



DECODING MICRO-IRRIGATION FOR FARMERS

Ft. Kaushal Jaiswal



DECODING Impact

[00:00:11] **Rathish:** Did you know that 90 per cent of all the groundwater in India is actually used by agriculture? And if there was one place we have to start to solve for water problems in India, it has to be agriculture.

[00:00:20] **Kaushal:** I think after politics and maybe cricket, water is the most discussed topic in India.

[00:00:25] **Rathish:** There has always been a conversation on micro-irrigation and drip irrigation. I've been in government meetings where they have said "We have to do this".

[00:00:32] **Kaushal:** There are a lot of benefits of micro-irrigation. Why? The basic concept of the micro-irrigation is you irrigate the crop, you don't irrigate the land.

[00:00:40] **Rathish:** The way pricing is done for water is by land size and not based on the volumetric value of water. So there is an incentive, a perverse incentive to actually get more water.

[00:00:49] **Rathish:** Why is the adoption so low today?

[00:00:51] **Kaushal:** Number one, is because of the technical side of it. Number two, the ecosystem is not available. And number three, the money.

[00:00:57] **Rathish:** I think there is a need for unlocking finance, which benefits the environment in some form. You can do everything you want, but the underlying mindset of assuming that the farmer is an intelligent person, I think stands true.

[00:01:09] **Kaushal:** So when he has the knowledge and capability to buy all those, which is not related to his livelihood, he definitely knows better than all of us.

[00:01:17] **Rathish:** This is not about one person selling one product. This is an ecosystem that has to be available so that the farmer is making an informed decision just like we are making informed choices.

[00:01:26] **Rathish:** India is still the largest market of micro-irrigation in the world. So our farmers are better than entire world in adopting the technology.

[00:01:34] **Rathish:** Welcome to Decoding Impact from Sattva Knowledge Institute hosted by me, Rathish Balakrishnan, where we take a look at population scale problems that need immediate and urgent attention and go beyond seemingly simple solutions to understand what does it take to solve these problems at system scale by engaging with experts on this topic.

[00:01:54] **Rathish:** This summer is a great time to have a conversation on water. Every household, every apartment is asking itself how much water it can save so that we have water for our daily use. But did you know that 90% of all the groundwater in India is actually used by agriculture?

[00:02:10] **Rathish:** And if there was one place we have to start to solve for water problems in India, it has to be agriculture.

[00:02:16] **Rathish:** Studies reveal that we are one of the largest exporters of groundwater because we actually export 32 billion metric tons of groundwater through agriculture.

[00:02:25] **Rathish:** We have 4 per cent of the groundwater share, freshwater share of the world, but our consumption of groundwater is actually much, much more larger. Thankfully, there are solutions like micro-irrigation and drip irrigation that are available that offer far higher efficiency, close to about 60 - 70% in water consumption in agriculture than traditional methods.

[00:02:47] **Rathish:** However, there are still parts of India where the adoption of micro-irrigation continues to be small. So it's something that is so important and has value for farmers, why is the adoption so low? More importantly, what can we do to increase adoption? To discuss this and more, we have Mr. Kaushal Jaiswal with us. He is the managing director of Rivulis Irrigation India, a company that leads micro-irrigation practices worldwide.

[00:03:13] **Rathish:** He's also the president of Irrigation Association of India, and brings in a wealth of experience from the ground down to policy on what it takes to make change happen. Sir, thank you so much for joining us today.

[00:03:25] **Kaushal:** Thank you for having me here on this conversation.

[00:03:29] **Rathish:** Mr. Jaiswal this is a topic that's very close to my heart. When we started the Sattva Knowledge Institute, we spoke about what are these population-scale problems that impact our country in the near future. And clearly, water was top of the list. And I'm from Bangalore. Most of our apartments don't have water today.

[00:03:46] **Rathish:** We have these six-hour lockdowns, et cetera. So it is not a problem that we discuss virtually. It is a real issue. And every data tells us that if you have to achieve water efficiency, agriculture is probably the place to start because 90% of our water is used for agriculture.

[00:04:04] **Rathish:** And there has always been a conversation on micro-irrigation and drip irrigation. I've been in government meetings where they have said that *yeh toh karna hi karna hai* [we have to do this]. This is exactly the right solution for it. But the numbers don't tell that promise at all. It's close to 6% that we see in terms of adoption.

[00:04:19] **Rathish:** You've been in this space for a very long time. So before we get started on the topic Mr. Jaiswal, I'd love to hear from you - what has been your personal journey? What got you to this very complex knotted problem of water efficiency in India?

[00:04:32] **Kaushal:** Rathish firstly, I think after politics and maybe cricket, water is the most discussed topic in India. That's, and maybe we all face it on a day-to-day basis. That's why we discuss it too much. So that's how it is. But the challenges are, as you mentioned how to resolve this problem and how to go about that.

[00:04:56] **Kaushal:** We may agree, we may disagree, there may be different viewpoints, but that's a fact of life. The problem exists, which everyone acknowledges. That's the good thing about that.

[00:05:06] **Rathish:** Correct.

[00:05:07] **Kaushal:** As far as my journey is concerned I'm an agriculture graduate from G. B. Pant University and then I joined a company called Rallis India Limited, which is a Tata Group company.

[00:05:17] **Kaushal:** And at that point in time, it was into multiple sectors related to agriculture and pharmaceuticals and maybe some engineering. Then I moved to the fertiliser sector, which was

Chambal Fertilisers, which is a build agro company, worked there for a few years, and came back again to Rallis. So came back to the parent company where I started my journey.

[00:05:41] And in 2001, FMC started their journey in India. I was part of the core team at FMC.

[00:05:49] **Kaushal:** Then I moved to Speciality Nutrition, which is water-soluble fertilisers. And there was a joint venture between Israel Chemicals and the Zuari Agro Chemicals. I moved there as a CEO in 2012 for the water-soluble fertiliser sector. And from there, my interest started for micro-irrigation.

[00:06:12] **Kaushal:** Because if you really want to use water soluble fertilisers, you need some of the mechanism to deliver the water-soluble fertilisers to the plant and fertigation as a technique is the best suited one for delivering water soluble fertilisers to the plants.

[00:06:28] **Kaushal:** And fortunately in 2016, I got an opportunity to start working for Rivulis. Since then I have been working with Rivulis Irrigation as their managing director in India. So that's what my brief journey, professional journey.

[00:06:43] **Kaushal:** What I feel always is when there is a challenge, there is an opportunity. Opportunity comes along with the challenge. So if you are resolving a challenge, then that is an opportunity for the people, whether entrepreneurs, whether the farmers, whether the government sector or policymakers. And now I am heading the irrigation association as the president. So, now that I am talking to you, I'll be representing the entire industry and their viewpoint here.

[00:07:08] **Rathish:** Excellent. I love how you say 36 years as a brief journey, Kaushal. It's a much longer journey. And I think sometimes I wonder how it is to see an industry from 1988 to 2024. So many things would have changed from this time. What I've seen in 1991, the opening up of markets to whatever has happened since then.

[00:07:28] **Rathish:** So one question as a follow up to that, which is how has the irrigation conversation evolved in India from, let's say, 1988 where you joined where maybe it was probably on the fringes is what I assume to now, what has changed and what has remained the same.

[00:07:44] **Kaushal:** In early 80s or late 80s and early 90s, the [fact that] water is a problem, it was not a realisation in India, to be very honest with you, right? We always thought is the problem of the Middle East and Israel and the countries those who don't have the water sources. India has enough water to survive. But late 90s, people have started doing that, realising that no, it's going to be a problem. India may face a serious water shortage for agricultural use, domestic use, industrial use, particularly fresh water. Look, in India, the availability of water is not a problem. We are fortunate enough country where we see a lot of precipitation, good rainfall, and a lot of water sources.

[00:08:40] **Kaushal:** And secondly, with the peninsular India, you have more than 7,000 kilometers of the coastline. So water is all across, it's not that the water is not there. The problem is the availability of the freshwater, right? You cannot use the saline water for irrigation purposes or other purposes otherwise, if you want to desalinate it, the cost is exorbitant.

[00:09:03] **Kaushal:** The cost is a major prohibitor for that. So how to overcome that? So that realisation started coming in the late 90s. That's what happened. And in 2003, maybe the government formed a committee under the leadership of Mr Chandrababu Naidu to give a report about how to rationalise the use and how to use fresh water more efficiently in the agriculture sector, because as

you mentioned in your introductory remarks, that agriculture consumes almost 85% to 90% of water, fresh water consumed in India.

[00:09:43] **Kaushal:** And you are also right that India has 4 per cent of the freshwater available globally, the total global availability and our consumption is more than 13 per cent of the global consumption. These are the challenges, the broader picture.

[00:10:00] **Rathish:** No, this is very helpful. And I think this context is important and usually is how nobody realises it's a problem. Then some people realise it's a problem, but then we come into this play that people realise it is a problem. Tell us also about, as part of the same conversation Kaushal, the conversation around micro-irrigation and how that has evolved.

[00:10:17] **Rathish:** What has worked better over the last 10-20 years? What is still the same? Would love to hear that as well.

[00:10:25] **Kaushal:** Look, in India there are states where the availability of the groundwater or maybe the surface water is lesser compared to the states where the availability of freshwater is more. If I compare the North with the South, the challenges are more down south than up north, right? Because of the Himalayan regions and the rainfall and the precipitation.

[00:10:51] **Kaushal:** And the availability of the groundwater in the Gangetic Plains is much, much better. So the adoption started happening where there was a challenge. The adoption started because there was a challenge in availability of the water. It was not that it was because of some economical benefit or environmental benefit.

[00:11:14] **Kaushal:** People started realising that the water is not available, how do I grow my crop? Maybe Maharashtra was the state first to realise that followed by Andhra Pradesh, Gujarat, Tamil Nadu, and then Rajasthan, Karnataka, where you are from, Bangalore. They started realising it a little early. That realisation is still lacking or there is less realisation.

[00:11:39] **Kaushal:** Realisation in the northern states, particularly in the state of Punjab, Haryana. Though the groundwater depletion is much bigger in these states, but still that realisation is not there because of the n number of reasons. Maybe the water is free. They don't pay for it. No one pays for it. Sometimes electricity is also free or highly subsidised.

[00:12:03] **Kaushal:** So you can extract as much as you want. Earlier the diesel was also subsidised in this country. So you can use the diesel pumps and now the government has started subsidising the solar pumps without having the convergence. So on one hand, you are giving the subsidies on the solar pumps, and then you are allowing the groundwater to be extracted, but it is not dovetailing with the micro-irrigation.

[00:12:30] **Kaushal:** This is the biggest conflict where on one hand you are allowing the groundwater to be extracted and then you are allowing it to be flooded. So there are challenges. That's why you see, if the adoption in India, in the six states, down south, from Tamil Nadu, Karnataka, Andhra Pradesh, Gujarat, Maharashtra, and maybe Rajasthan.

[00:12:55] **Kaushal:** These are the six states where the adoption is much, much higher compared to the other 22 states.

[00:13:01] **Rathish:** Interesting. Thank you for sharing that. I want to build on one point that you made and then ask you a follow-through question because recently I was doing a lot of work talking to industry about water. And the point that came up again and again, is that the cost of water is invisible to the farmer.

[00:13:17] **Rathish:** You're not paying for the electricity to get the water. And I was recently in a conversation with a government civil servant and he mentioned that the way pricing is done for water is by land size and not based on the volumetric value of water, which means irrespective of how much you flood your land, if the land size is the same, you're going to pay the same price.

[00:13:36] **Rathish:** Which means that the farmer assumes that value for money is more water coming for the same piece of land. So there is an incentive, a perverse incentive to actually get more water. So which means that if the price of something is invisible for me, I don't have any usage any incentive to reduce the usage for it. That's number one.

[00:13:53] **Kaushal:** My suggestion here to the government, whether you charge this or don't charge that is the call of the government of the day, whether you really want to charge for the water usage, but my suggestion to government is at least start metering it, start measuring it first.

[00:14:09] **Kaushal:** At least some time there is a self-realisation. When the farmer says I have used this much water and maybe out of that 50 per cent has gone to waste. The water use efficiency is only 50 per cent of the flooding. So maybe, sometimes self-realisation makes you do things better.

[00:14:28] **Kaushal:** Charge, don't charge. I'm not entering into that debate, right now, but at least metering it, start measuring it. This much groundwater is extracted and this much is used. So people will realise it at one point of time.

[00:14:45] **Rathish:** Correct. Before we go into challenges, Mr. Jaiswal, I wanted to ask you, what are the benefits of drip irrigation? Because there are people who are listening to this podcast who might not know the numbers, saying absolute value of water saved and other benefits to farmers. If you had to tell that value story to everyone, how would you frame it?

[00:15:04] **Kaushal:** Definitely there are a lot of benefits of the micro-irrigation. Why? The basic concept of micro-irrigation is you irrigate the crop, you don't irrigate the land.

[00:15:15] **Kaushal:** So the basic concept of the micro-irrigation is through the drip lines, the water goes exactly to the root zone where it is needed, getting absorbed by the plants and used by the plants. So there is no wastage of leaching down. So it doesn't percolate down into the soil and there are very lesser losses through evaporation. So water use efficiency is almost 95%, whatever you are irrigating, the 95% is getting absorbed by the plant while where you are flooding it. Number one, that there is absorption capacity of the plant. That plant can absorb that much. Rest of the things, either will go down, percolate down and will not be available to the plants or will get evaporated.

[00:16:12] **Kaushal:** There are challenges. So what we call is water productivity by using one KL (Kilolitre) of the water, how much kgs of the grain produced is much higher in your drip irrigation system compared to flood irrigation, that's number one. Number two, when you are using the right amount of water at the right time, the plant physiology is such that your production goes up because when you are thirsty and you are getting water, you get more satisfied. This is a natural physiology, there's nothing rocket science about that. So when that happens, the plant becomes much more healthier, your production becomes higher, your productivity becomes higher, and at the same time,

the quality of food grains or the fruits which you get are much, much better compared to the flood irrigated ones.

[00:17:14] **Kaushal:** And number three, the same system can be used for fertigation. So if you are using a micro-irrigation system for the fertigation, not only the water use efficiency but your nutrition use efficiency or the fertiliser use efficiency also goes high. The same principle applies when you are broadcasting the fertiliser.

[00:17:36] **Kaushal:** So maybe half of it is not available to the plant. And when you are, after broadcasting, if you are flooding the field. Some of it leaches down and pollutes the groundwater table and some of it gets evaporated. So, nutrition use efficiency is again more than 90 per cent in the case of fertigation. It is less than 50 percent in case of the broadcasting methods.

[00:18:02] **Kaushal:** Fourth one, when you are not irrigating the entire field, so the grasses or the weeds population which compete with the main crop is much, much lower with the drip irrigation systems because they are not getting the water, they are not getting the fertilisers to survive. So your crop weed competition is much lower.

[00:18:26] **Kaushal:** When the crop weed competition is much lower, then again, it results in a healthy crop, better yield, lesser labour because you need labour for the weed eradication or the weeding or maybe you'll start using the herbicides or the weedicides. So there is less use of the herbicides and the weedicides.

[00:18:49] **Kaushal:** And at the same time there is a saving in the labour cost. And fourthly [*fifth*] energy saving. While you are doing the flood irrigation, you are pumping maybe double the water into the field and that much energy you are consuming either electricity or diesel or any kind of energy. And if you are pumping a lower amount of the water, while drip irrigation, you are saving that much in energy.

[00:19:19] **Kaushal:** So lower energy consumption, less labour cost, environmentally friendly, lesser use of chemicals, as far as fertilisers or the herbicides is concerned, lower labour cost results into the saving. So every rupee saved is every rupee earned. So ultimately resulting in the higher farmer income

[00:19:43] **Rathish:** I want to go back to the point that you made on metering and share a personal experience, Mr. Jaiswal. So I came from a lower middle-class family. So in the mornings before I go to school, my job was to draw water from the well because we didn't have a pump. And I lived in, I grew up in Chennai. So Chennai summers are hard. When you drop the, I'm sure you know that when you drop the bowl to get the water in summer, it would just go down for a really long time before the sound of the water comes and then you draw it back. And just knowing that's all the water we had changed the way we as a family consumed water.

[00:20:17] **Rathish:** What we needed was the feedback loop saying *pani kam hai matlab* [there's less water]. Or when in the rains, when the water goes up, you know that you don't have to draw it down too much. And when you talked about the metering, that's what stuck me, because today, the farmer is not drawing the water, they might not even have a feedback loop to say *itna paani toh chala gaya mere land se* [this much water has been used], you know, so giving them the feedback loop makes sense.

[00:20:37] **Rathish:** But that sort of brings me to the question, all of the benefits that you talked about, because improved quality of produce, which hopefully results in better price. Lower cost for fertilisers,

lower cost for energy, lower cost for power and a better quality of groundwater because leaching is reduced, better quality of land because you're not overusing fertilisers.

[00:20:58] **Rathish:** All of this is great. Are the farmers able to see this value? When you've been in so many states, you've talked about farmers. Is it observable for the farmer to say, *yaar mujhe itna toh faidad mil raha hain* [I am getting these many benefits].

[00:21:13] **Kaushal:** Look, the challenge here is how to convince a farmer to start using it. Sometimes it's difficult for him to understand these tangible benefits. But once he starts using it, I keep telling people it's the question of when you start shaving, when the people start shaving, all the men, you start shaving with any blades.

[00:21:38] **Kaushal:** Till you start using Gillette, you don't realise what you missed, right? And once you move to Gillette, it is very difficult to move back to any other brand, right? I'm not promoting Gillette here, but I'm just giving you an example. Similar situation is micro-irrigation. It's difficult to convince farmers to start using. Once they start using it, once they start seeing the benefit for one or two seasons, it's difficult for them to go back now.

[00:22:09] **Kaushal:** So that realisation comes and that's why you are seeing the adoption in the states where they, those who started early is much higher. Those who are the latecomers, maybe that realisation will start coming and the adoption will come in the next 5, 7, or 10 years timeframe, right?

[00:22:30] **Kaushal:** Saving water or not saving water may be not the driver because they are not paying for it. But definitely saving on the labour cost is measurable, saving on the energy is measurable, saving on the labour cost is measurable. So all these things are measurable.

[00:22:48] **Kaushal:** I am not saying that, forget about the yield increase, even if you are getting the same yield with lesser cost is measurable.

[00:22:57] **Rathish:** Of course.

[00:22:59] **Kaushal:** So people realise that it's not that realisation is not there. And that's why year-on-year you are seeing that the adoption is getting improved.

[00:23:08] **Rathish:** Fantastic. Mr Jaiswal we've spoken about all the value. And we've also spoken about every which way the farmer is able to save money. And we know that the returns in agriculture are not high to a point where somebody says *yaar paisa hain toh kya hain matlab, karenge kaam types* [Who cares about money?]. A farmer really cares about every rupee saved because it is important to them despite this, the adoption of micro-irrigation in India is low. It's like saying, I have this beautiful thing that'll actually save you money, but people are saying *yaar nahi chahiye* [No, I don't want it]. That's a contradiction

[00:23:40] **Rathish:** I'd love to hear your thoughts on why is the adoption so low today?

[00:23:44] **Kaushal:** I keep asking the same question to myself. There are so much of knockdown benefits, measurable benefits, still the adoption is low. Why? So sometime when you introspect and you'll find that number one, it's not a plug and play system.

[00:24:02] **Kaushal:** It's a little complex. The farmer cannot go and buy the system and start using it. It needs a detailed hydraulic designing. Someone will go and design it for his field. So the same system

cannot be used for all the crops, same system cannot be used for all the fields. Same system cannot be used for all kind of water sources.

[00:24:26] **Kaushal:** So it requires different kind of systems for, maybe the customised system for each and every field. So that is one challenge. You cannot go and buy a tractor and start driving it.

[00:24:38] **Kaushal:** It will work in all the fields. So you need to consider water source, what kind of water source, whether it's an open well.

[00:24:46] **Kaushal:** It's a bore well, it's a groundwater extraction, whether there is a heavy metals or not, whether the source is from the surface or the maybe from the pond or maybe from canal or river. So you need to analyse that. Basis on that you will select the drip irrigation system, the filtration systems, and then, the farmer cannot decide himself all these. So number one is the complex hydraulic designing is required. Someone will have to go and do the installation for the farmers and then maybe farmer will start using it, but it's not a maintenance-free system. It requires a lot of maintenance also. Sometimes you will find there is a rodent damage.

[00:25:40] **Kaushal:** The rodents can come and chew the pipes and damage it. Sometime what happens when you are operating the implements, there can be mechanical damage to the system. Then there may be the choking of drippers because of the quality of the water being used. Sometime the filtration may get choked. So all these things require maintenance also.

[00:26:05] **Kaushal:** In states where the adoption is much higher there is an ecosystem developed to take care of all these things. So, when there is a person who is there to take care of all these things, the adoption may be much faster. But for a newer place or in an isolated place, if he wants to adopt a system and he has adopted a system and some problem occurs due to any reason, he may have to call the supplier or the company.

[00:26:41] **Kaushal:** And maybe the technician maybe available, not available, but the farmer cannot wait for the technicians to arrive. So these are the challenges and there, there are economic challenges for the companies, also those who are the manufacturers. In an isolated place where the farmer say farmer has adopted for 10 hectares or one hectare, I don't know.

[00:27:03] **Kaushal:** Ten hectares is still a big size, one hectare. And there is a problem in the system. The cost of doing the maintenance is much, much higher. So people generally avoid doing that. So these are the tech challenges for the technical side. We need to create an ecosystem for better adoption. Again, I will give you an example.

[00:27:25] **Kaushal:** Why the Maruti sells more is not that is the best car available because it can get repaired any nook and corner of the company. Similarly, if in every nook and corner of the company, there is a mechanic, there is a technician who can install, maintain, and repair the faulty systems, adoption will be much faster. Number one.

[00:27:50] **Kaushal:** Number 2, the initial cost, irrespective of whatever we may say, the initial cost is still too high for a normal farmer to adopt a system. Just a rough calculation - one hectare system may cost something between 1,20,000 rupees to 1,50,000 rupees depending on the crop and the water source and the availability of the water.

[00:28:14] **Kaushal:** But I am giving you a range. 1,20,000 rupees is still a huge cost, maybe \$1,500 is a huge cost for any farmer, any nook and corner of the world. Initial cost, you may recover that cost, you

may do lot of savings. The system life is five to 10 years, but initially, you need to have that much money in your pocket to adopt the system. So that is the second challenge.

[00:28:45] **Kaushal:** Third challenge is the government is trying to push us. Government is subsidising it. Most of the states, the system is available at maybe 70 per cent to 85 per cent or 90 per cent subsidy. Basic challenge here is the disbursement of the subsidy is not in time, whether it's a DBT or some other models. So when the disbursement of the subsidy is not in time, we go back to again, the same, the initial cost. And even the subsidy is disbursed to the companies, for example in some of the states where the farmer is only paying his contribution and the rest of the subsidy is coming after the verification and inspections of the company's account, there is a limitation of the working capital with each and every company.

[00:29:36] **Kaushal:** And fourth challenge is the commercial banks are not coming forward to maybe, do the funding or maybe do the loaning to the farmer for adoption of this step. Why it's number one, there is nothing called collateral here. You cannot do anything as a mortgage.

[00:29:57] **Kaushal:** Once the pipes are laid out, what will someone will do of the mortgaging it? It's not an implement on the tractor where you mortgage the tractor and do the funding and the farmer will repay it. So there are certain challenges we need to do brainstorming with the policymakers, with the farmer organisations, with the bankers to overcome this problem.

[00:30:19] **Kaushal:** If that happens, if the easy financing is available at the low cost financing is available, that may be the one solution so that the farmers can adopt it. Number two, the subsidy disbursement is in time. The farmers may adopt it. You can still arrange the funds for a few months. And even for, even in the case of the subsidies dispersed to the company, if it is dispersed in time, that much lower working capital, that much more rotation of the money, that much more service to the company.

[00:30:49] **Kaushal:** So it's a little complex. Number one, the technical side of it. Number two, the ecosystem is not available and number three, the money,

[00:30:57] **Rathish:** Yeah. And I think the first one, I want to pick up a little bit more in detail because till you told me this, I realised that, you know, it's like selling consulting versus selling, toothpaste drip irrigation is like selling consulting. *Ki aapko kya chahiye* [What do you want?] What is your land? What is your problem? Then I'll write a proposal.

[00:31:14] **Rathish:** Then I will come back to you. It's much easier to say, no, I want Colgate and then pick up a Colgate from the shelf. And I realised drip irrigation is consulting, not Colgate, but the intelligence of making this recommendation, Mr. Jaiswal, how hard is it today? Would you need an experienced, let's say engineer to be able to do that?

[00:31:33] **Rathish:** Or is that something that you can codify to a point where a local technician in the community can do it? What is the minimum skill? Forget qualification, but a skill, for us to be able to democratise this technical expertise across the country?

[00:31:48] **Kaushal:** Look, for the smaller landholding, maybe one hectare, two, four hectares, five hectares, which where the maximum number of farmers are in that. You don't need an agriculture engineer and AutoCAD designer to do that, but you definitely need some experience. And that ecosystem can be developed.

[00:32:08] **Kaushal:** We can train the people to do that. That's not rocket science. It comes with the experience, it's a simpler design, which can be done. And simple calculations or a lot of software are available when you put in the, say, inputs that will throw out the design. Now ChatGPT can throw the design to you, right?

[00:32:29] **Kaushal:** So artificial intelligence will play a bigger role here. I'm okay with that. And I welcome that if some software is there where a farmer can put the input himself, it can throw the design and someone can prepare a bill of quantities and the quotation based on that and give it to the farmer. That's not a very complex one. Yes, I do agree when it's a hundred hectares or thousand hectares, lot of complexities are there. But in a smaller set, I don't think that much of a complexity is there. Some trained manpower is required to do that.

[00:33:07] **Rathish:** Absolutely. And I think in the thousand-hectare case, the business case makes up for itself. So you mean the company will send a technician because ki yaar thousand hectares ki business aa rahi hain [we are getting business worth of thousand hectares]. But just to build that into the service and support as well, how hard is it to actually provide services and maintenance support to these products? And what sort of a skill level is required to make that happen?

[00:33:28] **Kaushal:** All said and done it's more of a plumbing operation. Any normal plumber can do the maintenance operation, right? What is there? There are the main lines, there are sub-main lines. There is a water pump, which is pushing the water to the filtration station. From there it is getting filtered and going to the field.

[00:33:50] **Kaushal:** So for the main and sub-main line, generally the PVC or SDP pipes are used. And beyond that filtration station or header unit, you will find that drip lines are used.

[00:34:01] **Kaushal:** Generally nothing happens to the PVC and SDP pipes. Their half-life is more than 100 years. So nothing will happen to that until and unless some mechanical damage happens and the pipe cracks and something like that.

[00:34:16] **Kaushal:** In filtration, there may be the mesh which can be replaced if the filtration is made for that. So it may get choked so you can clean it up. Automatic filters do it for themselves. They auto-flush the impurities that can be done or even manually also it can be done. So the flushing mechanism is there, available in those filtration station.

[00:34:44] **Kaushal:** And after that, there may be some mechanical damage to the pipes. If some plumber goes there and they rejoin the pipes, it can be done. Sometimes, yes, sometimes what happens, there is a choking of drippers happen. There are little technicalities there, where you can do the acid wash, you can run it, the acid can be run, phosphoric acid and any other acid which is usable, that can be done.

[00:35:06] **Kaushal:** But these are not very technical things, people can be trained about that, how to do that. And after a while, the farmers start doing it themselves. When a farmer starts using the system for 3, 4, or 5 years, he develops the competency to maintain that until and unless something is broken and needs to be replaced.

[00:35:27] **Rathish:** Yeah. So I want to take this service and support problem and I will come back to the financing problem that you highlighted as well. On the service and support problem, Mr. Jaiswal, one thing that I'm hearing you say is that a sole farmer in some random place, is harder to solve for, in some sense, we need some critical mass.

[00:35:44] **Rathish:** And two is some of these skills are very trainable skills. It's not like you have to have a BE degree from IIT to be able to do this everywhere. And you need a certain critical mass of farmers. So let's say if we are able to work with industry, and I'm throwing this to you, but it'll be great to hear your thoughts.

[00:36:00] **Rathish:** Let's say we work with a sugarcane manufacturing company or a cotton manufacturing company who have like these contract farms that are fairly large, it's commercial crops, so paying capacity of the farmer is better. And there is going to be a larger number of people. And if there is a way we can create an ecosystem, where the company, the agriculture company, where somebody like you, which provides micro-irrigation support can actually create a cadre of rural entrepreneurs that can actually do this well. Is that actually a doable solution for us to be able to achieve scale?

[00:36:31] **Kaushal:** You have exactly rightly pointed out what we are trying to do.

[00:36:38] **Kaushal:** Number one, the FPOs may be very helpful in doing that. Once we start working with the FPOs, it will be a cluster approach. Within that FPO, we can train their own manpower to do all these services. We can certify them.

[00:36:55] **Kaushal:** You talked about sugar mills, exactly what we are doing at Rivulis.

[00:37:00] **Kaushal:** We have just piloted some of the projects in Maharashtra and Uttar Pradesh, working with some of the sugar mills where we have brought in finance, we have created that ecosystem for the maintenance and the installation. And the results are amazing. You will not believe that this amazing adoption is happening in those sugar mill.

[00:37:25] **Kaushal:** We really want to scale up these practices. And for the second, which you talked about, like you or any other organisation who wants to work with the drip irrigation companies, everyone will be willing to work with that for creating that ecosystem, creating the rural entrepreneurs. There are three or four advantages to that.

[00:37:49] **Kaushal:** Number one, you are creating rural employment. Number two, you are creating efficiency in the services. You are saving a lot of cost for the industry for sending your own technician for 200 kilometres or 100 kilometres or 300 kilometres, I really don't know, depend on the area. That service is available next door to the farmer that gives the farmer confidence for the adoption. If there is an issue, his problem gets resolved within a reasonable time, I would say at a reasonable cost. And secondly, that guy who has done this, he has gotten employment. He either it will be paid by the customer, like farmer, or if the system is under warranty will be paid by the companies. So win situation for everyone, farmer gets service, someone gets employment and companies or the industry is saving a lot of cost. And overall, resulting in the better adoption of the micro-irrigation technology, which is the need of the hour.

[00:38:52] **Rathish:** Fantastic. I want to talk about the financing pieces. So then we'll try and see if we can tie it together. One part of the financing base, as you said, sir, is just to remove the friction of payment for subsidies. Because today if the farmer gets the money on time, if the company gets the money on time, because cash is not the problem, cashflow is the problem because money *abhi chahiye* (because the money is needed now), like you can't hold it in the books for a very long time.

[00:39:12] **Rathish:** If there is a way technology can be used for validation, verification, and friction free payment. I'm guessing that is one option, but that involves working with the government to do it.

But I want to crack the financing issue from a commercial bank point of view. As you rightly said, there is no collateral.

[00:39:28] **Rathish:** So if there's a tractor, it is there and it makes its own. But are there other ways to make banks or commercial institutions see this value? Is aggregation of demand going to help or is there other things that you feel will make this attractive for banks and financial institutions to come here?

[00:39:44] **Kaushal:** Two things in agriculture, the concept of EMI doesn't work because farmer doesn't have the regular income. The income comes to the farmer along with the crop cycle.

[00:39:56] **Kaushal:** For example, if some commercial banks or some of the financial institution, either NBFCs or any other financial institution want to fund it to the farmer, they may have to link it with the crop cycle. I am sure that there are certain RBI regulation which are a problem here. There are a number of issues which can be resolved, but someone will have to go and bell the cat. The sugarcane farmer will start earning money after one year when he supplies the sugarcane to the sugar mill. In between those 11 months, he has no other way to repay your instalments. So you need to link it with the crop cycle. You can involve sugar mills because that's where the aggregator, they are the aggregator, it's much more easier for them to maybe deduct that much amount and pay it back to the bank or the financier and the balance amount to be paid directly to the farmers. So it's much easier for the farmer doesn't feel the pinch of it.

[00:41:03] **Kaushal:** Money is easily recoverable. The recovery of that instalment, I'm pretty sure if you look at the crop economics, farmer may get it in one year or one and a half year, maybe in two instalments his system gets free. If that happens, sometime the farmer may not even ask for the subsidies. I'm talking at the full cost.

[00:41:23] **Rathish:** Correct.

[00:41:23] **Kaushal:** If the farmer is entitled for the subsidy and getting subsidies. Then is the bonus for the farmer. I'm fine with that. He can repay that loan much faster.

[00:41:36] **Rathish:** In some sense, the subsidy will accelerate the repayment rather than the purchase decision itself, depending on the subsidy, because that is the problem because the subsidy, you don't know when it is going to come. So you keep delaying the purchase. And when it comes out, so you don't know, it's not at the right time.

[00:41:50] **Rathish:** So you end up not buying. So if you see the subsidy as a bonus, it changes the way you look at the way you get this money as well. So we're talking four ideas Mr. Jaiswal, I'll just summarise that and see what, if you had to really do this at, let's say a million farmer scale, what does it take to make it happen?

[00:42:08] **Rathish:** One idea that we are talking about, as you rightly said, there's an industry provider collaboration in some sense, take a site approach, take a site which is an entire value chain, look at all the farmers there, bring in the financing, bringing in the technical expertise, enable the FPOs to become people who can offer services to their own staff, because it increases the value of the FPO as well, which I think FPOs are also struggling is how they can be relevant to the farmers.

[00:42:31] **Rathish:** So this is one idea: FPO industry product or manufacturer collaboration models. The second is the model of rural entrepreneur, which is identify an organisation that can bring

together a set of rural entrepreneurs. And the organisation should take some assurance of the SLA for the entrepreneur, which then is able to work with the product manufacturer.

[00:42:52] **Rathish:** Product manufacturer offers the training, payment in case of warranty and we can organise that the third model is really the frictionless subsidy model, work with the government to see how can we have digital payments digital evidence to be brought in. The fourth is to really look at industry-led collaboration with commercial institutions that's aligned to crop cycles. As you rightly said the RBI norms have to be organised around this but hopefully something we can do. Out of this, if you had to say a hundred rupees that you had to invest on saying, which has the most bank for the buck, where would you put the most amount of money?

[00:43:28] **Kaushal:** Look, I'll definitely put in creating an ecosystem first. It's a chicken and egg story, but if the ecosystem is available, when the farmer sees that the next door, when he moves out of his village, there is a shop which is selling the drip irrigation equipment, which is providing you all the assistance.

[00:43:47] **Kaushal:** That much confidence is there, right? That yes, I can buy it, I can do it, and there is a person who is known to me in providing the services. Secondly, the availability of the finances to the farmer, so that enable him to adopt the technology, which is known. He knows that it's beneficial, but he doesn't have the money to invest.

[00:44:12] **Kaushal:** You look at how the white goods market has boomed in India. You enter into any electronic shop, and there is a person ready with the final zero per cent EMI. You don't even think of buying 50,000 bucks of equipment or the one lakh rupees of equipment, you pay five thousand rupees, take it back home.

[00:44:36] **Kaushal:** And then you have signed a piece of paper where the EMI is on the auto-debit mode to your bank. Ideally, this kind of facility should be available to the farmer. Now the technology can enable that. I am absolutely clear on that. We need to really join hands with all the stakeholders right from the farmers to the banking institution or the non-banking institutions to the government policymakers to find a way to handle this.

[00:45:09] **Rathish:** Absolutely. I want to bring this down to specific priorities because I think the idea is really to have this bias for action saying *acha karna hain toh kaha karna hai* [where do we start from?], because I know that a lot of times when we talk about water, the image in people's mind is the waterlogged fields of paddy and wheat, "paani ja raa hai wahan pe" [water is going there] type of conversations. If you had to pick a few crops, what would you prioritise for us as low-hanging fruits to drive micro-irrigation?

[00:45:36] **Kaushal:** Tough question, but everyone has got their own priorities, right? But, to me, rice or the paddy should be the last priority. Number one, because of the package and practices, because of the yield impact, because of a number of things, and because of the cost of drip irrigation system in the paddy field. It is to be uh, very costly. It's going to be very costly because of the spacing. It has to be very low spacing. So you need that much number of drippers. To me, any say, long duration crop, which sees more of the sunny days than the rainy days like sugarcane.

[00:46:17] **Kaushal:** Despite having sugarcane in an area where the rainfall is more than 1000mm or 1200mm, still you will find 300 sunny days and you need to irrigate the crop for complete, throughout the year to make it healthy. So sugarcane is one, which is a very low hanging fruit. Number two may be your corn, maize, or maybe your cotton, which has huge acreages where if you start covering these

crop, you will be covering maybe 20 million hectares or more even in maize and cotton. Put together another 5 million hectares of say sugarcane.

[00:47:00] **Kaushal:** Then obviously all the orchards and horticulture crops. Number three is going to be the fruits and other vegetables. which is a high value crop and high return crop where the farmer doesn't mind paying it. Once you cover it, then let's go to the rice after that, I'm okay with that. Rice can be grown with the drip irrigation. That's the proven fact. But for that we need to change the way rice is grown, we need to migrate from the direct seeded rice, right from the transplanted rice. Once you started transplanting in the first seven days, you are forfeiting the entire concept because there is six inches of water available.

[00:47:44] **Kaushal:** You are flooding it with the six inches of the water on the field and then transplanting it. So first start moving from the transplanted rice to the direct seeded rice. And then in the direct seeded rice start adopting the drip irrigation system.

[00:48:02] **Rathish:** Absolutely. And I fully agree with you. I think with paddy and rice, I think changing the behaviour, because it has labour implications, it has other implications for the farmers. If you don't solve for it solving for micro-irrigation becomes like the second or third-level problem to solve. And unless we change the farming practice, I think increasing adoption of this is going to be difficult.

[00:48:22] **Rathish:** From a region point of view, any recommendation, Mr. Jaiswal, as to these states, given both the need, opportunity, et cetera, it'll be useful for us to move and prioritise.

[00:48:33] **Kaushal:** Look, that's the biggest challenge, unfortunately, we are not realising the water table is getting depleted in the northern part of the country, particularly Haryana and Punjab in the western Uttar Pradesh. And the adoption is still at a very low level there or negligible level there. So we really need to educate and sensitise people about drip irrigation in that part of the country.

[00:48:59] **Kaushal:** Fortunately, down south that realisation is there. And is the question of availability and other aspects of the businesses, but there the sensitisation is not there. Education is not there. First, we need to start educating up north, it's a very critical thing to do that.

[00:49:18] **Rathish:** We've talked about a lot of the immediate work, Mr. Jaiswal. So thank you. I wanted to throw two questions at you, which for me are a little bit more midterm in my opinion, but love to hear your thoughts.

[00:49:30] **Rathish:** One is sometimes we look at the problem of where is it really red at the moment and then go after it like Punjab and Haryana, which absolutely is necessary. But I also feel like there are emerging markets where increased productivity and increased income for farmers can have a significant impact. Like I'm thinking of Bihar, for example, the parts of Madhya Pradesh.

[00:49:48] **Rathish:** And so on. And there, there is an opportunity to actually make micro-irrigation the de facto approach to be able to do things. I wanted to get your experience outside of the north and the south, the east of India, which for me is always the problem child in terms of economic value.

[00:50:04] **Rathish:** How are you seeing that market? And is there a potential for going deeper there?

[00:50:09] **Kaushal:** Look in the east of India, Odisha is definitely, if you consider that in the east, is definitely an area to look into. And number one, there are challenges in the water availability of the

water. And secondly, the packaging practices and the crop are such, where you can easily adopt drip irrigation and the government support is also very good in the state of Odisha.

[00:50:38] **Kaushal:** So Odisha can definitely be considered there. I am not very sure, but in the plantation side of the tea plantation or the oil palm plantation, which is going to happen in the Northeast is definitely an area where we can consider micro-irrigation. Particularly in part of West Bengal and part of Assam.

[00:51:01] **Kaushal:** Turmeric is grown there and turmeric can be brought under the drip irrigation. Northeast is definitely an area which, where we can focus upon and because there are a lot of plantations, a lot of oil palm plantations, which government is pushing in Northeast. There are a lot of pineapples.

[00:51:24] **Kaushal:** So you can definitely do that. I'm not saying that, but again, the challenge is the ecosystem. You need to develop an ecosystem, so that the adoption happens. And if the adoption happens, whosoever is adopting, whosoever is coming into the forefront to adopt it, he should not feel cheated.

[00:51:44] **Kaushal:** That's where the whole idea is a farmer who is coming voluntarily to adopt the system and then he is not getting it repaired, not getting it maintained. So that is not a very good idea. If someone is becoming a brand ambassador, please support that guy with full might.

[00:52:01] **Rathish:** Absolutely. Fully agree with you. And I think the big alignment on the ecosystem idea like you mentioned earlier, when I buy a car as a person, the first thing that I'm thinking of is where I can get servicing and good quality servicing. And I don't buy a few cars, which are great driving experience, because I'm worried if I'm getting stuck somewhere, where will I go?

[00:52:20] **Rathish:** So your Maruti example was spot on. The second question, again, the slightly more midterm question, Mr. Jaiswal, that I wanted to ask you. is in some sense, when we talk about financing, we always look at the current commercial value discussion and seeing how that can be made to work. But some of these discussions when I think about it, I think it's good for the environment, even if it's not immediately good for the farmer.

[00:52:42] **Rathish:** Like we are saving water. The farmer might not care about water, but we as a country should care about water. And I think there is a need for unlocking finance, which benefits the environment in some form. There have been discussions around climate finance, carbon markets, et cetera. Is there anything that we can do at that level, which can make this decision easier for a lot of the farmers and manufacturing companies?

[00:53:06] **Kaushal:** Definitely. Definitely, we can do that. For saving water per se will not get to you the carbon credit. Let me be very honest, right? So how will you get the carbon credits? Number one, if we are able to change that package and practices and you know the carbon market, how it functions, and then we are able to prove that this much lower greenhouse gas emissions into the environment because of low uses of urea, say for example, when you start using urea, when it gets evaporated, releases nitrous oxide into the environment, which is 270 times more toxic than carbon dioxide. So if we are able to do that, then you are entitled to the carbon credit. Right now, a lot many companies are working with the farmers, but again, the auditing process is so complex for a normal farmer. We will really need to keep the thing simple and straight for a farmer to understand it. And secondly, who will bear the loss? No one is talking about it. In case of, because of these adopting the new technique where, he's entitled to the farmer carbon credits supposing there is a loss. I am not saying there will

be a loss, but supposing there is a loss, there is no one coming forward to guarantee that or recovery of that loss to a farmer. So if we are able to cover up some loss and incorporate confidence-building measures with the farmer, the farmers are ready to adopt technologies.

[00:54:54] **Kaushal:** Farmers are ready. Farmer understands all this. *Humko na yeh jo mindset hain ki "bechara" farmer. Yeh bechara word hata dena chahiye* [We have this notion that the farmers are very gullible]. He is an intelligent enough guy who understands this, but he needs the support system.

[00:55:10] **Rathish:** Correct. And I think it's, if it's true for us, it is true for the farmer. And I agree with you. Sometimes when we talk about the farmer, we make it a very mythical character. *Ki unko dhandha nahi aata* [They don't know how to do business]. They don't know how to make decisions. They are somehow just working in the farm, but I think they have, they are making their life choices with very difficult options already.

[00:55:30] **Kaushal:** He is the same guy who buys mobile phones, who buys computers, who buys wristwatches, who buys automobiles, who buys white goods. So when he has a knowledge and capability to buy all those which is not related to his livelihood and bread and butter. He definitely knows better than all of us what to do in the irrigation, which is his earning.

[00:55:56] **Kaushal:** So I'm pretty sure, but he needs some kind of support so that he can go and adopt those technologies.

[00:56:04] **Rathish:** Absolutely. On that note Mr. Jaiswal, I think we should end it because I think you've hit the nail finally on the head. We can do everything we want. But the underlying mindset of assuming that the farmer is an intelligent person, I think stands true for everything we want to do. It's been a fascinating conversation.

[00:56:19] **Rathish:** I want to summarise a few things that stayed with me. Number one, the water problem is real. We are not in the 1990s anymore. I think, like you said, we have 4 per cent share of the global water, our usage is significantly higher than that. And I think being aware of that is very important. Number one. Number two, there is already momentum in micro-irrigation.

[00:56:39] **Rathish:** When I started, I was a little bit more pessimistic, but like you said, in the Southern states, in Maharashtra, there is a proof point that when the ecosystem gets created people are willing to adopt. And what we need to do is how do we accelerate the creation of ecosystems in the new markets that we have to move to?

[00:56:53] **Rathish:** That's the second point. Third is like we said, two fundamental problems. The first fundamental problem is the fact that it is a complex product, it's not Colgate. It's consulting. So how do we make it easier for the farmers to adopt it? And how do we democratise the skill required to both sell it and maintain it for farmers is important.

[00:57:11] **Rathish:** Second, it is a financing problem. I think last time I spoke to you, you mentioned all of us would love to drive an Audi, but we should have the money to do it. That's because we know it's a good driving experience, we're not going to take it. So either through subsidies or through loans or by shifting the lending norms, How do we make income or money accessible for farmers so that they can make sure that the CapEx and OpEx of this is manageable for them, I think will be critical.

[00:57:37] **Rathish:** If you're able to do this data is telling us that the word of mouth will increase adoption, but we need to get the zero to one going by addressing some of these things. We also

discussed some of the more long-term opportunities, in terms of how do we look at carbon markets, etc. And I think the two points that you made, which is keep it simple for the farmer, bring the science to tell you what is the data so that we can unlock that I think is going to be important.

[00:57:59] **Rathish:** But I think the two things I take away from the whole conversation is one, the farmer is not stupid. The farmer is making informed choices, just give him the right incentives, he will take it. And two is this is not about one person selling one product. This is an ecosystem that has to be available. So that the farmer is making an informed decision, just like we are making informed choices.

[00:58:19] **Rathish:** I think this is a lot of value and a lot of this is practical as well, Mr. Jaiswal. So thank you so much for sharing this and thanks for the wonderful conversation we had.

[00:58:27] **Kaushal:** Thank you, Rathish. Thank you for having me here. It was really enjoyable conversation with you. And let me tell you one more thing. India is still the largest market of micro-irrigation in the world. So our farmers are better than entire world in adopting the technology.

[00:58:47] **Rathish:** Correct. So it's more about being, continuing to be winners rather than being a laggard and changing that. Thank you, sir. Thank you so much for sharing this.

[00:58:55] **Kaushal:** Thank you. Thank you.

[00:58:56] **Rathish:** Thank you for listening to this episode of Decoding Impact, a Sattva Knowledge Institute production. I'm your host, Ratish Balakrishnan, co-founder and managing partner at Sattva Consulting. If you liked this conversation, uh, head on to our Sattva Knowledge Institute web portal for more knowledge articles and publications we have on agriculture.

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