AeroFarms: The Case for Collaborations in Education

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AeroFarms®

MIT MANAGEMENT SLOAN SCHOOL

Executive Summary

AeroFarms' pioneering vertical farming technology has not only captured the imaginations of big farming, but also the interests of educators and schools. To investigate the business potential for expanding their grow tower technology into schools, our MIT Sustainability Lab team identified an appropriate segmentation of schools; interviewed 10 key stakeholders school spending; and forecasted the critical factors of customer acquisition for AeroFarms.

Beachhead Market: AeroFarms could establish a profitable revenue stream by serving affluent school communities in regions with inclement farming weather because:

1) AeroFarms' grow tower equipment requires relatively high capital investment that can usually only be funded by community grants;
2) affluent school communities tend to have the time and resources to assist with the yearly operational costs of a school garden program; and
3) regions with year-round favorable growing conditions are less likely to pay for the benefits delivered by AeroFarms' technology.

Cost of Customer Acquisition: Initially, to acquire a customer (one school) in this segment will require 30-50 hours of an employee's time over the course of one year, due to the need to identify champions, help them navigate the process to find funding, and, ultimately, get the equipment installed and program launched. Additionally, AeroFarms must expect to invest 1-2 years in co-developing curricula to accompany their grow tower hardware to support champion teachers in making the case to purchase the equipment for educational purposes. Given the immense value of the Rasberry Pi-enabled analytics and optimization tools to any STEM-focused curriculum, we recommend that future programs integrate these features into a packaged offering. In addition, the product itself may need to be re-designed to meet the needs of a 30-student/class, multiclass school so that the educational value can be equitably shared between students and teachers. With this investment and well-managed public relations, AeroFarms' product could be packaged to meet state and federal curricula and marketed through existing educational material suppliers.

Willingness to Pay: However, the research also revealed that capital investments over $20,000 are extremely rare for this type capital expenditure. Respondents also had significant concerns about the continued operational costs of the grow tower system with fears it would expend limited resources such as space, electricity, water, maintenance time, and teaching time. While respondents were supportive of students eating healthy greens, they were doubtful a grow tower would be able to replace the existing food providers in cost and reliability. In general, schools were much more keen on the potential value a grow tower system would have to their biology and wider STEM curricula, an area of increasing educational focus. As discussed with CSO Ed Harwood and Chief of Staff Stefan Oberman, the AeroFarms grow tower system

exposes students to novel technology and computer science in a highly engaging manner, something for which champion teachers, administrators, and parents would advocate.

Recommendation: Depending on AeroFarms' ability to reduce the price of its unit, we recommend either AeroFarms' targets a revenue driven model with affluent communities that sets baseline educational attainment indicators or establishes a "non-profit" arm who subsidizes high-need school programs and strengthens AeroFarms' brand visibility.

Project Background

AeroFarms has pioneered the technology for aeroponic vertical farming. The company's primary strategic goal is to enter the "big farming" industry. Their team has been designed to focus on farming technology development with 50% of their employees consisting of biologists, engineers, and tech specialists. With significant capital with which to develop their revenue channels, AeroFarms is poised to accelerate its business development in big farming.

Business Challenge

AeroFarms wants to develop an additional business model that would be both profitable and socially responsible. From their experience with Phillips Academy Charter School, they believe that there is demand in school systems for Grow Towers which would provide educational and nutritional value, but they lack confidence that this would be a profitable business plan to pursue. While AeroFarms has an understanding of their own material and service costs of working with a school, they lack a clear understanding of how much schools might value the installation of grow towers:

Key Question

How might AeroFarms determine the cost of acquiring education customers and what business model(s) would support these customers?

Research Design

To support AeroFarms' decision of if and how to enter the education market, our team focused primarily on investigating the multiple necessary steps to acquire customers in three different launch points: 1) public school 2) private school and 3) charter school, and then identified relevant catalysts, namely community and regional initiatives and federal nutrition regulatory pressures. Early desktop research revealed that these three domains could entail a very different approach to business development. In all of these domains, the local, state, and federal political and economic climates would factor in heavily to the successful funding and roll-out of a small pilot, let alone to a larger roll-out.

In assessing these three different segments, we developed a framework for understanding the decision making unit of a school. Although variable across segment, we outline a general map of stakeholder interests below to provide a sense of the purchasing dynamics at play in the consideration of any capital project or other budget increase.
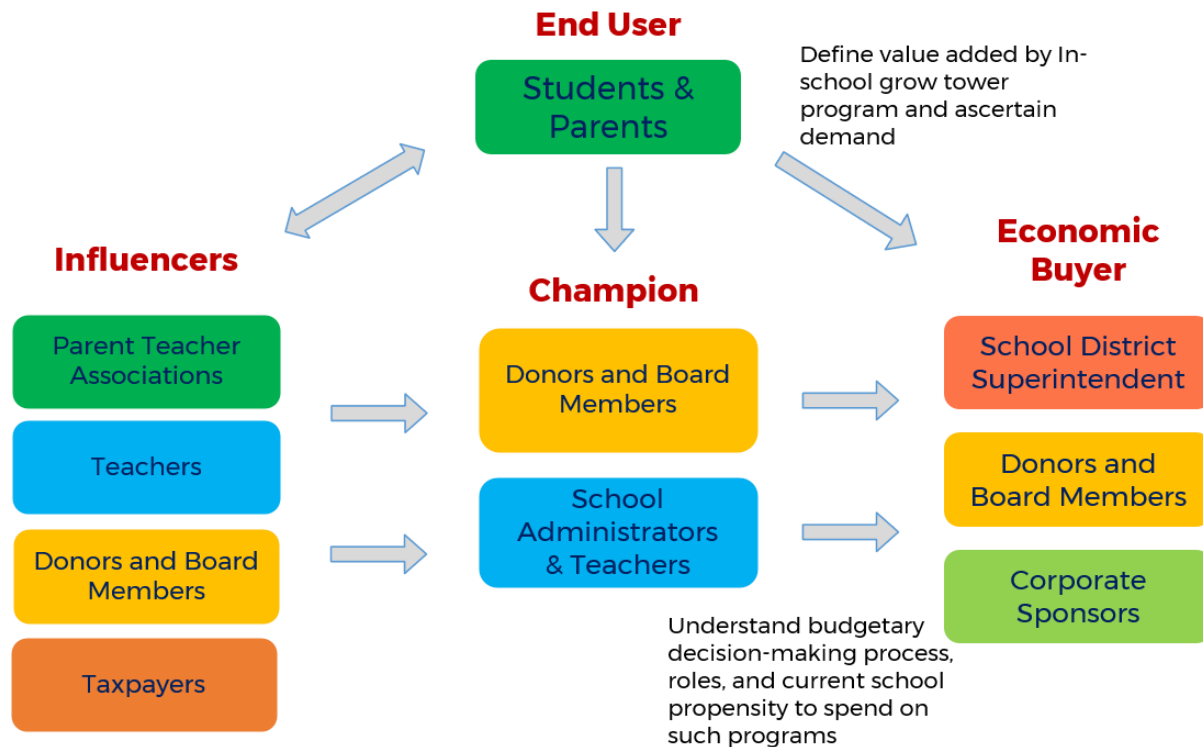
Decision Making Unit Overview: Public school budget sizes vary relative to state funding and local property taxes, while town, county, or regional school district superintendents control most budgetary decisions. Charter schools receive less public funding and thus rely on supplementary financial support from private donors. As such, board members tend to be final decision-makers, or economic buyers, for large budgetary items.

With this framework in mind, the team conducted desktop research, in-depth interviews with representative DMU stakeholders from each segment, and field site visits to build insight into potential use cases for a grow tower farming program and the decision making process, and develop an order of magnitude estimate of the cost of acquiring such customer segments:

Segment	Respondent Profile
1) Public	● **2 Teacher Champions:** 1 garden founder 8th grade teacher, 1 garden manager 1st grade teacher ● **2 Administrators:** Director of Athletics of administrative

	purchase decisions and Principal at Tahanto Regional, MA ● **1 Former Teacher/Administrator**: Principal - MA middle school and regional HS
2) Private	● **1 Board Member:** 7-year board member at 700-student K-12 school in Northern California ● **1 Retired Administrator:** founder and 27-year principal at special needs school ● **1 Active Administrator:** principal at special needs school
4) Community/Regions	● **Northeast schools, California schools**
5) Government	● **Literature Review** ● **Public Documents** ● **Chief of Staff to the Chairman of the Educational Committee for Washington DC**
6) Other	● **1 Public School food provider:** Revolution Foods specializes in low cost healthy foods for schools and retail ● **1 Institutional 3rd Party food provider:** World Bank Childcare provider's food distributor ● **1 Private Foundation:** Gates Foundation. Interview with Carina Wong, former member of Edible Schoolyard and now Deputy Director for College Ready at Gates Foundation

Based on the data collected from this research, the team distilled key insights through which AeroFarms may understand the relevance of the education market to its existing products and services.

Insights from Research

Insight 1: Affluence of school community determines the ability to make capital investments in a grow tower.

While our initial segmentation of education customer segments focused on differentiating between public, private, and charter schools, the interviews with stakeholders from across these segments revealed that *community affluence* is the largest deciding factor in determining a school's proclivity to invest in high-cost capital ($10-20k + dedicated space is considered very high cost). Affluent communities not only have access to funding, but they have more time and space to be involved in student education. As one private school board member shared:

> *All schools face an array of trade-offs when deciding where to invest. The vast-majority of private schools, including ours, do not have unlimited money, space, and time to invest in new projects… [The project] that does get through happens because of the momentum built up throughout the community.*

This sentiment was shared by public school stakeholders as well. Affluent school communities have many projects from which to choose, and the decision of whether to fund them often comes down to the community momentum behind a project proposal. This enthusiasm allows the community to find methods of funding popular proposals through either direct school funding, parent fundraising, or teacher grants that exist in affluent communities. When capital investments are made, the school budget will also begin to plan for this project in its operations budget by either affording teaching credits to a teacher or providing a budget for maintenance.

For less affluent communities, this kind of community financial support is more difficult to raise. There are often not existing teacher grants or strong PTO involvement in daily activities and fundraising. Even when high community involvement exists, it is difficult for these communities to access funding in quick ways as affluent communities can.

Funding "The Bentley Lab"

A few years ago, Bentley School in Northern California held its quarterly board meeting. Of the many projects to discuss for capital investment, the robotics club proposal was on the top of mind. The club had started outside of the school at a parent's house. Word had spread among the students to the parents the to the teachers and finally to the administrators. The cool electronics that the kids were working on had captured the community's attention and the proposal for a dedicated school space and equipment sat before the board.

At the same time, there was a general consensus at the school that installing solar panels would be a cost-saving investment. "Everyone agreed it was a good idea, but there wasn't a champion that was rallying people behind the idea," a board member remembered. The solar panels would have paid themselves off after a few years, but the board needed to make trade-offs. Even though they were a private school, they did not have a big enough capital investment budget to invest in both a maker space, solar panels, and pursue the various other goals the school had set. They went with the maker space over the solar panels because the maker space had pulled the community together.

Insight 2: A school champion must lead and maintain the initiative to invest in new program by building coalition between teachers, administration, and parents.

To move a project forward, it is critical that a "champion" is identified and supported for each school in which a Grow-Tower rollout is planned. The champion plays the role of engaging the school community and pushing the initiative forward when obstacles appear. The champion is tied to his/her initiative with a sense of purpose that can usually be recognized from the individual's willingness to invest personal time into the initiative, develop arguments for the initiative, and build strong coalition of diverse stakeholders around the initiative.

Champions can come from a variety of places in a school community. Research on successful school initiatives found they often come from:
- **Parents:** With their children's immediate education at stake, parents can be extremely vocal and urgent in getting initiatives through. Champion parents often work through Parent-Teacher Organizations which have regular meetings, have strong influence on school politics, and can even fund certain aspects of school expenditures. Parents can be effective fundraisers when organized around an important initiative.
- **Teachers:** Educators who work with students five days a week are always seeking to develop ways of engrossing the students in their lesson plans. Teachers who can draw the line between their students' educational goals and their personal passion have the potential to become champions for new initiatives.
- **Students:** Self-starting students can capture the attention and imaginations of a school community. Whether it's recycling programs or collecting money for UNICEF, students have been able to mobilize communities to support and amplify their actions.
- **Administrators:** Our fieldwork did not have any administrator champions, but discussions with other stakeholders revealed that a passionate administrator can help a great deal by putting the right people and issues on the agenda. An administrator with an initiative has a great deal of power to push it through.

These champions are often enabled by a variety of community resources. With the support of these community resources their initiatives hit the fast track to becoming a reality:
- **Town/City Committees:** Municipal education boards form committees on issues of importance. Currently, most towns and cities in Massachusetts have a permanent Wellness Committee that reviews projects and provides influential recommendations about the status of student nutrition and health.
- **Community Grants:** Affluent communities often support their teachers with community-funded grants to support teacher projects. These are reviewed and issued on a yearly basis and provide method for champion teachers to initiate their projects.

- **Superintendent and His/Her Deputies:** Top-down decisions have power, especially with new superintendents seeking to make a mark. Oftentimes leadership changes provide an opportunity for champions to get their initiatives through.
- **Local Residents:** The support of the community through discussions, local media, and visibility help to garner local support for an initiative that keeps the momentum going.

- *How might a business like AeroFarms act to empower school champions?*

The Lawrence School Garden
One of the best examples of the importance of a champion in realizing a school initiative came from a field site visit to the Lawrence School garden. An 8th-grade science teacher at this Greater Boston public school was pushing to install meteorology equipment at the school, and he reached out to the school's PTO for support. He teamed up with a passionate mother who turned his attention to how a garden might help provide similar educational value. With her support, they received a repeated spot on the PTO agenda and eventually were able to raise $20,000 for the garden. Moreover, as the champions of this garden they used a great deal of their personal time working with contractors to redesign the landscape and set up the garden.

Ten years later, the garden is in full swing. One teacher is in charge of managing the garden and spends about 100 hours/year of his own time on it. He manages parents to help care for it and helps teachers integrate it into their curriculums. It is now a steadfast part of the school's operations budget.

Insight 3: Regional schools tend to have expansive facilities, greater purchasing flexibility for capital investments.

Regional and technical schools receive funding at an aggregated level meaning there is more potential for these schools to be able to make the decision for a significant investment. In speaking to a former public school administrator who now consults for regional high schools in central Massachusetts, we discovered funding from across districts for a single regional high school or vocational school can allow for greater flexibility in capital and discretionary spending. Regional schools avoid the bureaucratic friction normally associated with special projects that only benefit one particular municipality.

Vocational schools, in particular, tend to have science and engineering tracks, such as biosciences and agricultural technology. Experience working with high-tech agriculture during their education would help for an immediate transition to future jobs in agriculture. Furthermore, capital projects that benefit STEM-related curriculum for vocational schools are increasingly emphasized as these schools attempt to prepare their students for increasingly high-skilled jobs.

Acton-Boxborough's Regional High School has been able to embark on a $14.1 million capital investment plan in the year 2017 due to the aggregated funds they receive from serving multiple districts. The vast majority of these funds are dedicated to building improvements that facilitate safety, accessibility, and education.

Insight 4: Teachers desire teaching instruments to be a) flexible to meet a variety of curricula and b) modular to give all students hands-on access to the equipment.

The best way to introduce the towers in education is to make them as non-disruptive as possible by adapting the design and concept to fit into existing curricula. Moreover, the towers should be more than a showpiece for the school.They need to be regularly used teaching tool that provides continuous value to teachers throughout the school. In order to do this, interviews with teachers revealed two key considerations when they make while evaluating the usefulness and need of a teaching aid.

Customizability: Each grade has several topics that it must cover throughout the year. The more of these topics that can be enriched with a single piece of equipment, easier it is for the teacher to plan for class and the better the learning outcomes of students. Computers are an excellent example of a teaching aid that can be customized to almost any lesson plan. By the same token, AeroFarms' grow towers should be able to apply to a high diversity of curricula across a school's grade levels. Interviews with teaches in the 1st grade and 8th grade revealed several areas they would hope a Grow Tower might be customizable to demonstrate and experience specific lessons:
- Biology/Ecology: water cycle, photosynthesis, decomposition, pollination
- Physics: states of matter, light spectrums
- Teamwork and Interpersonal Skills
- Health: nutrition, dietary habits, culture-based health
- Entrepreneurship: students learn the whole process from planting, caring for sprouts, harvesting to selling the produce
- Engineering: how does the different variables in the grow tower operation impact the production (eg. mist, LEDs, etc)
- Cooking: growing ingredients, healthy eating

Scalability: Teachers prefer equipment that can amplify the experience of a learning activity. Thus, it is important for all students to have direct access to interact with any teaching aids. Thus, a single piece of expensive equipment is usually not as useful as several smaller versions. To balance between cost and experience, teachers usually will break their class into groups of 3-4 students. Each group will be allotted the materials and equipment for the class. With AeroFarms' grow towers, teachers recommended that the tower be highly modular so that trays could be taken to different group desks to be worked on, and then returned to the tower. Additionally, teachers recommended that to maximize the educational value of a grow tower, it should be made accessible to all the teachers in the school to work with - similar to how a school will have a single computer lab which teachers can use to enhance their lessons.

*Photo not of actual classroom to protect privacy of students, teacher, and school.

Scaling a Learning Experiences

The first grade teacher at the Lawrence school was interested in having a "class pet" for the students to observe and learn from. However, a single hamster or guinea pig for the entire class would make it hard to engage all of the students in the observational exercises he had planned.

Instead, he made 8 praying mantis habitats out of jars and assigned each jar to a 3-student group. Together the students have watched their praying mantises hatch and grow. They can touch and play the mantises and feel responsible for their well being.

Insight 5: Students' nutritional intake is often managed by 3rd-party vendors who ensure reliability, calories/student, and nutritional balance.

While AeroFarms' grow towers would offer significant improvement to the average nutritional intake of a public school student, we have found it would be difficult for AeroFarms to compete with existing cafeteria suppliers for school budgets and federal subsidies. Third-party vendors (such as Sodexo or Aramark) are roughly 90% subsidized by the federal government. These private services allow schools to not worry about managing a full cafeteria, greatly reducing the amount of time they must invest in this area. While the meals provided by these third-party services have received a great deal of public scrutiny recently, schools would be hardpressed to spend take on the added management cost of a grow tower using federal subsidy funding. The convenience and reliability of the third-party cafeteria system has thus far dominated over quality of food in the school cafeteria industry. There may be an opportunity to appeal to corporate sponsors looking to make an impact on this hot button issue, where federal and state grant funding is lacking (See Insight 6).

In order to make create a "nutritional value" pitch to schools, AeroFarms would need to first demonstrate that a grow tower could reliability replace existing leafy green sources. It would then need to demonstrate that the value of the consumption of these leafy greens is greater than the value of the convenience of its full-service third-party providers. While AeroFarms would not need to entirely replace the third-party provider, it would at least need to ensure that the grow tower's operational time and maintenance costs are returned in other arenas. Some studies have shown that students' test scores actually suffer from consuming too many calories and sodium from third-party vendors (http://ns.umich.edu/new/releases/6422). If AeroFarms could provide schools with persuasive data showing how students' preference to eat the AeroFarms' leafy greens leads to better test scores, this would provide immediate access to the $11 billion in federal school lunch subsidies.

Insight 6: There are several organizations with similar projects with which AeroFarms could partner to potentially help build relationships.

We have identified similar projects related to both indoor farming and gardens in schools that could serve as partners or references to launch the project. These are:

- Aeroponics Indoor Farms: This is a project focused on farming in a controlled environment to secure sustainable food sourcing. The main idea is to be cost effective, "bringing the entire crop cultivation process into a precisely managed operation, to maximize the good and reduce or eliminate the bad"[1].
  Moreover, they have a section dedicated to "install your own aeroponic equipment", for which they have a special design of small footprint commercial indoor farms that can be installed inside a truck. To finance these installations, they offer access to direct loans, farm leases and USDA FSA Loans.
  To further research this option:
  Website - https://www.indoorfarmsamerica.com/
  Contact - Tom Davis at tomdavis70@gmail.com

- The Edible Schoolyard Project: This project started 20 years ago with a school in Berkeley, where Alice Waters started a garden/kitchen and built a curriculum for the kitchen, which teachers used as a hand-on learning experience for the students. Now, the schoolyard offers over "100 varieties of seasonal vegetables, herbs, vines, berries, flowers, and fruit trees. Also, it has a staff of five teachers, two AmeriCorps members, and two administrative positions and robust corps of 30 volunteers"[2].
  Moreover, in the last 3 years, the Edible Schoolyard Project has secured funding to develop School Lunch Initiative, which "transformed what 10,000 Berkeley public school children are offered for breakfast and lunch in school, and how they learn about food every day."[3]
  Website - http://edibleschoolyard.org/
  Funding - Chez Panisse Foundation

- REAL School Gardens: This project is dedicated to building learning gardens in schools, focused on hands-on outdoor teaching in low-income schools. To achieve this, they not only create the gardens and the facilities necessary, but also work on training the teachers to be able to use the gardens as teaching tools that fit in with their science curriculum. They assure that their "partner schools have seen 12%-15% increases in

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[1] Indoor Farms America https://www.indoorfarmsamerica.com/who-we-are.html
[2] The Edible Schoolyard Project http://edibleschoolyard.org/our-story
[3] Ibid

standardized test score pass rates."[4]

REAL School Gardens is covering mainly texas but looking to expand across the country. Moreover, they have partnerships with both foundations such as ORIX Foundation, The George and Fay Young Foundation and The Meadows Foundation, and corporations such as Target, Bank of America, Walmart, among others.

Website - http://www.realschoolgardens.org/

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[4] Real School Gardens - http://www.realschoolgardens.org/who-we-are.aspx

Implications to AeroFarms

1) Identify affluent school communities in Northeast region by looking at housing prices (and mill rate), endowments, and PTO/community grants.

If AeroFarms seeks a profitable revenue stream from the beginning, their best bet for a beachhead market will be affluent school communities in the Northeast. These communities will be able to fast-track attractive initiatives by finding local funding. To do this, AeroFarms should spend 1-2 months identifying these communities by looking at the following factors:
- Housing prices which can be identified through publicly available mill rates
- Publicly available school budgets and endowments
- Size and activity of the PTO as measured by the existence of PTO websites, social media, and publicized grants and fundraisers
- Community grant sizes and frequency which can be found on the local school board's meeting minutes and/or community-established funds
- Local business communities that want to get involved in supporting educational projects

2) Identify and support champions by looking at publicly available meeting minutes and then amplifying their voice by inviting them to AeroFarms' summer camp/pilot program.

After identifying target communities, AeroFarms *must* identify and cultivate their champions. Having an internal champion to push for a grow tower investment not only helps the decision get made, but it builds the coalition of initiators who will put in the extra time to learn about and operate the grow tower. AeroFarms should consider itself a coach and cheerleader for the champions they identify by providing support in the form of curriculum development (see below) and communication aids such as diagrams, cost estimates, and potential outcomes. To find these champions consider:
- *Town Wellness Committees:* Most towns' education boards now have Wellness Committees which address initiatives regarding student nutrition and health. These committees have their meeting minutes available to the public and would be a likely place for a gardening champion to being his/her push.
- *School Boards:* Champions' activities will be noticed because of the momentum they build with their coalition of stakeholders. Successful champion's will be mentioned in the meeting minutes of school board meetings.
- *PTOs:* Call local PTOs to see their reaction to AeroFarms' grow tower idea. Ask if anyone would be interested in experiencing and using a grow tower for education.

- *Local News:* Local reporters will have the best idea of who's making pushes for new ideas in the school systems. Read a few issues from a target community and give a local reporter a call to find out more.
- At the same time, it may make sense to conduct targeted internet and outreach to science and technology teachers (via LinkedIn) to identify potential champions

3) Target schools beginning capital improvement projects, growth initiatives or curriculum expansions

School systems that are in the midst of significant CIPs could be more receptive to making a ~$25,000 investment in a grow tower. As mentioned above, recent activity in regional and vocational schools has revealed a heightened interest in making these capital investments. Regional high schools w/ consolidated financial resources from multiple towns tend to have expansive facilities. A great time to target such schools is when they are considering structural renovations and facilities expansions. Opportunity for special technology-based curricular expansion is ripe within the vocational or technical school domain. These special regional schools are increasingly emphasizing STEM education and could potentially derive great value from an AeroFarms grow tower installation and program.

4) Develop grow-tower specific curricula with teachers during a Teacher Summer Camp and/or pilot semester.

The incorporation of grow-towers in the school agenda needs to come complemented with a full curriculum that addresses the learning objectives for students. AeroFarms should focus the Teacher Summer Camp or the first pilot semester in developing the curricula that would include the use of the grow towers. As part of the curricula, there should be experiments design and matching between the grow tower features and the science learning topics the teachers want to cover. For a large investment into a grow tower, a school would hope the value would touch as many students as possible. Each state's K-3, 4-6, 7-8 curricula and lesson materials are publicly available. AeroFarms should review existing curricula and standards and map how a grow tower would bring value to each grade level of a school.

5) Redesign and remarket AeroFarms' grow-tower to demonstrate the educational flexibility of the unit.

The current grow tower does not provide teachers with the customizability and scalability they need. AeroFarms should develop a modular, smaller grow tower that could serve a class of 30 students that is broken into 10 groups of 3. The form factor of the unit will be critical in teachers willingness to use it as a teaching aid. Additionally, the grow tower should be amenable to "failure" as teachers will organize experiments for a variety of different lesson plans. Giving

teachers and students the ability to play with settings and nutrients mixtures to the point of failure would help students learn scientific method.

Additionally, AeroFarms should re-design the the unit to be shared as a school-wide resource. Specific challenges will include balancing between the demands of different classes and teachers; distributed maintenance and operations responsibilities; and distribution of the yields of the grow tower.

Recommendations

Drawing on the above insights, below we lay out two fundamentally different models:

a) On the one hand, we prescribe a set of market approaches for implementing a pilot program (within one specific school category or across multiple) that would eventually develop into a business line in the event of measurable pilot success. This pilot program approach assumes AeroFarms will commit some level of internal resources to developing a product/program offering for schools and will work closely with economic buyers across the various school categories to source funding;

b) alternatively, the company can elect to set up an adjacent non-profit organization with 501(c) status to raise funds for the explicit purpose of donating AeroFarms aeroponics systems to under resourced schools. Its mission would be clear: to promote enhanced STEM learning, agricultural awareness and nutritional health (this is, of course, an approximation). We believe either approach is viable while carrying associated benefits and risks.

Near-Term Market Approaches

We believe that AeroFarms will have to validate the value proposition of the technology in schools before selling and maintaining on any large scale (within both the public and private school segment). With that in mind, we propose three general approaches to testing and developing the value proposition in a limited roll-out. With all of these approaches, the implications outlined above apply. Especially critical to all of these approaches will be securing the right internal champion to foster and develop the program in conjunction with at least one AeroFarms staff member responsible for facilitating school partnerships and developing the business line on some permanent basis.

- **Tip-of-the Spear Pilot**: Target private schools within high income communities emphasizing STEM curriculum

    Rationale:
    - Able to secure funding most easily
    - Most driven to be on cutting edge in terms of science curriculum
    - More flexible in terms of staffing decisions and curriculum design

    Risks:
    - Minimal effect on children in most need of enrichment
    - Does not necessarily validate the program model for public schools

- **Public School Pilot Implementation:** Target regional and/or technical high schools with relatively high budget and propensity to spend on technology-based programs or any public school within wealthy district with high rates of local matriculation

Rationale:

- Relative to standard public high schools, regional schools have expansive facilities and more flexible purchasing processes
- At technical schools: Emphasis on technical training means they are incentivized to develop program and gain curricular value
- Public schools are in most need of such a program; starting here will allow the company to validate the model within the pure public domain and quickly transition to broader public implementations

Risks:

- Piloting in the public domain runs the risk of greater exposure to any failure or perceived lack of success
- Still probably a slower roll-out, even for a pilot as public schools exists on fairly rigid budget cycles

- **Charter School Expansion Approach**: Target schools similar to Phillips Academy and replicate what has been done there. Identify potential champion teachers like and program coordinators like Frank Mentesana to ensure adoption and successful maturation of the program

    Rationale:

    - Phillips Academy can serve as champions most effectively with this segment
    - Independent governance removes bureaucratic friction often felt by public schools
    - Can iterate on the model without being as heavily scrutinized as in a standard public school

    Risks:
    - As with private schools, the charter school model does not necessarily translate to public schools
    - Heterogeneity in school governance and operations presents challenges to replication elsewhere

Alternative Approach: Nonprofit Incorporation

- **Incorporate a nonprofit organization adjacent to AeroFarms, LLC:** establish an adjacent independent nonprofit singularly devoted to expanding K-12 student agricultural literacy and nutritional awareness via hands on aeroponic educational experience.
- This model assumes that AeroFarms would likely still want to pilot the implementation in 2-3 additional schools to develop a repeatable program before attempting to raise funds in excess of $250,000 to support wider implementation in 10+ schools.

Rationale:
- Establishing a clear social mission disambiguates reasons for entering school markets more broadly and aligns staff to a singular goal, while maintaining symbiosis with AeroFarms LLC's larger sustainability-driven mission.
- Streamlines approach to fundraising; non-profit can make direct appeal to corporate and private donors without any perceived or real conflict.
- Allows for company to make more immediate impact on those most in need of enrichment, and, if successful, ensures ongoing focus on this mission

Risks:
- Potentially limits opportunity of integrating a for-profit school business segment within AeroFarms, LLC. However, it seems entirely feasible that AeroFarms can distinguish between for-profit school sales through AeroFarms LLC and donations thru TBD nonprofit organization, if it decided to pursue both in parallel.
- Incremental "startup" costs associated with forming this new organization. However, since we believe AeroFarms needs to allocate internal resources to this project regardless of structure and
- Governance issues may pose challenge

Hybrid Approach

- As outlined above, the company might adopt some kind of hybrid business model strategy, wherein AeroFarms LLC either a) donated some amount (~$100k) worth of equipment and ancillary resources to seed the nonprofit and launch a pilot in schools within underprivileged districts. Simultaneously, AeroFarms, LLC would begin developing a for-profit segment by partnering and installing in private schools willing to invest. The two parallel programs could measure and compare their progress and best practices to accelerate any educational or operational innovation vis a vis the curriculum and program. This innovation would, in turn, promote future nonprofit fundraising as well as educational business development.

Internal Alignment and Implementation

- Regardless of business model type, allocate at least one internal business development resource 50-100% to the initiative. In addition to ensuring execution, the hire or reallocation signals organizational commitment
- Consider allocating additional resource to develop the program and standardize from educational and/or operational standpoint
- Focus on developing the technical curricular aspect of the program, integrating analytics and optimization capabilities
- Develop tools or program to measure nutritional and economic impact on school

- Work closely with school administrators and those teachers responsible for designing curriculum and facilities personnel responsible for maintenance
- *Staffing needs would change if AeroFarms were to elect nonprofit or hybrid approach

Future Expansion

While the company's public traction has been significant and the enormous value of the technology undisputable, it became clear in speaking with educators that the curricular value proposition needs to be better defined. This aspect will be the selling point for schools buying on the expectation of implementing a sustainable educational program. The cases for nutritional and economic value are likely valid, but not as critical to selling the program at this point in time. We believe the company should seek 2-3 wealthy private school partners with whom to partner and further develop the program before it seeks collaboration with the public domain, where stakes are much higher.

Under the market only approach, assuming that the company can foster 2-3 pilot relationships with well-endowed private schools over the next 12-18 months, we believe the company can validate its value proposition and quickly move on to public schools in wealthier communities. Similarly, if AeroFarms were to choose the non-profit approach, said organization would facilitate installations in 2-3 public schools, and proceed with expansion after validation. Regardless, the company and/or nonprofit must commit full-time staff over the next two years to develop the proper model from a physical, operational, and educational standpoint with its pilot partners. If successful in executing along these lines, we think AeroFarms LLC can start to build a sustainable "Agricultural and Nutritional Education" business line and/or nonprofit organization with reasonable goals of large scale implementation (100+ schools) over the next 3-5 years. At that point, the company will hopefully have a much better understanding of the unit economics associated with building and maintaining a school program at scale.