologies are celebrated, in the words of one speaker at the 2019 agri-food ontologies conference, for their ability to model reality with "mathematical, logical precision." Yet, the pursuit of such precision inevitably requires some flattening of difference across contexts to achieve commensurability and machine readability. A researcher we spoke with who co-founded

a major agricultural big data initiative gave the example of two linked datasets about the same village: "it's in one village with the same name, but in reality, the data were collected from two opposite sides of the village." On these two sides, he continued, "you could have very different soil and livelihood[s] and even microclimate," but these differences are often lost in favor of importing the data into interoperable formats in which "village" is the functional geographic unit. Local names for soils, crops, or insects, which are rooted in the day-to-day lived experience of farmers and steeped in cultural associations, must also, almost by definition, lose some of their meaning as they become incorporated into ontologies (if they are incorporated at all).

In addition, combining disparate datasets through shared ontologies tends to erase the conditions of data collection. The same big data researcher explained that it is very hard to understand the meaning of data without understanding the context in which it was collected, which presents challenges for the universalized ontological relationships meant to render data commensurable:

> So you have . . . two different datasets and a similar column heading for the same location and you attempt to just link them together *[laughs]* and see what kinds of new correlation you can find, or new insight you can find, but in reality things are much more complicated, especially for smallholder farmers. You know, how they are selected in the program, how they answer the question . . . when the question was even asked. All those things are so complex and it's very difficult to know everything if you are not really familiar with all these data's background story.

The ability to integrate multiple open datasets can lead to new, more scalable analytical capacities, but bigger is not necessarily better. To illustrate this point, the researcher described a public "datathon" event in which his organization linked multiple separate datasets and invited university students and NGO experts to analyze them for new insights. One participant found an unexpected correlation between women's confidence in public speaking and children's nutritional outcomes. This finding surprised and excited other attendees but ultimately crumbled under greater scrutiny. This was the day, the researcher wryly commented, that he learned the meaning of the term "p-hacking" and found that "it actually was exactly what we were doing." Open data, in short, can contribute to the kind of quantitative, generalizable, and "objective" knowledge claims favored by Northern researchers and industry, but it also shares the shortcomings of this epistemological approach (Dutta et al., 2021).

The standardization of terminology implicit in ontology construction also tends to reflect the needs and values of particular development sector and market actors. Another speaker at the San Francisco agri-food ontology conference, a researcher at an international agricultural development center, explained that the breeders she works with develop crop varieties with a focus on specific qualities such as drought resistance. She explained that farmers might look for quite different qualities, such as vegetable skins that are easier to peel or the color of the crop, but these will not necessarily be included in agricultural ontologies because farmers are rarely involved in their creation. Meanwhile, one development data analyst we interviewed, who was creating an open data repository for agricultural projects in Asia, explained that, in practice, organizational expediency also plays a role in the creation of these semantic systems. While

program officers at times added local agricultural terms to AGROVOC in an effort to better reflect variable meanings, she explained that project personnel "often don't know where to start" with "namings and languages," and most often "you just pick a word that you like best as kind of a staff member in charge of that survey, or the one that you used before." As primarily top-down projects created by data scientists in the Global North, agricultural ontologies risk consolidating the data universalism characteristic of many international development efforts (Abebe et al., 2021; Couldry and Mejias, 2019; Madianou, 2019; Milan and Treré, 2019) by extrapolating data from their local contexts, standardizing them across geographical and temporal spans, and restructuring them for consumption by international experts, governments, and businesses.

That such decontextualized and top–down ontology construction is frequently the norm reflects the fact that farmers are rarely the anticipated users of this information infrastructure. It is presumed that farmers will benefit from open data, but generally through indirect mechanisms, such as improved extension advice or incorporation into thriving agricultural value chains (a questionable assumption as discussed above)—*not* through direct data access. The data analyst working on the Asian agricultural data repository, for instance, explained that her organization did not yet have a model for enacting data sharing with their local partner organizations. When asked whether local citizens, particularly farmers, were likely to access and use the new open data systems, she replied that although her organization's platforms had mechanisms for public access and interaction, "the truth is that doesn't happen very often." The ag tech CTO concurred when we asked him about the extent to which his firm consulted with farmers about the data categories, relationships, and hierarchies they need. "I do not know how interested farmers are in the whole technicalities of this," he responded. "They are kind of pretty busy with what they are doing on the ground—we are trying to provide the information services, but farmers tend to be very farm-centric." The marginalization of farmers as data users within the projects discussed by our interviewees raises doubts about open agricultural data's potential to contribute to an expansion of a knowledge commons that is both accessible and useful for stakeholders beyond trained professionals in the development community and the agricultural industry (cf. Fraser, 2019).

Underlying these tensions between the promise and practice of semantic systems for open data is the distribution of power within the development sector. Power is vested in the predominantly Northern data scientists and development practitioners who design universalizing ontologies, as they schematize what counts as reality and standardize the hierarchies and relationships that render data legible and interoperable (Iliadis, 2018). The "semantic web of food," as it is currently being constructed, may therefore end up codifying the knowledge and values of the socially and economically powerful, and disciplining marginalized groups into conforming with those values (Johnson, 2014). In the process, it risks further entrenching the structural inequalities endemic to development work and its adherence to increasingly abstract digital rationalities descended from colonialism (Greenwood, 2020; Ricaurte, 2019).

Conclusion

Openness is capacious and easily adapted to serve divergent interests. It can be a powerful tool to defend or expand the data commons against encroaching proprietary claims; it can also facilitate enclosure for private accumulation. This tension is particularly pronounced

within decolonized contexts, where open data carries the weight of developmental promises but also the potential to exacerbate existing North–South inequalities. In the agricultural domain, open models have been taken up by farmers, plant breeders, and engineers as a means to pursue food sovereignty—reasserting farmer autonomy, protecting common resources, and advocating democratic control. We have argued that the current drive for open agri-food data has quite a different ideological bent. GODAN propagates an anti-political neoliberal vision for how open data can enhance agricultural development, which centers values such as good governance, private sector innovation, efficiency, and individual empowerment rather than redistributive or collaborative approaches to expanding collective benefit. These projects are, furthermore, frequently being rolled out in a context shaped by dynamics of data colonialism, in which development institutions and agribusinesses intensify data extraction while embedding their own values within universalizing information infrastructures.

And yet, the possibilities of open data for agriculture are not predetermined by these neoliberal and neocolonial tendencies. The contingent nature of openness means that open agricultural data could be deployed—and in some cases, is already being deployed (Bronson, 2022)—in ways that would make it a force for food system transformation rather than just a means to achieve a more efficient version of the status quo. Such open data initiatives would arise from and actively center the experiences and needs of peasant farmers, farmworkers, Indigenous peoples, and other "data subjects," giving them the space and resources to decide how open data might serve them (Bronson, 2019), or to reject it altogether. Such initiatives would also be reflexive about the development models underpinning their work, likely eschewing the dominant neoliberal approach for an alternative model, such as those rooted in human rights and capabilities (Heeks and Renken, 2018; Taylor, 2017), participatory governance, or commoning (Bentley et al., 2021). Following Indigenous approaches to data sovereignty, such initiatives would challenge the primacy of individualized, Western notions of data ownership and privacy, opening opportunities for collective control of and benefits from data (Snipp, 2016; Walter and Suina, 2019). They would embrace "information pluralism," allowing diverse knowledges and value-systems to coexist, rather than seeking to flatten and subsume them in pursuit of data universalism (Johnson, 2014: 270). The precise shape these practices take should emerge from local needs and leadership, but could include for example, visioning exercises aimed at proactively anticipating possible negative outcomes of data sharing (Eastwood et al., 2019), providing farmers with material and social support that enables them to play a meaningful role in technology design (Gamage et al., 2020), and the creation of farmer-centered ontologies rooted in local culture and ecology (Walisadeera et al., 2015).

Ultimately, the value of open data to agri-food development must be demonstrated rather than assumed. Despite open data's potential utility for public good under specific conditions, the development sector's rush to uncritically embrace it for agricultural development initiatives risks reinforcing existing power imbalances in local and global food economies. If open data is to play a role in envisioning more egalitarian, democratic, and liberatory agri-food futures, it will have to be embedded in a development praxis that prioritizes data justice (Heeks and Renken, 2018; Johnson, 2014; Taylor, 2017) and data sovereignty (Snipp, 2016; Walter and Suina, 2019). It may also be that

small farmers in the Global South are better served by such long-standing "Southern practices of Openness" as seed sharing and farmer knowledge exchange, than by the hegemonic form of openness that is open data (Dutta et al., 2021). While this article has explored open agri-food data as it is understood by development industry actors, it is critical that future research explore how farmers—and other intended beneficiaries— actually experience diverse open data initiatives.

ORCID iD

Madeleine Fairbairn ![iD] https://orcid.org/0000-0003-0168-4179

Notes

1. The video is available online (GODAN Secretariat, 2016).
2. The Code of Conduct Toolkit—though still referenced on the GODAN website—seems to no longer be operational as of manuscript revisions in October 2022.

References

Abebe R, Aruleba K, Birhane A, et al. (2021) Narratives and counternarratives on data sharing in Africa. In: *Proceedings of the 2021 ACM conference on fairness, accountability, and transparency*, Virtual Event Canada, 3 March, pp. 329–341. ACM. DOI: 10.1145/3442188.3445897.

Arnaud E, Laporte M-A, Kim S, et al. (2020) The ontologies community of practice: a CGIAR initiative for big data in agrifood systems. *Patterns* 1(7): 100105.

Baack S (2015) Datafication and empowerment: how the open data movement re-articulates notions of democracy, participation, and journalism. *Big Data & Society* 2(2): 205395171559463.

Baker T, Whitehead B, Musker R, et al. (2019) Global agricultural concept space: lightweight semantics for pragmatic interoperability. *Npj Science of Food* 3(1): 16.

Barns S (2016) Mine your data: open data, digital strategies and entrepreneurial governance by code. *Urban Geography* 37(4): 554–571.

Barry A (2002) The anti-political economy. *Economy and Society* 31(2): 268–284.

Bates J (2014) The strategic importance of information policy for the contemporary neoliberal state: the case of Open Government Data in the United Kingdom. *Government Information Quarterly* 31(3): 388–395.

Bello O, Akinwande V, Jolayemi O, et al. (2016) Open data portals in Africa: an analysis of open government data initiatives. *African Journal of Library Archives and Information Science* 26(2): 97–106.

Benjamin S, Bhuvaneswari R and Rajan P (2007) Bhoomi: "E-governance" or an anti-politics machine necessary to globalize Bangalore? CASUM-m working paper. Available at: https://casumm.files.wordpress.com/2008/09/bhoomi-e-governance.pdf

Bentley C, Chib A and Smith M (2021) Openness in international development. In: Chib A, Bentley C and Smith M (eds) *Critical Perspectives on Open Development: Empirical Interrogation of Theory Construction*. Cambridge, MA: MIT Press, pp. 1–24.

Birch K and Siemiatycki M (2016) Neoliberalism and the geographies of marketization: the entangling of state and markets. *Progress in Human Geography* 40(2): 177–198.

Birchall C (2015) "Data.gov-in-a-box": delimiting transparency. *European Journal of Social Theory* 18(2): 185–202.

Birchall C (2016) Shareveillance: subjectivity between open and closed data. *Big Data & Society* 3(2): 205395171666396.

Borgesius FZ, Gray J and Van Eechoud M (2015) Open data, privacy, and fair information principles: towards a balancing framework. *Berkeley Technology Law Journal* 30(3): 2073–2131.

Bronson K (2019) Looking through a responsible innovation lens at uneven engagements with digital farming. *NJAS—Wageningen Journal of Life Sciences* 90–91: 100294.

Bronson K (2022) *The Immaculate Conception of Data: Agribusiness, Activists, and Their Shared Politics of the Future*. Montreal, QC, Canada: McGill-Queen's University Press.

Buttel F (1993) Ideology and agricultural technology in the late twentieth century: biotechnology as symbol and substance. *Agriculture and Human Values* 10: 5–15.

Calhoun C (2004) A world of emergencies: fear, intervention, and the limits of cosmopolitan order. *Canadian Review of Sociology/Revue Canadienne de Sociologie* 41(4): 373–395.

Campbell LM, Corson C, Gray NJ, et al. (2014) Studying global environmental meetings to understand global environmental governance: collaborative event ethnography at the tenth conference of the parties to the convention on biological diversity. *Global Environmental Politics* 14(3): 1–20.

Carbonell IM (2016) The ethics of big data in big agriculture. *Internet Policy Review* 5(1): 1–13.

Carolan L, Smith F, Protonotarios V, et al. (2015) *How Can We Improve Agriculture, Food and Nutrition with Open Data?* Oxford and London: GODAN and ODI. Available at: https://the-odi.org/wp-content/uploads/2015/05/How-can-we-improve-agriculture-food-and-nutrition-with-open-data.pdf

Carolan M (2017) Agro-digital governance and life itself: food politics at the intersection of code and affect. *Sociologia Ruralis* 57: 816–835.

Carolan M (2018) "Smart" farming techniques as political ontology: access, sovereignty and the performance of neoliberal and not-so-neoliberal worlds. *Sociologia Ruralis* 58(4): 745–764.

Charmaz K (2014) *Constructing Grounded Theory* (Introducing Qualitative Methods). 2nd ed. London; Thousand Oaks, CA: SAGE.

Clapp J (2017) Responsibility to the rescue? Governing private financial investment in global agriculture. *Agriculture and Human Values* 34(1): 223–235.

Clark L, Higdon GL, Roberts T, et al. (2020) *Performance Evaluation of the Global Open Data for Agriculture and Nutrition Programme*. Brighton: Institute of Development Studies. Available at: https://iati.fcdo.gov.uk/iati_documents/56313536.pdf

Cochrane W (1993) *The Development of American Agriculture: A Historical Analysis*. 2nd ed. Minneapolis, MN: University of Minnesota Press.

Coleman EG (2013) *Coding Freedom: The Ethics and Aesthetics of Hacking*. Princeton, NJ: Princeton University Press.

Compton S (2016) *GODAN Success Stories—Issue 1*. Oxford: GODAN. Available at: https://godan.info/v1.pdf

Compton S (2017) *GODAN Success Stories—Issue 2*. Oxford: GODAN. Available at: https://godan.info/v2.pdf

Couldry N and Mejias UA (2019) Data colonialism: rethinking big data's relation to the contemporary subject. *Television & New Media* 20(4): 336–349.

Couldry N and Mejias UA (2023) The decolonial turn in data and technology research: what is at stake and where is it heading? *Information, Communication & Society* 26: 786–802.

Crawford K and Finn M (2015) The limits of crisis data: analytical and ethical challenges of using social and mobile data to understand disasters. *GeoJournal* 80(4): 491–502.

CTA, GODAN, and PAFO (2016) *Data Revolution for Agriculture*. Wageningen: CTA. Available at: https://brusselsbriefings.files.wordpress.com/2015/03/1937_pdf.pdf

Dutta M, Ramasubramanian S, Barrett M, et al. (2021) Decolonizing open science: southern interventions. *Journal of Communication* 71: 803–826.

Eastwood C, Klerkx L, Ayre M, et al. (2019) Managing socio-ethical challenges in the development of smart farming: from a fragmented to a comprehensive approach for responsible research and innovation. *Journal of Agricultural and Environmental Ethics* 32: 741–768.

Fairbairn M and Kish Z (2022) "A poverty of data"? Exporting the digital revolution to farmers in the Global South. In: Goldstein J and Nost E (eds) *The Nature of Data: Infrastructures, Environments, Politics*. Lincoln, NE: University of Nebraska Press, pp. 211–229.

Fairbairn M, Kish Z and Guthman J (2022) Pitching agri-food tech: performativity and non-disruptive disruption in Silicon Valley. *Journal of Cultural Economy* 15: 652–670.

Fairclough N (2012) Critical discourse analysis. In: Gee JP and Handford M (eds) *The Routledge Handbook of Discourse Analysis*. Oxon: Routledge, pp. 9–20.

Ferguson J (1990) *The Anti-Politics Machine: "Development," Depoliticization, and Bureaucratic Power in Lesotho*. Cambridge: Cambridge University Press.

Ferris L and Rahman Z (2016) *Responsible Data in Agriculture*. Oxford: GODAN. Available at: https://www.godan.info/rr1.pdf

Fraser A (2019) Land grab/data grab: precision agriculture and its new horizons. *The Journal of Peasant Studies* 46(5): 893–912.

Fraser A (2022) "You can't eat data"? Moving beyond the misconfigured innovations of smart farming. *Journal of Rural Studies* 91: 200–207.

Free Software Foundation (1996) What is free software? Available at: https://www.gnu.org/philosophy/free-sw.en.html (accessed 14 March 2022).

Gamage P, Rajapakse C and Galpaya H (2020) What makes an agriculture initiative open? Reflections on sharing agriculture information, writing rights, and divergent outcomes. In: Chib A, Bentley C and Smith M (eds) *Critical Perspectives on Open Development: Empirical Interrogation of Theory Construction*. Cambridge, MA: MIT Press, pp. 227–234.

GODAN (n.d.) Mission. Available at: https://www.godan.info/mission

GODAN (2018a) *GODAN'S Impact 2014 to 2018: Improving Agriculture, Food and Nutrition with Open Data*. Oxford: GODAN. Available at: https://f1000research.com/documents/7-1328

GODAN (2018b) *Harnessing Open Data to Achieve Global Food Security*. Oxford: GODAN. Available at: https://www.godan.info/rr8.pdf

GODAN Secretariat (2016). GODAN PSA: one solution for zero hunger. Available at: https://www.youtube.com/watch?v=ZNKkMCsQwcI (accessed 14 March 2022).

GODAN Steering Committee (2020) GODAN steering committee meeting minutes, October 22, 2020. Available at: https://www.godan.info/governance

Goodman D, Sorj B and Wilkinson J (1987) *From Farming to Biotechnology: A Theory of Agro-Industrial Development*. Oxford: Basil Blackwell.

Gray J (forthcoming) *Data Worlds: The Politics of Open and Public Data in the Digital Age*. Cambridge, MA: MIT Press.

Greenwood F (2020) Data colonialism, surveillance capitalism and drones. In: Specht D (ed.) *Mapping Crisis: Participation, Datafication and Humanitarianism in the Age of Digital Mapping*. University of London Press, pp. 89–118. Available at: http://www.jstor.org/stable/j.ctv14rms6g.12 (accessed 23 February 2022).

Gurstein MB (2011) Open data: empowering the empowered or effective data use for everyone? *First Monday*, 23 January.

Heeks R and Renken J (2018) Data justice for development: what would it mean? *Information Development* 34(1): 90–102.

Hegarty B (2015) Attributes of open pedagogy: a model for using open educational resources. *Educational Technology* 55: 3–13.

Howard PH (2016) *Concentration and Power in the Food System: Who Controls What We Eat?* (Vol. 3: Contemporary Food Studies: Economy, Culture and Politics). New York: Bloomsbury Academic.

Iliadis A (2018) Algorithms, ontology, and social progress. *Global Media and Communication* 14(2): 219–230.

Janssen M, Charalabidis Y and Zuiderwijk A (2012) Benefits, adoption barriers and myths of open data and open government. *Information Systems Management* 29(4): 258–268.

Jebaraj J and Sathiaseelan J (2017) An exploratory study on agriculture ontology: a global perspective. *International Journal of Advanced Research in Computer Science and Software Engineering* 7(6): 202–206.

Johnson JA (2014) From open data to information justice. *Ethics and Information Technology* 16(4): 263–274.

Kelty CM (2008) *Two Bits: The Cultural Significance of Free Software* (Experimental Futures). Durham, NC: Duke University Press.

Kitchin R (2014) *The Data Revolution: Big Data, Open Data, Data Infrastructures & Their Consequences*. London: SAGE.

Klerkx L, Jakku E and Labarthe P (2019) A review of social science on digital agriculture, smart farming and agriculture 4.0: new contributions and a future research agenda. *NJAS—Wageningen Journal of Life Sciences* 90–91: 100315.

Kloppenburg J (2014) Re-purposing the master's tools: the open source seed initiative and the struggle for seed sovereignty. *The Journal of Peasant Studies* 41(6): 1225–1246.

McGill University (2019) GODAN moves headquarters to Montreal, Canada. Available at: https://www.mcgill.ca/macdonald/channels/news/godan-moves-headquarters-montreal-canada-300941 (accessed 19 December 2022).

Madianou M (2019) Technocolonialism: digital innovation and data practices in the humanitarian response to refugee crises. *Social Media + Society* 5(3): 205630511986314.

Mann L (2018) Left to other peoples' devices? A political economy perspective on the big data revolution in development. *Development and Change* 49(1): 3–36.

Maru A, Berne D, Beer J, et al. (2018) Digital and data-driven agriculture: harnessing the power of data for smallholders. Report, GFAR, GODAN, CTA, Rome.

Milan S and Treré E (2019) Big data from the south(s): beyond data universalism. *Television & New Media* 20(4): 319–335.

Mirowski P (2018) The future(s) of open science. *Social Studies of Science* 48(2): 171–203.

Montenegro de and Wit M (2019) Beating the bounds: how does "open source" become a seed commons? *The Journal of Peasant Studies* 46(1): 44–79.

Morozov E (2013) *To Save Everything, Click Here: The Folly of Technological Solutionism*. 1st ed. New York: PublicAffairs.

Nally D (2016) Against food security: on forms of care and fields of violence. *Global Society* 30(4): 558–582.

Open Knowledge Foundation (2022) The open definition. Available at: https://opendefinition.org/ (accessed 14 March 2022).

Open Source Initiative (2018) History of the OSI. Available at: https://opensource.org/history (accessed 14 March 2022).

Patel R (2013) The long green revolution. *Journal of Peasant Studies* 40(1): 1–63.

Pomerantz J and Peek R (2016) Fifty shades of open. *First Monday*, 12 April.

Ricaurte P (2019) Data epistemologies, the coloniality of power, and resistance. *Television & New Media* 20(4): 350–365.

Rotz S, Duncan E, Small M, et al. (2019) The politics of digital agricultural technologies: a preliminary review. *Sociologia Ruralis* 59(2): 203–229.

Schaap B, Musker R, Parr M, et al. (2019) Agriculture. In: Davies T, Walker S, Rubinstein M, et al. (eds) *The State of Open Data: Histories and Horizons*. Cape Town, South Africa; Ottawa, ON, Canada: African Minds and International Development Research Centre, pp. 35–50.

Schöpfel J (2018) The paradox of success. In: Ulrich H and Schöpfel J (eds) *Open Divide: Critical Studies on Open Access*. Sacramento, CA: Litwin Books, pp. 57–68.

Schrock AR (2016) Civic hacking as data activism and advocacy: a history from publicity to open government data. *New Media & Society* 18(4): 581–599.

Segura MS and Waisbord S (2019) Between data capitalism and data citizenship. *Television & New Media* 20(4): 412–419.

Smith M and Seward R (2020) Introduction: governing openness in an unequal world. In: Smith M and Seward R (eds) *Making Open Development Inclusive*. Cambridge, MA: MIT Press, pp. 1–19.

Snipp CM (2016) What does data sovereignty imply: what does it look like? In: Kukutai T and Taylor J (eds) *Indigenous Data Sovereignty: Toward an Agenda*. Canberra, ACT, Canada: Australian National University Press, pp. 39–55.

Suber P (2012) *Open Access* (MIT Press Essential Knowledge Series). Cambridge, MA: MIT Press.

Taylor L (2016) No place to hide? The ethics and analytics of tracking mobility using mobile phone data. *Environment and Planning D: Society and Space* 34(2): 319–336.

Taylor L (2017) What is data justice? The case for connecting digital rights and freedoms globally. *Big Data & Society* 4(2): 205395171773633.

Thatcher J, O'Sullivan D and Mahmoudi D (2016) Data colonialism through accumulation by dispossession: new metaphors for daily data. *Environment and Planning D: Society and Space* 34(6): 990–1006.

Tkacz N (2015) *Wikipedia and the Politics of Openness*. Chicago, IL; London: University of Chicago Press.

Walisadeera AI, Ginige A and Wikramanayake GN (2015) User centered ontology for Sri Lankan farmers. *Ecological Informatics* 26: 140–150.

Walter M and Suina M (2019) Indigenous data, indigenous methodologies and indigenous data sovereignty. *International Journal of Social Research Methodology* 22(3): 233–243.

Wiseman L, Pesce V, Zampati F, et al. (2019) *Review of Codes of Conduct, Voluntary Guidelines and Principles Relevant for Farm Data Sharing*. Wageningen: Technical Centre for Agricultural and Rural Cooperation (CTA).

Wolf SA and Wood SD (1997) Precision farming: environmental legitimation, commodification of information, and industrial coordination. *Rural Sociology* 62(2): 180–206.

Wolfert S, Ge L, Verdouw C, et al. (2017) Big data in smart farming—a review. *Agricultural Systems* 153: 69–80.

Author biographies

Madeleine Fairbairn is a sociologist and Associate Professor in the Environmental Studies Department at the University of California, Santa Cruz. She studies the political economy of agriculture, including the financial sector's growing interest in farmland and, more recently, the Silicon Valley agri-food tech sector. Her first book, Fields of Gold: Financing the Global Land Rush was published in 2020 by Cornell University Press.

Zenia Kish is Assistant Professor of Media Studies at the University of Tulsa. Her work examines the intersections of finance, agriculture, and digital media. She is co-editor of the anthology Food Instagram: Identity, Influence, and Negotiation (University of Illinois Press 2022).