



Unlocking Potential: A Deep Dive into the Funding Landscape of Agtech Start-Ups

Junada Sulillari¹

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Abstract: *This research aimed to identify some critical developments related to the funding landscape in agtech start-ups. It is exploratory and interpretative research based on secondary information. We collected information from the venture capital industry, agricultural organizations, industry reports, and other relevant research.*

The research found that investments in the agtech sector have increased significantly in the last decade and venture capital plays a vital role in this. Some critical reasons for this are shifting consumer habits and needs, high capital requirements, the rise of impact investors, and having a greater variety of exit options for agtech start-ups. The Covid-19 pandemic transformed the fundraising environment for these start-ups. However, the nature of these start-ups renders them more stable in terms of access to funding, because of the existence of impact investors who are ready to balance between earning higher returns and investing in enterprises with social impact.

1. INTRODUCTION

Agriculture is the greatest and fundamentally the most important of our industries. The cities are but the branches of the tree of national life, the roots of which go deeply into the land. We all flourish or decline with the farmer. (Bernard Baruch)

This quote reflects the importance of agriculture. Agriculture has a significant impact not only on the farmers who have dedicated their lives to work on the land but on the entire society. For farmers, it is a way to make a living, but the impact of agriculture is much wider. Agriculture is the basis of many other industries, so its impact is not only present for those who directly work in the field or are involved with a farming activity. Many products that we produce derive from these farmers' worldwide produce. As this quote says, we all flourish or decline with the farmer, because many other activities and industries depend on the farmer and his success. If they have a successful year, this will bring positive changes in the other parts of the chain, including organizations and final customers.

A comparative analysis between today's agriculture and the way things in this sector used to operate decades ago helps to see the notable contrast and the radical changes that this sector has experienced. A key factor that has catalyzed these changes is technology. Many things that were made manually decades ago are being made by using the amazing solutions that technology is offering now. Start-ups are contributing by offering solutions to farmers that none would have ever imagined could exist. Farmers are now enjoying the benefits that technology is giving them. Examples of innovation in agriculture include smart irrigation systems, drones, targeted weed control, robotic harvesters, and autonomous tractors (Bear Flag Robotics, 2022). Agtech stands for the technology that is being used in agriculture (Senior, 2020). Many start-ups contribute positively to society by introducing innovative solutions like these, driving transformative changes in the agriculture sector. Even though many start-ups have the potential to

¹ Economic Faculty, Fan S. Noli University, Korce, Albania

transform the agriculture sector, many of them fail for several reasons. Limited access to funding is a key reason for agtech start-up failure. This represents a missed opportunity to benefit from their potential to transform the sector.

The production of advanced machinery has led to the production of farm equipment that contributes to a more efficient cultivation of land. (Goedde et al., 2020) Improved seeds, fertilizers, and irrigation systems have contributed to increased yields for farmers. A key role in transforming this sector is playing artificial intelligence, analytics and connected sensors, which help in improving the efficiency of water and other inputs, increasing yields, and promoting sustainable agriculture. The role of regenerative agriculture is getting more and more important and its practices are being used widely. Considering the increasing global demand for food (United Nations, 2021), these solutions and practices that help improve the yield for farmers, protect the environment and do not damage the land, are critical.

As previously mentioned, funding can be a critical factor in determining the degree of impact that start-ups in this sector may have on society. The number of start-ups and agtech start-ups that are established every year is high, and also high is the rate of start-ups that fail. As the numbers from Statista show limited access to funding is a major reason for start-up failure (Statista, 2023). These numbers include all the start-ups, despite the sector in which they operate. The question that this research raises is “Is limited access to funding a key challenge for agtech start-ups too?”. What is happening with the investments in start-ups in this sector? How are these start-ups positioned compared to start-ups of other sectors related to their ease of difficulty in securing funding? What are some key drivers of the funding landscape of start-ups in this sector? How can agtech start-ups deal with the changes in the funding environment that the Covid-19 pandemic brought? This is what the research will focus on.

2. AIM OF THE PAPER AND METHODS

This research aimed to identify key developments related to funds invested in start-ups in the agtech sector. It helped identify the key drivers underlying the changes experienced within this sector. Analyzing key developments related to agtech start-up funding helped to understand the changes that the funding environment of these start-ups has faced. This could serve as a basis to see what are the funding opportunities and challenges for agtech start-ups. It can make it easier for start-ups to deal with the challenges and how to take advantage of the opportunities. These funding challenges add to challenges that are faced by all start-ups and not only agtech start-ups. It is exploratory and interpretative research based on secondary information. We collected information from the venture capital industry, agricultural organizations, industry reports, and other relevant research. We filtered the information collected to keep only the one that was relevant to the research. This information was the basis for doing the qualitative analysis. The aim of the research was realised by achieving some objectives. These objectives were:

- Analysing some key developments related to the funding landscape of start-ups in the agtech sector.
- Finding some key drivers of the funding landscape for start-ups in this sector.
- Analysing the impact that the Covid-19 pandemic had on the process of funding agtech start-ups.
- Finding some key ways for agtech start-ups to succeed in securing funding despite the challenges that they face.
- Creating a guideline that can help other start-ups in the sector manage better similar challenges.

3. LITERATURE REVIEW

Agriculture is an important sector, and technology is showing that it has an enormous potential to transform it. Agriculture, technology used in agriculture and agtech start-ups have attracted the attention of different stakeholders, like investors, governments and researchers. This section aims to make a summary of some key research that is related to this research. The following section includes some key findings of existing research made by other academics.

According to (Dutia, 2014) government policies, incentives and regulations will play a key role in determining the future of agtech start-ups. He also emphasizes the increase in the number of investors that have a more diverse set of motivations, where they still care about the economic returns, but also about setting goals related to the social impact or the environmental impact of the start-ups where they invest. Other sources of capital that seek environmental and social returns are emerging. This includes angel investors, venture capital funds, philanthropists, and crowdfunding.

Sippel and Dolinga (2023) emphasize that potential investors see agtech start-ups as a profitable investment opportunity and also as a moral obligation that enables the continuity of food production in the presence of environmental threats.

Kumar (2023) focused on the funding issue of agtech start-ups in India. The research found a growing interest in the investors' community to invest in agtech start-ups. This reflects the significance of agriculture and its potential. The research found a high interest in investing in supply chain optimization, which reflects the urgency to improve supply chain efficiency in this sector. Something significant that the research highlights is being more supportive of start-ups in agri-financing, farm management systems and land transactions. This would enable them to unlock their potential and would contribute to promoting sustainable agriculture.

4. THE IMPACT OF AGTECH ON THE ECONOMIC DEVELOPMENT

As previously mentioned, agriculture plays a key role in the economic development of many countries. When agriculture meets technology, the potential to promote higher economic growth is higher. What is the potential of agtech to contribute to the economic development of countries around the globe? What are the ways through which start-ups in this sector can do this? Some key ways through which agtech start-ups can enable this are (FasterCapital, 2023):

- *Increasing efficiency in farm operations.* Agtech start-ups are offering solutions and are introducing technologies that are increasing efficiency significantly compared to traditional farming practices. This is empowering farmers by enabling resource utilization, streamlining production processes, and reducing waste. Some examples of this include satellite imaging and drones that allow monitoring of crop health, identifying problems early, and applying targeted treatments. They lead to lowered costs and higher yields.
- *Enhancing crop yield and quality.* Agtech start-ups are providing farmers with technologies that improve the yield and quality of their crops. Examples of this include sensors and data analytics platforms that allow farmers to have access in real-time to data about soil moisture, nutrient levels and temperature. This improves their decision-making process regarding fertilization, irrigation and other activities which leads to increased productivity.
- *Enabling sustainable agriculture.* Agtech start-ups have become key players in promoting sustainable agriculture practices. Their solutions are promoting the minimization of the

environmental impact on farming operations. This goes parallel with the creation of long-term viability. Some well-known examples of this include hydroponic and vertical farming, which enables crop cultivation all year round and also reduces the need for land and water. Other technologies like biological pest control help minimize the use of pesticides, which helps protect the ecosystem and increases food security.

- *Improved supply chain efficiency.* The technological innovations in agriculture are transforming the entire supply chain, from farmers to final customers. Agtech start-ups are developing platforms that enable farmers a direct connection with their final customers. Blockchain technology is becoming widely used to increase traceability and transparency in the supply chain.
- *Creating new economic opportunities.* Creating new economic opportunities. Agtech start-ups have a high potential for creating new economic opportunities. They do this by creating jobs, attracting investment and promoting entrepreneurship in rural areas. The creation of agtech hubs, for example, supports agtech start-ups by helping them attract capital and talent to local communities. Adopting innovations that agtech start-ups offer can also promote the development of ancillary industries that can contribute further to economic growth.

All these reasons reflect the importance of the agtech sector and its potential to foster economic development. The contribution that agriculture has to the GDP (Gross Domestic Product) varies from one country to the other, but in some of them, it goes up to 37% of the GDP ([The Global Economy, n.d.](#)). This shows how significant agriculture and the development of this sector are for these countries.

5. AN OVERVIEW OF THE MOST INNOVATIVE AGTECH START-UPS WORLDWIDE

This section aims to make a summary of some information about the most innovative start-ups that operate in the agtech sector. There is a wide range of solutions that start-ups in this sector may offer, but this section will focus on some of the most innovative agtech start-ups in the world ([Startup Savant, 2023](#)). It helps to create an idea about what agtech includes and to bring some examples of how the technology is contributing to transforming agriculture.

- *Farmspeak Technology.* This company is based in Nigeria and helps Sub-Saharan agricultural businesses with its IoT (Internet of Things) technology. Their technology offers African poultry farmers the opportunity to grow their profit by using data-driven decisions. They aim to fight extreme poverty among farmers and ensure food security.
- *Biome Makers.* This company is based in California and produces bio-computing applications that enable sustainable and productive farming techniques. It aims to optimize farming practices, improve soil health and promote sustainability.
- *Oishii.* This company is based in New Jersey and is leading the vertical farming revolution. It produces high-quality strawberries indoors in every season by using its proprietary technology. They are setting new standards for sustainable agriculture, by using hydroponic farming and by delivering pesticide-free strawberries.
- *Mootral.* The company is based in the United Kingdom and offers a solution that reduces greenhouse gas emissions and the use of antibiotics, by fighting antimicrobial resistance. Their technology, which includes a natural feed supplement, reduces the methane emissions from cattle.
- *Augumenta.* This company is based in Greece and it enables yield increase, quality improvement, and the reduction of inputs used by using an automated precision application

for farm inputs. Their solution which is based on deep learning is a way to promote profitable sustainability.

- *Agriledger*. This company is based in the United Kingdom and helps in developing traceability, transparency, and accountability in the supply chain. They do this by using digital identity, information and financial services.
- *Big Wheelbarrow*. The company is based in Texas and focuses on helping small local producers. They do it by creating a SaaS company that enables wholesale food buyers to work with smaller companies. Through this, they empower local buying to help wholesale food buyers increase the portion of the local produce they buy.
- *Trace Genomics*. This company is based in California and offers a solution that focuses on the soil that is being used and leveraging it to bring sustainable change. They provide the customers with insights into the quality of their soil and what type are the best management practices that they can use.
- *RootWave*. The company is based in the United Kingdom and develops innovative products that use electricity to kill weeds. They do not use chemical herbicides, and the way they kill weeds does not harm the soil and does not generate additional costs. This makes that a sustainable and regenerative technology.
- *Apeel Sciences*. The company is based in California and solves the global waste problem by developing plant-derived shelf-life extensions for fresh produce. The way they do it enables keeping moisture inside the produce and prevents the oxygen from getting inside. This reduces the spoilage during the process.

6. AN OVERVIEW OF SOME KEY DEVELOPMENTS OF FUNDING AGTECH START-UPS

The previous sections discussed the importance of agtech start-ups and the start-ups in this sector and the crucial role that funding plays in their success or failure. It is interesting to see how the funding landscape of agtech start-ups has changed with the rapid changes that this sector is experiencing. This section aims to make a summary of some key developments related to the funding landscape of agtech start-ups. Besides this, the focus will be on the critical drivers of the funding landscape for these start-ups.

The agtech sector has experienced significant growth in the last decade to attract funding. Among the different sources of financing that are being provided for start-ups in this sector, venture capital is one of the biggest investors in these start-ups. Considering the limitations of getting access to funding information on a database on the investments made in agtech start-ups we could access only information from the venture capital industry. Figure 1 shows the number of venture capital deals in agtech start-ups, between 2013 and 2022. As the figure shows, the number of agtech start-ups that have secured funding from venture capital funds has experienced significant growth in 10 years. The figure shows a steady increase in agtech start-ups that have secured financing from venture capital funds.

Different from figure number 1, which shows the number of agtech start-ups that have secured funding from venture capital funds, figure number two represents the value of the venture capital deals in the agtech sector. The tendency that this figure shows is the same as the one in the first figure, a significant increase in the money that is invested in agtech start-ups. What is interesting is that even though in 2022 the number of start-ups where venture capital funds have invested has increased, the amount of money that is being invested is lower compared to 2021.

This partly relates to the impact of the Covid-19 pandemic on transforming the funding environment for agtech start-ups, by making it more difficult for start-ups to secure funding. Securing funding become more challenging because of the increased interest rates. In 2022, there were fewer funds available for start-ups in the later stages (Asthana et al., 2022). Compared to other start-ups, funding for agtech start-ups has been more stable, for several reasons. This will be the focus of the coming section.

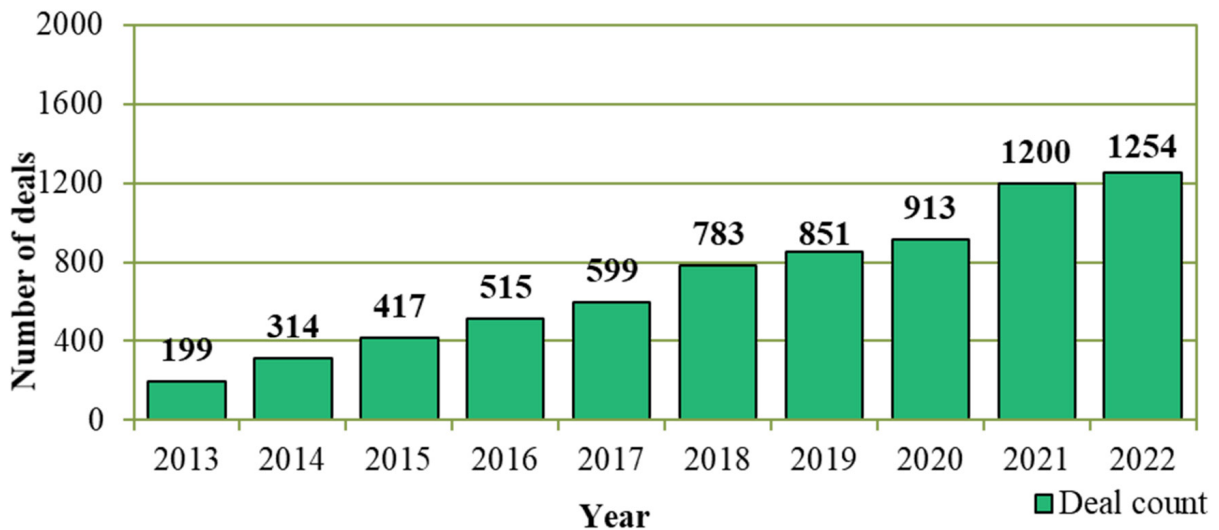


Figure 1. Agtech venture capital deal activity (deal count) during the period of 2013-2022

Source: PitchBook, 2023

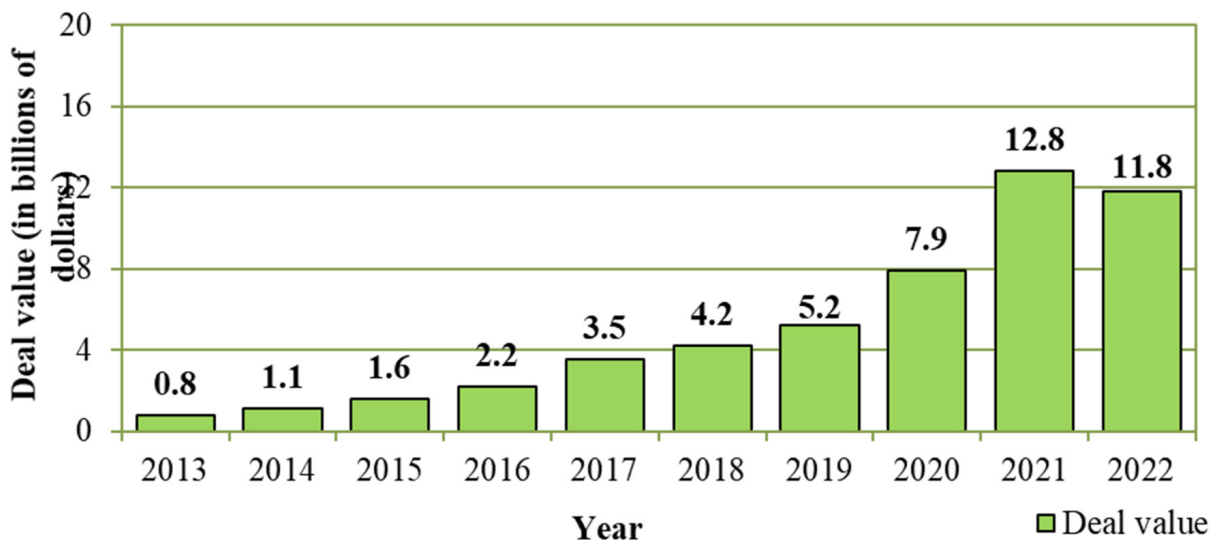


Figure 2. Agtech venture capital deal activity (deal count) during the period of 2013-2022

Source: PitchBook, 2023

The above figures show a significant increase in the money that is being invested in agtech start-ups. What lies behind his numbers? What is driving the funding landscape of agtech start-ups? The following section analyses some key drivers of the funding landscape of agtech start-ups.

- *Rise of impact investors in agtech.* Impact investing, which seeks to generate both financial returns and positive social or environmental impact, has seen a surge in the agtech sector (Asthana et al., 2022). These investors prioritize sustainability and are often willing to balance profit with purpose. Unlike traditional investors, impact investors often adopt a

- long-term perspective, understanding that transformative solutions in agriculture may require extended timelines to realize both their financial and societal benefits. More impact investors are aware of the importance of the reduction of the carbon imprint and the environmental impact that agriculture has. This is made through the promotion of sustainable agriculture. (White, 2019).
- *Collaborative funding models.* The agtech sector is witnessing a shift towards collaborative funding models. Co-investment strategies, where multiple investors pool resources, are becoming common. Public-private partnerships are also on the rise, leveraging the strengths of both sectors to drive innovation in agriculture. Public-private partnerships can enable the creation of a start-up ecosystem that drives emerging tech innovations and agile business models. Universities and research institutions can help validate the business solutions by bringing in their expertise in the sector (World Economic Forum, 2022). Also, crowdfunding platforms are emerging as a viable funding source, democratizing investment opportunities and allowing a broader audience to support agtech innovations.
 - *High capital requirements in agtech.* Agtech start-ups often face high capital requirements, especially those focused on hardware or biotech solutions. The research and development (R&D) processes in these areas can be expensive. Also, the product development cycles can be long, requiring sustained funding over extended periods. As these start-ups aim for scalability, the initial capital requirements can pose significant challenges, especially for those without substantial backing. Venture capitalists and angel investors often hesitate to invest in these start-ups because of these reasons. Securing financing and building a strong and experienced team becomes critical to overcoming the challenges. Some options to secure funding besides angel investors and venture capitalists are seeking government grants, loans, incubators and accelerators, crowdfunding, or partnering with established companies in the industry. These established companies can support them with funding and expertise (AdvisoryCloud, 2023).
 - *Geographical disparities in agtech funding.* While agtech innovations are global, funding often concentrates on developed markets. Start-ups in emerging economies, despite their potential to offer localized solutions for unique agricultural challenges, often face limited access to capital. In small countries, start-ups may not access angel investors or venture capital funds, or may not even be aware of the existence of these funding options (Petković et al., 2012). Sometimes start-ups lack information about potential investors, angel investors, or venture capitalists who can reach out. This leads to missed opportunities for them to secure funding. Bridging this geographical funding gap is essential to harness the full potential of agtech innovations worldwide.
 - *Changing exit strategies for agtech start-ups.* The exit strategies for agtech start-ups are evolving. While the IPO market has slowed down, there's a noticeable rise in strategic acquisitions by larger agricultural corporations seeking to integrate innovative technologies. This shift underscores a broader trend in the sector: a focus on long-term value creation over short-term gains. These changes partly resulted from the Covid-19 pandemic, which was a key factor in transforming the funding environment of agtech start-ups. General partners take more time to evaluate the deal and for due diligence, which leads to longer times for closing deals. They mainly invest in the following rounds in existing portfolio companies or start-ups with lower risk (PitchBook, 2023).
 - *Changes in consumer behaviour.* The behaviour of today's consumers differs from decades ago. Customers now are more concerned about what they are consuming or eating. They are not as indifferent as in the past. Besides being interested in what the food taste is consumers are interested in the nutritional qualities and sustainability. Consumers are now

more interested in knowing about how the food is being produced, which motivates companies to find innovative ways to produce their products. (Thioller, 2022). The demand of customers to have different products all year round has led to an increasing demand for vertical farming and other agtech solutions. People now do not care only about agriculture-related emissions but also about the amount of land and water that is needed to support the supply chain (Weber & Bigalke, 2022).

Agtech start-ups indeed face several challenges regarding funding, but this shall not discourage them. Besides the challenges that shall take advantage of the opportunities that come up and learn not to give up when difficult situations arise. They shall try to avoid playing safe during downturns and be more strategic. It is also important to set ambitious but achievable goals. Start-ups shall also move quickly to achieve their milestones so they can increase their growth rate and become more attractive to investors in the later rounds (Asthana et al., 2022). Staying focused is also critical to eliminate distractions and better manage the burn rate. Considering all the possibilities and challenges, it is up to start-ups themselves the final result: succeeding or failing.

7. FUTURE RESEARCH DIRECTIONS

Considering the crucial role that agriculture plays in the economy and in economic development, it shall get more attention from different stakeholders. Agtech start-ups have a high potential to transform agriculture. This research was an explorative one and the author could not access the full information about the investments made in agtech start-ups. The information accessed included only venture capital investments, which is a limitation of this research. Considering the fact that the research was a more exploratory and descriptive one, this suggests that there is space for future research to focus on a deeper analysis of this topic. Future research can focus on a more detailed analysis of the factors that impact the way venture capitalists, angel investors, or other investors make their decisions when investing in agtech start-ups. To make the research more complete, a deeper analysis that considers the perspective of start-ups in this sector would help to better understand what is driving the funding landscape of agtech start-ups.

8. CONCLUSION

Technology is playing a crucial role in transforming agriculture. Many technological innovations are offered by start-ups. Considering the many challenges that start-ups face, funding is crucial. This is also true for agtech start-ups. This research aimed to analyse some key developments in the funding landscape of agtech start-ups and to find some factors that have transformed the funding environment of agtech start-ups. The research was an exploratory and descriptive one. What the information collected from the venture capital industry was that agtech start-ups have experienced significant growth in terms of the investments that they have attracted. The change is significantly different compared to a decade ago. Some key factors that explain the changes in the funding landscape of these start-ups are the rise of impact investors in agtech, geographical disparities in agtech funding, changing consumer behaviour, changing exit strategies for agtech start-ups, collaborative funding models, and high capital requirements for agtech start-ups.

The research found that even though the COVID-19 pandemic had an impact in slowing down investments in this sector, the nature of these start-ups makes them more stable in securing

funding compared to other start-ups. What the results suggest would be for start-ups not to give up, but to keep going, and for different stakeholders like the governments to be more active in supporting them. Creating solutions that would enable start-ups to access funds more easily would make a difference in determining their success or failure.

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