



“If you could combine those two things: money and expertise, and be hands-on in specific solution areas, it would be much more catalytic.”

A Conversation with Kaushik Kappagantulu of [Kheyti](#)

Ambika Samarthya-Howard

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Ambika Samarthya-Howard: Why are you working with tech and agriculture in India?

Kaushik Kappagantulu: Our mission is to increase incomes for smallholder farmers affected by climate change.

Ambika Samarthya-Howard: How do you define a smallholder farmer?

Kaushik Kappagantulu: For us, it's as simple as owning less than five acres of land. 85% of farmers in India have less than five acres of land. 75% of farmers in India only own two acres. That's 100 million smallholder farmers in India.

This mission came about because my background is not in tech, it was in social enterprise and rural livelihood before starting Kheyti [the Small Farmer Revolution organization]. I got into it straight out of college. I worked for five years in a skill development vocational training company startup to help school dropouts and villagers get access to jobs through training and placement services. I did that for five years and scaled that up, but I felt like we were solving a symptom of a problem, because every kid we were training was from a farming family, and they were leaving farming because it is not working and moving to other things.

Ambika Samarthya-Howard: A lot of what you're doing now is around climate change. How soon did this focus develop after you entered the livelihood skills field?

Kaushik Kappagantulu: For five years, there was nothing in climate change I was thinking about. I was thinking about livelihoods, livelihoods, livelihoods. When I started thinking about agriculture as the core problem we need to solve, I spent a year talking to almost a thousand farmers across India in 2015. That year every farmer we talked to, without knowing the word, talked about climate change. They say that in agriculture, you work really hard, but the climate decides whether you succeed or fail. The climate is

getting worse every year because of excess heat, unseasonal rain, increasing pest attacks, and drying water tables. If you want to increase incomes on agriculture, you have to solve the problem of climate change for farmers. Otherwise, there is no future in agriculture. That's where this focus started.

Ambika Samarthya-Howard: What did farmers say exactly about climate?

Kaushik Kappagantulu: They would say it's just a trend, that farming is always hard, but now it's getting harder. They talked about how before you would harvest until the end of March, but now we can only harvest until February because it's too hot. They said the rains would come in the beginning of June, but now they come in random times, or in unseasonal times when we don't think about it. Pest attacks have been increasing, and water tables are drying up. They say that farming is now at a level where it's not going to be viable in the next five to seven years if these trends continue.

That's where the tech angle came in. It was not because we wanted to bring in tech. We just asked ourselves how we can solve this problem. We looked at solutions across the world, and what's working in Israel, the US and Europe. There are so many technologies, including what we're working on now called Greenhouses, which people are using to solve the problem of mitigating climate change and making farming more sustainable, but also to protect them from climate change. These technologies were not accessible to smallholder farmers, so the model became how to democratize access to climate smart technologies for small farmers. That's how Kheyti started. We focused on these greenhouses as the first program.

The program is called the Greenhouse-in-a-Box. Basically, we make greenhouses for smallholder farmers. We make them super cheap, 90% cheaper than regular greenhouses, make them for reducing heat in the summer instead of increasing it, protecting from pests and rain, and using less water. We combine those [approaches] with training inputs, market intelligence, and advice so that small farmers can use them in the right way. That's a one-stop shop to adopt a greenhouse cultivation, which is a high-tech cultivation that nobody thought a one-acre farmer in rural Bihar would use. We made it work for them.

Ambika Samarthya-Howard: How did you make it work for them? Introducing a physical product to areas that are widely distributed from each other seems nearly impossible. How were you able to do that? Or are they building it themselves?

Kaushik Kappagantulu: No. We're doing it. That was a big challenge as most of the existing solutions were service solutions, advisory solutions, or mobile-based tech solutions. What we said was unless you change the actual growing [process on the farm], we don't have actual real depth of impact. There has to be a clearly different way of growing that we have to adopt in the era of climate change, not just advice or training.

For us, the advisory work was the second big part. First we needed to make the technology work for that area. The biggest challenge was cost, but also that these

technologies are made for places like the US with very different weather, very different paradigms, different crops, and different land sizes. The first focus was cost, so for five years, we did eight different versions of our greenhouse, primarily by involving thousands of farmers in the design process to ask how to make the cheapest greenhouse suited for Indian growing [environments]. That brought down the cost by 90%, and also made it modular, so that farmers can start small. They can start at 1/10 an acre and grow over time.

Also, we made it work for Indian vegetables. That was the first product development. There are still affordability problems, because even after a 90% reduction in cost, farmers still have a problem accessing capital. We work with philanthropies, government, and financiers to get farmers access to money to buy a greenhouse. That's the second part of our work.

The third part is that once a farmer buys a greenhouse, they still don't know how to use it. That's where the software technology comes in to give them all the support they need, not only training, but also day-to-day support to use the technology in the right way. That's where the software or the advisory part comes in.

Ambika Samarthya-Howard: How are you measuring scale and impact? On one hand you can measure impact by how many people have this, but if you're measuring impact against how this technology is working for climate change, it's very hard to know what would have happened if they weren't using it.

Kaushik Kappagantulu: The way we look at it is to start from a livelihood angle. First, we focus on the poor. Is this reaching the poorest farmers? We look at demographics and land sizes to measure that. Secondly, we look very clearly at an increase in incomes. On average, our farmers increase their income in their first year by 70% just by using this greenhouse for one hour daily on a small part of their land.

Then we look at the sustainability side. We do surveys and R&D [research and development] studies on water, fertilizer, and pesticide savings. We also survey the farmers to ask how much more they think they can adapt to climate shocks. Additionality [i.e. when a project's emissions reductions or removals are genuine and would not have occurred without the incentive provided by carbon credit sales or other project funding] of all of those things is a question. We don't know, based on this pesticide usage, whether they're using pesticide more somewhere else.

Ambika Samarthya-Howard: Having them funding your impact study is important, because even though climate is more complicated, that's where all the attention is going now.

Kaushik Kappagantulu: Yes, but even that impact study is more focused on the income side. There are not a lot of impact research agencies adept at measuring what's happening with climate on a big scale, systems-level. Or on the sustainability side. What we found is that farmers are at the R&D level where they can do a controlled setting to

look at greenhouse cultivation, but on a systems level, we've not found agencies that focus just on that very well.

For example, are farmers using things differently? Even carbon trade mechanisms look at some form of additionality, but it's not as strong as it should be. For example, in paddy cultivation, they're looking at how alternative wetting and drying [AWD] will increase sustainability in a certain way, but they're not looking at what is happening with that farmer in the rest of their land, when compared to doing paddy AWD in one part of the land. There's something to be desired when it comes to actual additionality, because I have seen farmers move to organic farming in one part of their land, and become even worse [on this] in the rest of their [farming] life, because now they feel they've done their part already. This study is going to be a challenge to measure over time in agriculture.

Ambika Samarthya-Howard: Can you explain your financing model, and how you're involving the government?

Kaushik Kappagantulu: We've not solved [the financing model] yet, but that is the challenge we're iteratively trying to solve. First [challenge] was reducing the cost. In the last three years, we solved part of that by working with philanthropy and CSR [corporate social responsibility] [to subsidize part of the cost]. Farmers also pay a part, which helped us scale from 500 farmers to almost 10,000 right now over the last two and a half years.

Ambika Samarthya-Howard: Are you getting any government funding right now?

Kaushik Kappagantulu: This year, we needed to move away from philanthropy to a more scalable model. We have a three-year plan to unlock government policy at scale. We started this year, and we got our first three state government contracts, in Andhra Pradesh, Telangana, and Uttar Pradesh.

Ambika Samarthya-Howard: Why those three? Was it the relationships you had?

Kaushik Kappagantulu: We just went to every state we were working in and looked wherever there were champions in the bureaucracy who were willing to try it out. Now the focus is to scale those up, but also move at the central policy level, because already there's a \$230 million yearly subsidy on horticulture that the government spends on farmers. Out of that, \$60 million a year is spent on greenhouses, but none go to smallholder farmers. They go to large commercial greenhouses because that's the only thing they know. We're trying to shift that policy. We say that just with that \$60 million, you could fund 100,000 smallholder farmers to get greenhouses. In 10 years, it would be a million, but if you increase that amount slightly as well, there's a lot of impact. That's the goal for the next three years, to create a share in policy.

Ambika Samarthya-Howard: What made you want to move away from philanthropy?

Kaushik Kappagantulu: We looked at all the models that could scale. The two non-negotiables for us are, first, we need to create a clear depth of impact on income,

climate resilience, and sustainability, and we did that in the first five years. Secondly, we need to get this to a million farmers because climate change is happening exponentially, and we need to unlock that market to get our model to a lot more farmers, because there are 100 million smallholder farmers in India. The only path that can scale fast to 100 million farmers in India is the government. Philanthropy cannot reach 100 million farmers in, let's say, 8 to 10 years, and markets are going to fail when it comes to the poorer farmers. Most technologies in India that have scaled to that level have had government support. It was just a process of elimination in looking at what would get our project to scale fast.

Ambika Samarthya-Howard: What is the difference between climate resilience and sustainability?

Kaushik Kappagantulu: Resilience is resilience to climate shocks and sustainability is agriculture as a contributor to climate change. Agriculture has a two-sided role to play with mitigation and adaptation. Agriculture is a contributor to climate change, but it also could be a mitigator because soil can hold carbon as well. It holds a unique place.

Ambika Samarthya-Howard: How did your relationship with Rippleworks go? What are you doing with them now?

Kaushik Kappagantulu: We've been working with Rippleworks since almost 2019. We started with a capacity building project. When we started building the initial product market fit, as we call it, to make sure the greenhouses work, we wanted to bring in experts to help us figure out the software side of things. We knew the hardware side of things. We did a capacity building project with Rippleworks where they brought a Silicon Valley executive to think about all that over four months, i.e. how to bring in technology to support farmers. We did another capacity building project with Rippleworks last year on supply chains to find out how we can buy and deliver a hundred thousand greenhouses a year for the next three years.

They also gave us a separate capacity building grant a couple of years ago of \$500,000 to build and train our team, because that's something we needed to do. Very recently in December 2024, they gave us a catalytic capital grant for our whole government plan. We told them we're ready to work with the government to unlock our plans on a big scale, so we need to invest in government partnerships and technology. They gave us a big two-year grant to accelerate the government part in getting to a scale point.

Ambika Samarthya-Howard: How did the original \$500,000 grant for capacity building work for your team? How much contact did you have with Rippleworks? Was it too little contact or too much?

Kaushik Kappagantulu: It is pretty hands-off, and at some point I should talk to them about it. It is basically an unrestricted grant. We spent a lot of money on team training. In one sense, it would have been ideal if they had a combination of their projects plus this grant. It was a separate mechanism, and the projects were separate. We did use some of their expertise, for example, their office hours to talk to their head of HR human

resources, and we worked with them on what kinds of training we should do. Basically, they let us figure it out. They gave us money to invest in HR and training, but otherwise they were fully hands-off. Even now, the much bigger \$3 million grant they gave us, they let us know that they trusted us. They told us to come to them if we need something for the capacity building projects, but otherwise we could spend the money the way we want.

Ambika Samarthya-Howard: While the hands-off model helps social venture entrepreneurs because they want to feel trusted, some are fine with the hands-on approach because they could really use the help from experts. What do you think?

Kaushik Kappagantulu: I was saying this today at a meeting with another funder which also does a lot of capacity building, the Autodesk Foundation. They were very helpful for us because we have a hardware product team, and they're a hardware design software company. Basically, their software is to design hardware, and they helped us build our product team. I was telling them that the ideal would be, and the same thing I would tell Rippleworks, an integrated program, with capacity building on the side, office hours, money for capacity building, and a capital grant. Sometimes the money is great, and we know how to spend it, but a bigger chunk of expertise is missing. For example, it will take me a long time to hire an HR head, because we're too small, even if you pay good salaries, get the right fit, and all that. If you could combine those two things money and expertise and be hands-on in specific solution areas, it would be much more catalytic. Autodesk has product experts, but the way they do it is similar to Rippleworks, in that you apply separately, and you get some pro bono support for a very small piecemeal thing. Rippleworks is giving us \$500,000, unrestricted, but they're expecting us to build a product. With \$500,000, if we spend \$50,000 of it on an expert, it would be much more catalytic because I don't know anything about how to build a hardware design team from scratch, but they know how to recruit and train them, so they could have helped us in things like that.

Ambika Samarthya-Howard: How was your experience with the Rippleworks office hours?

Kaushik Kappagantulu: We've done it a few times with their HR officer, Brooke Rufo-Hill. It's similar to working with an advisor about training, for example.

Ambika Samarthya-Howard: Did you feel that results came from that conversation?

Kaushik Kappagantulu: Whenever you work with an advisor, you also have to have capacity behind it.

Ambika Samarthya-Howard: So you need to have both advice and money to implement the advice?

Kaushik Kappagantulu: Yes. Then you need time from people, more than advice. For example, Rippleworks gave us money. We talked to Brooke about an archetype to use

to hire an HR head. When you go into tactical approaches on how to find that HR head, how to screen with the right questions, or what is the right fit for us, that would tactically be much more useful, even sometimes more than the money. The money can come afterwards as well. That's become a bottleneck sometimes for some of these areas. For example, if I had gotten an advisor for the government, that would help me get ideas. How do I start thinking about hiring for it? How do you build a coalition per policy influence? How do you separate a conflict of interest in government? Those are very tactical things that we had to figure out from scratch. That's the part of capacity building that sometimes isn't as easily available. Rightly so, since people don't have the time to get into tactics with you. They want to talk about the strategy level. There's something missing there in this sector. Perhaps somebody could figure that out.

Sometimes it exists with consultants. We work with a sales consultant who worked with our team to build team training, which we funded through Rippleworks. But then they embedded a team member, the sales consultant with Kheyti, for six months, who went every day with the team to the field to train them and also update the process. For an entrepreneur, that is worth much more than \$500,000 sometimes, because I don't have the time to spend on that, too.

Ambika Samarthya-Howard: Have you done Leader Studio?

Kaushik Kappagantulu: Yes. We did one of those on recruiting. I attended it along with one of my HR people for six weeks, an online training on how to hire the right talent. We were going to have one for mid-level managers, but we didn't have anybody then at that level. They wanted someone who's not too junior and not too senior.

Ambika Samarthya-Howard: We now are seeing a huge global shift in aid. Do you feel it's the time for philanthropy to fill in that gap? Or should we expect more from our governments?

Kaushik Kappagantulu: It's also a regionalistic concept. It's more of a pragmatic approach. India is a very big country. The scale of problems in India, if you look for philanthropy, is going to be very challenging. It's either solved by markets or the government because of the number of people in India.

Secondly, the Indian government doesn't want philanthropy. They're more restrictive about it. There is less and less philanthropy flowing into India every year because people also feel it's a difficult country. Or sometimes philanthropists think it's a middle income country that doesn't need our money anymore, which is also not true.

Pragmatically, there's less philanthropy flowing in, more restrictions, and a very big population. Government spending on subsidies is not going down. The thing that will probably change is finding more efficient ways for funds to flow. That's what we're trying to work on as well. The money is being spent. If you look at what they spent in horticulture the last 10 to 20 years, every single farmer could have gotten a greenhouse, and a drip irrigation, and even something else, maybe a solar pump and all of those things, and we could have been climate smart.

It's more about the efficiency of that funding flow rather than anything else. It's an interesting time with what's happening in the US to say, will that happen in India? I don't know. My sense is with 1.6 billion people, it's always going to be a populist socialist country, which will have a lot of government spending, and we need to lean on it. It's difficult to move the country in any other way because of the number of people and the fewer number of jobs we have. There will always be social benefits for rural Indians.

Ambika Samarthya-Howard: What are the things you've done on this project that have been the biggest lessons, mistakes, or advice you'd give to someone else doing this?

Kaushik Kappagantulu: On the positive side, not from a mistake, but from something we've learned a lot about by doing it is just proximity or human-centered design. We didn't start as a greenhouse or tech company. We said, we're a solution. Basically we start with the problem, spend enough time on it, and the solution will come. We include the same people who are affected by the problem, more than designing it ourselves. The greenhouse idea came up because we took 10 different technologies to farmers, and asked them what they thought and liked about it. Farmers wanted a certain amount of money per month minimum to invest in something like this.

From Israel, we brought the technologies to Indian farmers. We talked to 500 farmers and told them these were the technologies we saw. We asked them which they wanted and when they would use it. Then with every iteration of the greenhouse, we asked them what we should change to make it simpler and cheaper. We've had nine iterations in the first five years. In the last five, we've not done a lot of new versions, because we need to go back a little bit. We've involved more than 2,000 farmers in the design process. It's human-centered design rather than anything else. I'm a big believer of human-centered technology first, the user first, the problem first.

Maybe one thing we did too much of, or made mistakes we learned from, is that is on the bigger challenges, like financing and access to capital problem, is to have quicker iterations to try things out, letting some things go, and leaning in on one thing, rather than spending too much time on solving one problem.

You always have a bias. When we started out, this made a lot of sense on paper. We said loans are the main model to solve this, because it makes money in one year, so why wouldn't you have a loan to do it? Why would you depend on government or philanthropy and all of that? We spent almost four or five years solving the question of loans before figuring out we were at least 10 to 20 years away from rural loans being solved in India, because of multiple reasons.

Ambika Samarthya-Howard: What's the main reason?

Kaushik Kappagantulu: The main fundamental reason is that smallholder farmers have such high risk that they're not bankable, to be very honest. There's no profitable loan model that's going to work well for them for some time. I still think we should have

done some version of that, to use philanthropy to prove that the greenhouses work. We did that for three years and scaled a lot. We had a lot of impact.

Then we realized that the long-term model is still government, in one sense. We could have done a year or two of philanthropy and moved to government earlier. It's about maybe trying multiple models at the same time for solving the business problem, especially in the early stages, then maybe leaning into one. If we started out five or six years ago, probably we would have had earlier [success] now.

Hindsight is 20/20. It's getting stuck in solving one problem for too long, because there's always some progress. The incremental progress is sometimes risky because it makes you feel like there is something more you can do about that. The risk is that, in a lot of the early stages, it's based on the founders and the idea. Then you have the luxury of also trying the same thing for years if there's incremental progress and funders are continuing to support you. Or sometimes they go to the other extreme to say that this is the model, why waste time on anything else? It is useful for entrepreneurs also to think about prioritization and time boxing.

Ambika Samarthya-Howard: What are the top three things you need, outside of funding?

Kaushik Kappagantulu: Right now we need expertise on the whole government model.

Ambika Samarthya-Howard: Which entrepreneurs are doing it right?

Kaushik Kappagantulu: Everybody from Atul Foundation who's doing it with some government departments are starting to unlock some policy. Tarun from Indus Action does government benefits to last mile farmers. They make sure the government benefits are reaching the right people. They understand that level of work. Other entrepreneurs don't have the time. It's the tactical work of doing that. It's not high level strategic work, or if we're working with the government, we need to do advocacy.

Second one is a continued focus on the technology side, which is the software side. One of the main scale bottlenecks is still going to be, how do we provide this advisory service at scale? Government will fund the greenhouses, but farmers need handholding support. We are more of a hardware-focused company, so we need to focus on the software side a little bit more.

The third I would say is HR. It's a continuing problem. As you scale more and more, it becomes one of the main ongoing challenges. How do you build a scaffolding that can deliver a hundred thousand, a million, and after that?

Ambika Samarthya-Howard: Anything else you'd like to add, specifically about funding models?

Kaushik Kappagantulu: For the four livelihoods in climate change, we need to build assets. Asset financing in general is not solved for. I've been looking for solutions

everywhere, in Africa, Southeast Asia, and all the nonprofits. There are a lot of solutions for service-based models. They're working well. We're not building assets at the last mile. There's some for affordable housing, for example. We do not build assets for the poor in the global south, and specifically in India as well, but even in Africa. What are the models that are working? That's the question I'm continuously questioning for.

There's still things like carbon markets and new ones coming in, but what are the scalable solutions for scaling assets? Unless we build those assets, we're going to be incremental in impact, rather than exponential. Even in affordable housing, when you build a proper house, it's so much different than providing services for people in slums. EarthEnabled's product also is almost like a service. It's basically labor costs. They also had financing challenges, but now they're doing a lot of philanthropy focused work.

That needs to be part of the level two work we need to solve for, because there's obviously subsistence level work that has to be done, which is services primarily for farmers, namely training and inputs. What's the next stage after that? It has to be assets. When you look at low income and urban groups, how do we build more assets? That's how the next mile happens. You can't depend only on markets for that. Markets are failing the middle, because once you cross a certain stage into the middle class, there's not a lot of graduation programs after that.

Ambika Samarthya-Howard: That was great. Thanks so much.

Kaushik Kappagantulu: Thank you. Happy to do this.

Ambika Samarthya-Howard Samarthya-Howard (she/her) is the Solution Journalism Network's Chief Innovation Officer: She leads on innovation and technology, leverages communication platforms for the network strategy and creates cool content. She has an MFA from Columbia's Film School and has been creating, teaching and writing at the intersection of storytelling and social good for two decades. She has produced content for Current TV, UNICEF, Havas, Praekelt.org, UNICEF, UNFPA, Save the Children, FCDO, Global Integrity and Prism.

** This interview has been edited and condensed.*