

Mossavar-Rahmani Center for Business and Government
Harvard Kennedy School
Senior Fellows Program, First Research Meeting

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Paper 2

Title: Agricultural Technologies, Businesses and Human Rights: An Emerging Conundrum

Keywords: Agricultural technologies; Agricultural IoTs; Agricultural drones; Farm robotics; Novel farming systems; Food technologies; Global food systems; Agricultural innovations systems.

1. Introduction

The nexus of technology, business and human rights is the focus of my project. This project explores the implications of innovation and disruptive technologies in the food and agricultural sector for human rights including the right to food. Specifically, the project seeks to apply the business and human rights framework to the emerging AgTech sector. The United Nations Guiding Principles on Business and Human rights (UNGPs) provide a useful framework for analyzing and, perhaps, addressing the human rights issues in the AgTech sector. Drawing on food systems theory as well as theories of fragmentation, regime complexes and polycentricism, I examine the implications of the emergent sector for global food systems governance. A food systems approach “is not confined to one single sector, sub-system (e.g. value chain, market) or discipline, and thus broadens the framing and analysis of a particular issue as the result of an intricate web of interlinked activities and feedbacks.”¹ This approach “considers all relevant causal variables of a problem and all social, environmental, and economic impacts of the solutions to achieve transformational systemic changes.”² From a governance standpoint, the convergence of technology and science, together with new business models with a myriad of applications that create new categories in the food and agricultural sector is both challenging and unsettling. Ultimately, I hope, through this project, to open a debate in a conversation that so far has been one-sided.

2. Background

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¹ Food and Agricultural Organization, Sustainable Food Systems: Concept and Framework (2018).

² Id.

Challenges to the global food system are many and are growing.³ Between 720 and 811 million people in the world faced hunger in 2020 and nearly 2.37 billion people did not have access to adequate food in 2020, according to the State of Food Insecurity in the World 2020. Even more alarming are new projections that hunger will not be eradicated by 2030 unless bold actions are taken to accelerate progress and that all other things constant, around 660 million people may still face hunger in 2030. Global challenges like climate change, a growing population, urbanization, and increased competition for scarce resources are affecting the global food system in new and significant ways. What is more, the COVID-19 pandemic disrupted farming and food production, exposed the fragility of the global food system, and highlighted the importance of efficient supply chains and the need for alternative ways of growing, processing, transporting, and selling food to consumers.⁴ Across the globe, policy makers, researchers, scholars, agribusiness executives, and farmers are exploring sustainable and alternative approaches to farming and food production. Increasingly, attention is turning to agricultural technologies (“AgTech”, “AgriTech,” or “Agrifood Tech”).

A major promise and premise of the AgTech sector is the ability to grow more food sustainably using fewer resources. To the startup companies, investors, and other key players in the AgTech sector, agricultural technologies will disrupt and revolutionize the global food system and are the solution to food and nutrition insecurity. As one industry insider put it, “[t]he AgTech sector has the potential to completely reshape global agriculture, radically increasing the productivity of the agriculture industry while reducing the environmental and social costs of current ag production practices. It has the potential to have a positive impact on so many levels such as climate change, hunger elimination and healthy lifestyles....”⁵

A key question not addressed in the AgTech literature is the actual and potential impact of agricultural technologies on human rights and the implications of the ‘business and human rights’ framework for this emerging sector. While there are few studies that examine the impact of technologies on human rights, these studies do not address the peculiarities of the AgTech sector. Furthermore, available studies focus primarily on digital technologies and do not address the challenges posed by other emerging technologies.⁶ In addition, available literature do not evaluate

³ See Uche Ewelukwa Ofodile, *International Food Law: History and Evolution*, in INTERNATIONAL FOOD LAW: HOW FOOD LAW CAN BALANCE HEALTH, ENVIRONMENT AND ANIMAL WELFARE (Ilja Pavone, Cinzia Caporale, and Maria Pia Ragionieri, eds. 2021).

⁴ AgFunder, AgFunder AgriFoodTech Investment Report 2021 (2021).

⁵ <https://agfundernews.com/4-reasons-why-the-food-agtech-boom-is-no-false-dawn.html>

⁶ R F Jørgensen, "Right Talk: In the Kingdom of Online Giants", in R F Jørgensen (eds), *Human Rights in the Age of Platforms* (MIT Press, 2019) < <https://direct.mit.edu/books/book/4531/Human-Rights-in-the-Age-of-Platforms> >; See also J A Cannataci, "Report of Special Rapporteur on the right to privacy" (HRC, 8 March 2016) < https://www.ohchr.org/EN/HRBodies/HRC/RegularSessions/Session31/_layouts/15/WopiFrame.aspx?sourcedoc=/EN/HRBodies/HRC/RegularSessions/Session31/Documents/A-HRC-31-64.doc&action=default&DefaultItemOpen=1 > accessed 01 July 2021; Latonero (2018), “Governing Artificial Intelligence: Upholding human rights and dignity”, Data & Society: <https://datasociety.net/library/governing-artificial-intelligence/> [Accessed July 01, 2021]

the human rights implications of agricultural technologies from a food systems perspective which “is a way of thinking and doing that considers the food system in its totality, taking into account all the elements, their relationships and related effects.”⁷

Questions about human rights impact and the human rights responsibilities of enterprises in the AgTech sector are timely and pertinent for at least three reasons. First, competing narratives of the cause of global food insecurity and of pathways to food systems sustainability and transformation suggest that the benefits of agricultural technologies cannot and should not be assumed and that the human rights impact of emerging agricultural technologies must be routinely interrogated. Second, the AgTech sector is still in its nascent stage and now is the time to address human rights concerns in the sector. The first wave of innovators across categories are maturing and raising larger growth stage rounds and the second wave of agrifood innovators are beginning to enjoy increasing sector recognition by a widening spectrum of venture capital investors.⁸ Third, the governance gap in the technology sector is huge and is growing. While there appears to be a growing recognition, including by States, of the need to adopt policies specific to the sector, very few legal instruments have emerged.^{9,10}

3. The AgTech Sector: A Very Brief Introduction

AgTech has been defined as “[a] form of technological innovation, encompassing data-connected devices using information and communications technology, internet and artificial intelligence, agricultural biochemistry and biotechnology, innovative food and farming, farm robotics and automation, and smart warehousing and logistics.”¹¹ AgTech includes a wide variety of innovations and technologies with applications throughout the agricultural value chains. Although technology has always been a part of agriculture, what is new is the type of technologies that are revolutionizing the sector, the pace of innovation and evolution in the sector, and the types of actors driving innovation in the sector today. Mainstream technologies such as mobile apps, and emerging technologies such as IoT, artificial intelligence, big data, and autonomous aerial and field vehicles are increasingly repurposed for the agricultural sector. The AgTech sector is a broad sector that encompasses an upstream segment (FarmTech) and a downstream segment (FoodTech). FarmTech can be further categorized into seven broad sub-sectors: (1) Biotechnology, Biochemistry and Biologicals; (2) Bioenergy & Biomaterials; (3) Farm Management Software, Sensing & IoT; (4) Farm Robotics, Mechanization and Equipment; (5) Agribusiness Marketplaces; (6) Novel Farming Systems; and (7) Midstream Technologies.¹² FoodTech has also been broken

⁷ Id.

⁸ AgFunder, AgFunder AgriFood Tech Investment Report (2021).

⁹ B Tech, "The UN Guiding Principles in the Age of Technology" (2020) <<https://www.ohchr.org/Documents/Issues/Business/B-Tech/introduction-ungp-age-technology.pdf>>

¹⁰ WEF and BSR, "Responsible Use of Technology" (White Paper, Aug 2019) <http://www3.weforum.org/docs/WEF_Responsible_Use_of_Technology.pdf>

¹¹ Aarti Krishnan et al, Disruptive Technologies in Agricultural Value Chains, ODI, Working Paper 576

¹² AgFunder, AgFunder AgriFoodTech Investment Report 2021 (2021).

down into six key sub-sectors: (1) Innovative Food; (2) In-Store Retail and Restaurant Tech; (3) Restaurant Marketplaces; (4) eGrocery; (5) Home & Cooking Tech; (6) Online Restaurant and Meal kits.¹³

AgTech has become a key area of focus for investors around the globe. 2020 was “a blow-out year” from the standpoint of investment.¹⁴ In 2020, the AgTech sector attracted \$22.3 billion in investment, according to a report from Finister Ventures and PitchBook Data.¹⁵ Indeed, AgTech investment in 2020 accounted for 34% of the total \$65.4 billion in investment in the sector since 2010.¹⁶ According to analysts, the AgTech sector closed out with a 50% compound annual growth rate between 2010 and 2020. Interest in the AgTech sector continues to grow. Globally, startups raised \$24 billion in the first half of 2021, according to AgFunder, a venture capital fund.¹⁷ Overall, analysts agree that the AgTech sector “is no longer an early-stage industry.”¹⁸ Startups that attracted some of the largest funding deals of 2020 include Xingsheng Selected (\$800 million),¹⁹ Zomato (\$660 million), Deliveroo (\$569.6 million), Indigo Agriculture (\$500 million), Ynsect (\$371.5 million),²⁰ Plenty (\$315 million), Revol Greens (\$203.7 million). The trend continues in 2021. In July 2021, Israeli cultured meat company Aleph Farms announced the completion of a \$105 million Series B financing round. This was reportedly one of the largest financing rounds ever completed worldwide by a cultured meat company.²¹ Founded in 2017, the goal of Alpha Farms is to cultivate the world's first slaughter-free ribeye steak, using 3D bio-printing technology and natural building blocks of meat - real cow cells, without genetic engineering.²²

Mergers and acquisitions in the AgTech sector are heating up. Interest is coming from traditional agribusiness enterprises such as Monsanto (acquired The Climate Corporation), John Deere (acquired Blue River), DuPont (acquired Granular) and Sygenta (acquired Cropio). In 2020, Lineage Logistics, the world’s largest temperature-controlled industrial REIT and logistics solutions provider, announced 16 acquisitions and executed on 15 new expansions and greenfield facilities. In under three months, since June 2021, Semios, the leading precision-farming platform for permanent crops, has acquired Altrac, Centricity, and Agworld.²³ Interest in AgTech startups

¹³ Id.

¹⁴ Id.

¹⁵ Finister Ventures, 2020 AgriFood Tech Investment Review (2020).

¹⁶ Id.

¹⁷ AgFunder, AgFunder AgriFoodTech Investment Report 2021 (2021).

¹⁸ Id.

¹⁹ Changsha-based Xingsheng Selected is a community group-buying platform incubated by Rurong Xingsheng. The startup is best known for its Xingsheng Youxuan shopping app, is an online-to-offline (O2O) grocery seller. See: <https://www.theinformation.com/articles/chinas-hottest-grocery-startup-worth-8-billion-wants-to-build-an-online-version-of-costco>

²⁰ Ynsect is a French insect farming startu. See <https://agfundernews.com/breaking-french-insect-farming-startup-ynsect-raises-125m-series-c-breaking-european-agtech-record.html>

²¹ <https://en.globes.co.il/en/article-cultured-meat-co-aleph-farms-raises-105m-1001377337>

²² Id.

²³ <https://www.agweb.com/news/business/technology/three-tech-acquisitions-two-months-semios-building-mode>

is also coming from some very surprising quarters outside the agribusiness sector. To launch a brand new agricultural sector, Telus, a Canadian telecommunications giant, has been on a buying spree acquiring among others Decisive Farming (in 2019), Farm At Hand (in 2019) and Conservis (in 2021). In 2020, Telus launched Telus Agriculture. In 2018, AeroFarms attracted over \$400 million in funding from IKEA, Chef David Change, and the Vice President of Dubai.

In sum, investment in the AgTech sector is growing and is coming from a wide array of actors including States, individuals, established technology companies, agribusiness companies, public equities and venture capitalist funds. Whole AgTech ecosystems are emerging to support the growth of the sector. Established in 2020, Farm 2050, is described as a collective of diverse partners that is committed to advancing the future of food through supporting AgTech entrepreneurs and startups.²⁴ Farm 2050 reportedly brings together researchers, farmers, entrepreneurs, manufacturers, and distributors to accelerate the path for new disruptive AgTech ventures.

4. The Five Main Stages of this Project

Like all technologies, AgTechs can have both negative and positive impact on human rights. For example, agricultural biotechnologies could support the right to food but also has the potential to undermine the right to food of vulnerable groups and communities. For each pillar of the BHR framework, the paper will examine the current state of play, discuss the changes that are needed to address perceived governance gaps, and the challenges to implementing the BHR framework. Research and analysis will be carried out in five stages: (i) an exhaustive research into the AgTech sector and a mapping of the major players in the sector; (ii) an examination and a mapping of the human rights impact of AgTech products and Services; (iii) an analysis of the implications of *The State Duty to Protect Human Rights* for the AgTech sector; (iv) an examination of the implication of *The Business Responsibility to Respect Human Rights* for the AgTech sector; and (v) an analysis of food systems governance in the age of agricultural technologies.

4.1. AgTech Categorization and A Mapping of Key Players

In this section, the AgTech sector will be fully analyzed and key players in the sector identified. Preliminary studies suggest that in the past decade, a diverse array of players in the private sector have stepped into the AgTech sector. Key private sector actors include: (i) startup companies; (ii) a diverse array of investors; and (iii) a diverse range of end-users. With mergers & acquisition heating up, traditional agribusiness corporations, traditional technology companies, and enterprises outside of the agribusiness and technology sector are also pouring into the AgTech space. Public-private partnerships of various kinds are also emerging. Israel is one of the leading hubs for AgTech thanks largely to a mix of policies from central and regional governments and public-private partnerships. In 2020, Arieli Capital signed a \$5 million cooperation agreement with Ramat Negev Regional Council and Ramat Negev Industries for the establishment of an AgTech innovation center within the jurisdiction of the regional council in southern Israel.

²⁴ <https://www.farm2050.com/#solution>

4.2. Analysis of the AgTech and Human Rights Interface

This section involves a scoping of the intersection of AgTech and human rights. The project will examine the present and future impact of agricultural technologies on human rights. Answers will be sought to several questions. First, what are the current ways that agricultural technologies affect human rights? Which rights are being negatively impacted by agricultural technologies and by which players in the sector? Which rights might be negatively impacted by agricultural technologies in the future? Applying a food systems analysis, who is likely to be left behind if and when agricultural technologies succeed in totally disrupting and revolutionizing global, regional and national food systems?

4.3. Pillar I: State Duty to Respect

The focus of this section is on the governance gaps arising as a result of developments in the AgTech space. Under the UNGPs, States have a duty to “[s]et out clearly the expectation that all business enterprises domiciled in their territory and/or jurisdiction respect human rights throughout their operations” (UNGPs 2). Furthermore, States are to “[p]rovide effective guidance to business enterprises on how to respect human rights throughout their operations” and “[e]ncourage, and where appropriate require, business enterprises to communicate how they address their human rights impacts” (UNGPs 3). Regarding enterprises that receive support and services from states, the UNGPs requires that States “take additional steps to protect against human rights abuses” by such enterprises.”

I hope to examine what States, individually and collectively, are doing or are planning to do to address perceived legal and regulatory gaps when it comes to agricultural technologies, and the challenges to effectively bridging the governance gaps. What is the appropriate policy response to new and emerging technologies of unproven value but with enormous potential to cause harm? Should states adopt a ‘do no harm’ approach, characterized by rigorous, cautious and transparent approaches to deployment and use? Is the ‘precautionary principle’ and governance tools from the international environmental law regime relevant and applicable? The goal is to identify all the relevant and applicable policy frameworks at national, regional and global level regarding the development, deployment and use of agricultural technologies.²⁵ Legal instruments such as the UN Secretary General’s ‘Roadmap for Digital Cooperation’²⁶ and other regulatory developments will be examined for their content and usefulness.

Questions about the state duty to protect are pertinent for at least three reasons. First, States are actively promoting the development of agricultural technologies. Agricultural technologies are promoted in the Irish Government’s *Targeted Agricultural Modernization Scheme* as well as in

²⁵ United Nations, Human Rights Council, (17 July 2019), Resolution 41/11, ‘New and emerging digital technologies and human rights’, A/HRC/RES/41/11, Preambular Paragraph 10, available from: <https://undocs.org/A/HRC/RES/41/11>.

²⁶ United Nations, Secretary-General, ‘Roadmap for Digital Cooperation’, June 2020, available from: https://www.un.org/en/content/digital-cooperation-roadmap/assets/pdf/Roadmap_for_Digital_Cooperation_EN.pdf

Singapore's '30 by 30' food security goal, for example. Israel, the 'start-up nation', has a thriving AgTech sector thanks, in large part, to the support from the Israeli government.²⁷ For starters, Israel reportedly spends 4.1 to 4.25 percent of GDP on civilian R&D and this investment is spread across start-ups, established companies and universities. Second, States provide the enabling environment that AgTech companies need to operate and thrive. In 2013, the British Government, for the first time, explicitly recognized the country's Agtech sector with the adoption of the *UK Strategy for Agricultural Technologies*.²⁸ The first version of the U.S. *Agriculture Innovation Strategy* was released in January 2021. Third, a growing number of states are actively investing in the AgTech sector and financially support, contract with and/or procure from technology companies.

4.4. Pillar II: Business Responsibility to Respect

International human rights treaties generally do not impose direct legal obligations on business enterprises. However, business enterprises, including companies in the AgTech space, have a responsibility to respect human rights. This means that "they should avoid infringing on the human rights of others and should address adverse human rights impacts with which they are involved." (UNGPs 11). The responsibility of business enterprises to respect human rights refers to internationally recognized human rights including economic, social and cultural rights such as the right to food (UNGPs 12). The implications of UNGPs 13 -16 for businesses in or connected to the AgTech sector is of particular interest to me. Pursuant to UNGPs 13, the responsibility to respect human rights requires that business enterprises: (a) "[a]void causing or contributing to adverse human rights impacts through their own activities, and address such impacts when they occur;" (b) "[s]eek to prevent or mitigate adverse human rights impacts that are directly linked to their operations, products or services by their business relationships, even if they have not contributed to those impacts." At a minimum, AgTech enterprises are supposed to embed their responsibility to respect human rights including by adopting a clear statement of policy (UNGPs 16). To fully and effectively identify, prevent, mitigate and account for how they address their adverse human rights impacts, businesses in the AgTech sector are expected to carry out human rights due diligence (UNGPs 17).

In this section, the goal is four-fold: (i) examine the extent to which key players in the AgTech sector are responding to the BHR mandate; (ii) identify emerging best practices where they exist; (iii) identify main challenges to the emergence of robust industry response in this area; (iv) offer recommendations on the way forward. Some issues will be raised but not addressed, for example the human rights responsibilities of businesses in the context of M&A and divestment.²⁹

²⁷ See 'Support Program for Innovation in Select Fields – Agriculture (Agri-Tech). <https://www.innovationisrael.org.il/en/program/Pilot-Program-Agriculture>; See also, 'Why Israel is Leading in Global Agricultural Technology', <https://www.futurefarming.com/smart-farming/why-israel-is-leading-global-agricultural-technology/>

²⁸ HM Government, *A UK Strategy for Agricultural Technologies* (July 2013).

²⁹ BSR (2016), "Human Rights Impact Assessments and Responsible Divestment Plan for Business Region Eurasia: Summary project report for Telia Company": <https://www.teliacompany.com/globalassets/telia-company/documents/about-telia->

4.5. Agricultural Technologies, Food Systems and Global Governance

The challenges to purposeful and meaningful global governance of emerging technologies will be the focus of this final section. Emerging technologies are disrupting national and global governance tools and mechanism. Questions are increasingly being asked about how to formulate ‘innovation-proof governance approaches’ – approaches that stand the test of time and successive evolutions in technology.³⁰ Unfortunately, while there is broad consensus that international cooperation is necessary if the risks associated with emerging technologies are to be effectively addressed, few legal solutions have emerged. Whether a human rights approach to the regulation of emerging technologies is feasible given competing approaches to regulating emerging technologies and fragmentation in international law will be the examined.

5. Methodology and Challenges to Research

My research will be based on desk review of literature, case studies, as well as interviews with key players in the AgTech sector, policy makers, and individuals affected or likely to be affected by developments in the sector.

There are several challenges to a project of this nature. First, the AgTech sector is still in its nascent stage industry. This project comes at the early stages of the development, deployment, adoption and use of agricultural technologies. This means that there are still many unknowns about the technologies, how they will be used, and their potential impact on human rights. Second, relevant technologies are still evolving and are evolving very fast. Third, the complexity of this emerging sector is also a challenge. A big challenge to applying the BHR framework to the AgTech sector is the diversity of players in the sector. In addition to traditional technology companies and traditional agribusinesses, a new variety of actors have emerged including large pension and sovereign wealth groups, late-stage private equity firm, and corporate venture capitals (CVCs). A final challenge is lack of transparency in the AgTech sector. Owing to a host of issues including concerns about loss of trade secrets, startups are not very transparent. While we a growing number of AgTech startups are going through IPOs and M&As, the vast majority are still in the early stages of their innovation. What is more, the AgTech sector has its share of “unicorns” – startup

company/bsrtelia-company-hria-summary.pdf [Accessed July 01,2021]; Facebook (2020), “An Update on Facebook’s Human Rights Work in Asia and Around the World”:
<https://about.fb.com/news/2020/05/human-rights-work-in-asia/> [Accessed July 01, 2021].

³⁰ https://www.researchgate.net/publication/334155342_Innovation-Proof_Global_Governance_for_Military_Artificial_Intelligence/link/5d5ae3594585152102521e9b/download

companies that reach a valuation of \$1 billion or more without going public.³¹ In a growing number of academic articles, scholars assert that these companies pose a distinct danger to society.³²

5.1. Conclusion

Human rights law can and should play a critical role in the continuing development of agricultural technologies. Agricultural technologies can support and advance human rights but also have the potential to negatively impact human rights. In a recent report, the Milken Innovation Center concluded that “Governments, NGOs, researchers, agritech firms, and investors must find pathways of collaboration to meet the challenge of producing more food for more people amid resource depletion and climate change” and predicted that “[d]igital solutions, crop protection, and new breeding methods will all play important roles in this process.”³³ It is hoped that that this project can contribute to emerging debates about how to bridge governance gaps in the age of technology. The primary audience are stakeholders from across the AgTech sector, governments, academics, and civil society. Because the AgTech sector is still in its infancy, the project would likely raise more questions than it answers and will identify areas where further research is urgently needed. My research into human rights and governance issues in the AgTech sector is likely to continue into the future and will continue to track evolution and developments in the sector.

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³¹ CB Insights, The Complete List of Unicorn Companies (accessed May 2021) <https://www.cbinsights.com/research-unicorn-companies>; Damian Garde, Ego, ambition, and turmoil: Inside one of biotech’s most secretive startups, STAT (Sept. 13, 2016); Aileen Lee, Welcome to the Unicorn Club: Learning From Billion-Dollar Startups, TECHCRUNCH (Nov. 2, 2013).

³² Amy Deen Westbrook, We’(re) Working on Corporate Governance: Stakeholder Vulnerability in Unicorn Companies, 23 U. PENN. J. BUS. L. 505 (2021); Jennifer Fan, Regulating Unicorns: Disclosure and the New Private Economy, 57 B.C. L. REV. 583 (2016); Renee Jones, The Unicorn Governance Trap, 166 U. PA. L. REV. ONLINE 165 (2017).

³³ The Milken Innovation Center, Accelerating Agritech Solutions in Israel, California, and other developing countries (2020).

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