**B5CC - Interview Olarte Casa Luker - 14-7-2022**

**To begin, a presentation. Let’s begin with a presentation. Who are you? What organization do you belong to? Your role in that organization or institution and a little about your experience.**

Yes. My name is [name]. Currently, I work in a consultancy office, for cocoa. I worked for many years in Casa Luker and my experience is on all the process of the cocoa chain. Going from cocoa cultivation until its processing, for it to get transformed in cocoa. And my strong experience is in the post harvesting handling. From the fermentation until the industrialization of the cocoa and its transformation into chocolate.

**Whitin all of this experience, which you motioned was 30 years, currently, what is your perception in the cocoa environment, which is your main experience, what is there for cocoa, right now, at the regional level?**

Ok. We must mention that this area used to be very strong with cocoa but then it was transformed into coffee. Actually, everything you see is coffee cultivation. But the soil and the conditions are appropriate for an adequate cocoa cultivation, right? That is why there are some initiatives to have a second economic line in the coffee axis, which is conformed by Pereida, Armenia, and Caldas. Or more like… Yes, Pereida, Armenia, and Manizales, to go back to the times where there was cocoa cultivation.

**When you mention that I used to be more about cocoa growing rather than coffee, when was that?**

When there started to be, let’s say, some governmental strategies to find alternatives for international commercialization, other than cocoa. So, there started to be better prices and guarantees for cultivation of cocoa and… For the coffee farmer. And people started to aim their cultivations towards coffee crops.

**And do you currently, maybe, have figures on those interests or on the… No, not on the interests but on the difficulties or challenges to go back to cocoa cultivation?**

I would say that the unstable prices, let’s say, I don’t know if they are, for coffee in the international market. The weather, is another factor that influences coffee a lot. The growth of the cocoa industry. The expansion of the cocoa industry. International expansion. It pushes people, not only in Caldas, to look cocoa as another important source for economic movement. At the international level, there is that change towards the field of cocoa farming. That’s the first step. The second step… well, we know we are coming from a peace process. A peace construction process and if you observe the map where there are social conflicts and where cocoa is being cultivated, they are really similar. It means that in those areas, where there are social conflicts, there is cocoa farming. That is why, since some time ago, there is a big Colombian governmental project, together with the ISAI and some other institutions, to substitute illegal crops like coca and these other crops, for cocoa trees. In that context, then, there is a tendency towards cocoa cultivation.

**Ok. And the challenges for cocoa in the region, meaning Caldas, Quindio and Risaralda, what would those be, currently?**

Look. To start a cocoa plantation is not an easy thing. Cocoa is a long-term plant, let’s say. This means that in order to cultivate cocoa, or to get a cocoa plant into production, you need of at least 4 years. From 4 to 5 years for that plant to begin producing. This means that there are not crops that require… These are not easy economical handling crops for a farmer. You must have an agro-forestry schedule to generate money flow for someone who wants to develop a cocoa plantation. Even though a cocoa plantation takes from 4 to 5 years, there is the possibility to mix it with different types of crops with smaller production times and faster money flow. Such as banana, such as… other types of agro-forestry components, depending on the region. So, you might cultivate corn, bananas or other type of things. This could have an important focus since banana is abundant in terms of biomass production. A lot of biomass, right? And in general, in agricultural issues, there is a lot of biomass. Every banana plantation, for each banana bunch being harvested, the rest of the tree disappears, right? And since all of this is bio… materials, let’s call it, with high organic content, high cellulose, hemicellulose… All of these… lignin, pectin and all of these kinds of components that could be relevant for biofuels production.

**Thinking about the challenges cocoa plantations have, going into sustainability as a topic, where it is important to understand sustainability… But how should we understand sustainability like? Well, I think that from the top. The farmer sustainability, the business sustainability, that’s the reason cocoa is being cultivated… The sustainability of all of this context… Thinking of the current situation, what are the challenges towards cocoa sustainability.**

I would say that, if you look at is as the sustainability of a business, based on the three fundamental pillars, meaning the economical perspective, the ecological sustainability and the social impact sustainability; cocoa, and I would say also banana, are important. For us or for me, the most important part is everything related to environmental balance. Because, in the case of cocoa, the cocoa fruit is being produced. I don’t know if you know the cob and all of that.

**Yes**

That is an organic matter component that is obtained from the tree but the tree is not cut down. The tree continues to produce its oxygen and to capture CO2, etc. etc. I mean, it is not about cutting trees as the wood industry or other types of industries. I mean, the tree keeps producing and producing, surely for 20, 30 and 40 years, right? Here there is an important factor and it is how much biomaterial are we talking about around cocoa? We are talking about a 92% of bio-material that is not being utilized. This means that only 8% is transformed into cocoa beans that later get transformed into chocolate. But the 92% is a biomaterial that could be perfectly used. On top of that, if it doesn’t work… I mean, if it doesn’t get utilized, the contamination that it could generate is very high.

**You were telling us about the Casa Luker farm. From your experience in Casa Luker… As an organization, does Casa Luker have projects or activities that impact on the sustainability of cocoa crops and on the social sustainability you were talking about, regarding the producers? Do they have these activities?**

It is important for it to be clear, as I mentioned at the beginning, that I no longer belong to Casa Luker. Although I stayed for a long time in Casa Luker. I would like for that to be very clear. The second thing is, actually yes. And, actually, for Casa Luker sustainability is not a thing in paper but a reality. Actually, it is an area with its own manager, on sustainability, and a group of people working on sustainability within Casa Luker. I don’t know if you are following. Are you following?

**(Siban) Yeah, I am understanding.**

So, it is a very important area and, in fact, of great impact within the organization. That is why it is worked from the economical perspective, from the social perspective, with all of the cocoa farmers. Because they are the ones producing the cocoa, the ones producing the things we need. That is why it is very, very important. All of the social aspect and the way in which Luker supports this group of people in order for them to develop. That is the reason why the utilization, the research, and all of the things that we do, or that has been done, or that Casa Luker continues to do, on cocoa biomaterials, have a sustainability purpose. And it is to improve the income of the coffee farmer, right? To improve their families and to improve the general environment of the cocoa industry.

**Ok. From… Here it is about your broad experience within those 30 years in the sector. From the cultivation until the transformation and commercialization that you mentioned, in those 30 years have you had experience in bioenergy projects?**

Yes. But not liquid, not under this complex topic, which I still don’t understand, that is liquefaction. But indeed, regarding solid biofuel production, in order to generate thermic energy that then becomes electric energy, right? This, based on the thermal power that cocoa peel, and also coffee peel and what is left from the coffee and cocoa trims, and from all of that non-wood material, let’s call it, has. This can be transformed and then be burned to produce thermal energy and with that thermal energy to generate cold, if you want, or to produce heath if you want. To produce electric energy, if you want to. Right? This in order to create sectors that can interconnect with normal electric energy. Actually, in the country, there has been big examples from the sugar industry. Which, by the way, is no longer called the sugar industry. It is now called the sucro-energetic sector. Because there is a link between energy production, ok? From bagasse and all the leftovers being produced, with sugar production. And all of this, which is a beautiful example from the sugar industry, in the fact that they foresaw a long time ago that the activities from sugar consumption, which were harmful to people, could be transformed, the industry, and could aim to other alternatives. And these alternatives were the utilization of the biomaterials. Because of that, the use of bagasse, of the sugar cane, went to be used for the generation of paper and the generation of thermal energy for the production of electric energy. Actually, the sugar mills, are electricity generators, electric energy, and it is transformed in that energy to be sold to the main national energy central. That is why they… they electric bills are negative, meaning that the industry doesn’t consume nor pays for electricity. Instead, they sell electricity and they bills are negative because of that.

**By understanding that parallelism, sucro industry…**

Sucro-energetic

**Sucro-energetic, what would be the opportunities and the challenges or… Yes, how would the energy production impact on the cocoa sector? I mean, bioenergy.**

I would say that, if it is achieved… If what Siban mentions is possible to be developed, let’s call them biorefineries, where you could transform those residues, and we are not talking only about cocoa but all of the biomaterials that could be generated. When you are able to join, unite, assemble a structure for all these sorts of things, obviously, the possibilities would be very big. In that sense, there are still a lot of things that require to be developed. A development that has to originate from the original investigation on the potential these materials have, to identify the path that could be followed to the production… more like the use, that could be given to these biomaterials.

**I’ll show you a first scheme on what Siban and Susan are developing. Although the main project is clean shipping, which is the largest one, they refer to this scheme as biohubs. These biohubs become a win-win between local communities and the transformers, or refiners. We understand these communities as the countryside, represented in this green area, where there are many dispersed farmers, as Siban mentioned, which is why coffee and cocoa were prioritized. Since palm tree and sugar are large extensions of land and all of the residues are there and are transformed there, but coffee and cocoa are dispersed and not much is done with the residues. So, what is developed with such a large project as it is a biorefinery is a value chain, and that value chain begins with the recollection of the biomass. It is taken to, and this is a link we have to create, a biorefinery. In that biorefinery this process happens, which is a hydrothermal liquefaction, consisting of submitting this biomass to (high) temperature and pression. These four elements are obtained from which the biocarbon can be used to improve the soils, as a energy source or as a water treatment agent. Since this is a hydrothermal process, the resulting water would be used in this process, the gas would be reused in this process and the main protagonist of this process, the biocrude, would continue its way until reaching a crude refinery, as if it was a crude but being a biocrude, to finally become in biofuel for the maritime industry. There are many questions that could arise from there. Can it only be used for the maritime industry exclusively? Not necessarily. It could also be used in this transported itself. It could be used in this transport. There are studies being made. Yet, the final use, the proposal is this, due to what it represents. Given the large amount of fuel in the boats, in the industry. The large bet is placed here. In the biorefinery where the organic residues are being used, right? The residues, as you mentioned, being the trims, the pulp, the peels, the lixiviate, the honeys, the shells, all of this, for this process and we have to understand that this could also be used but it would have to be a very clean process, it would require of a very clean biomass and there is a more complex cultural issue. And, finally, this has an impact in the regional impact in education, an improvement of income for the productive sector, the coffee and cocoa producers, would have this income because this income goes back, right? The idea is for this income to returns through the purchase of the biomass, meaning the recollection of the… well, right now the shells are being sold for the silos. And for the pulp and the peels. Then, this is the value chain being proposed by Siban and Susan. That being said, from your perspective and experience, those 30 tears of experiences, what would be the benefits, the challenges and the harms to develop or why developing a project like this one?**

Challenges. Cocoa farming, coffee farming, are small holds meaning they are really small, sometimes very distant one from the other. The first challenge is how to recollect. How to create beneficio centrals for the process to be economically viable, right? For me, it is not true that the palm farming sector utilizes their own wastes in an industrial way. They use it because they have it there. Because it is organic matter. Because they need it to fertilize. But, in my opinion, I think there is a stronger network. Because they don’t have a better way to use them, that’s why they use them there. But if you look into the palm industry, you could use it into something way better. For example, this could be an idea. That is why I disagree on the palm sector as having figured out the handling of their waste. Now, the sugar cane sector has, as I had mentioned previously. But coming back, the challenge is how to collect all of these raw materials, coffee and cocoa. Banana has an additional advantage. They are large plots, right? Around the equator, they are large plots. So all of the production is centralized to a region. And they are large biomass producers, if you can call them like that. For me that’s the largest challenge. The second largest challenge, knowing cocoa farming culture… No, knowing Colombian culture, is the resistance to associating. That is a big issue. Because when people associate, things are way easier. But given the culture of ours, we don’t have the tendency to associating. Look at the examples. Asopanela, Asopapa… Well, all of these associations, if there was one that associated all of them, except for coffee which historically has been stronger. But associations, for example, of people who cultivate papa. (To Siban) Do you know papa? *pomme de terre*, there are so many associations around it because everyone wants to work independently. So you find an potato farmer association, a milk association, for cattle, you find a lot of these but very dispersed. Everyone aiming to different places. Different to Perú. Perú has large farming association. Therefore, all of the programs, when there are associations, are way easier.

**And regarding benefits and harms?**

Benefits. That is a large advantage and you must be aware of it. When Colombians are focused on working it is about working and moving forward. That is a big advantage. If they have the focus on something they want to develop, they won’t rest until achieving it. The Colombian work capability of Colombians is big. The creative capability of Colombians is big, right? The capability of getting in action and achieve big things, is big, right? If I were to choose between Ecuador or Peru to move cocoa and cocoa residues, I would stay here. There is way more effort and way more work capability. More understanding capability on the ecological links and on sustainability that people have to manage around farming, around social responsibility they have on farming. I would think that is one of the largest advantages it may have.

**And on harms?**

I would say… on harms? I would introduce there the government, the governmental side, on how to arrange the public and governmental sector for things to flow with clarity, without corruption, with an industrial and productive spirit rather than with political tangles. Actually, you could obtain resources for this project with royalties’ funds, being aimed with a more technical aspect, more scientifical, rather than political.

**Of course. A question that goes into the visualization is, as a consultant in the cocoa sector, currently working, and as someone who belong to Casa Luker… from your personal perspective as an advisor and as someone who belonged to Casa Luker, I take advantage of this to make this question, do you visualize or would you be able to see a role that you could perform in this value chain?**

From a personal perspective, I would say, yes. From the Casa Luker perspective, I wouldn’t really know right now but if the question would have been made time ago, I think so. Because there is also the possibility that the utilization of all of these residues under a win-to-win perspective, if it is a win-win, I think Luker would be down for it. Because as I said, one of the important things that are sought to be developed, is for everyone to win. Meaning that the cocoa farmer feels that what he is doing, that the effort that he is doing, makes him win. And it should be like that, no one works to lose. A cocoa farmer that has needs for the education of his children, economical needs and social needs. Look, if this is achieved, if people stay in the countryside… young people leave and come to the cities seeking for education but don’t go back to the countryside but they don’t go back to the countryside because they don’t see relevant business opportunities. If that keeps going as it is for the coffee industry… Here in Marisales you see a lot of coffee farmers that are owners of coffee companies but they stablish their business here. They produce their own coffee that has nothing to envy from anyone. They very well achieved coffees, very well processed coffee. They are kids who studied different careers in the University and now realize that they can create their own business here, that they can export coffee from their own plot and get a seal as *state coffee*, being a coffee they produce in their own plots, and they can export it. That is an openness that coffee farming has had and has helped for that generational gap, between the old farmers and the kids from those farmers, to come together a create a sustainable business. Sustainable at the medium term and environmentally friendly, right? That can be seen. But that is not happening with cocoa. The old cocoa farmers are staying in the country side. The young people leave and once they are in the cities there is no way for them to go back to the countryside. And that is an issue, not only here but in Ecuador, in Peru, and in Africa even worse. That is what is happening right now. Therefore, these kind of things that tackle these kind of things are very important. And not only that. I don’t understand why you wouldn’t use trash here. And I don’t understand why the fruit producing sector, since we are in a tropical region and they also produce a large number of residues, are not here, Siban. Do you know what is the reason that certain type of materials like, for example, orange… I don’t know, we are in the tropical area so the production of different types of fruits… you can get a lot biomaterial. What is the reason why you don’t have here this type of biomaterial?

**(Siban) Yes. That is because this is a new technology but it also gives the chance to integrate it with existing petrochemical industry. If you want to build a biorefinery for, I don’t know, new ethanol or… you have to build it from scratch. That requires a lot of investment. But, let’s say, if I just build one place, one reactor here, to get the crude, I could use this crude in the existing, already existing… it could be petrol or companies who already have infrastructure. We can just replace the crude, the existing crude, so it gives us the chance to actually integrate with the current infrastructure. That’s… yeah, that’s easy to realize rather than doing something from scratch. Which the unintelligible much more, rather than this kind of things. That’s one. Number two. This kind of biomaterials, if you want to prepare, those are… how to say it? They require specific conditions and specific feedstocks. You cannot just use any feedstock; you cannot combine it with anything. It requires really good sources of cellulose and pretreatment is necessary. You know? And the moisture context should be less and those kinds of things. But those technologies offer us those benefits, actually. Yes, we focus on HPL but it could be anything, right? The concept in this project is biohub, that’s the main stuff, but the technology can change. You can replace… yeah, you can remove thermal liquefaction and replace it by biochemical and then you can produce high value products like cosmetics, pharmaceutical, those kinds of things. But, yeah, we are focusing on that project, we are focusing on that technology which has a lot of potential.**

Perfect.

**Done. Let’s continue. Well, this question, I’m going to make it broader. It is focused on Casa Luker but I’ll make it broader. You can see it from Casa Luker or from the broad national context and it is, what is currently impeding the development of projects such as this one? What are the obstacles to develop projects like this one in Colombia?**

I don’t know about how much money we are talking of for a project like this. I don’t know how expensive it is to set up a biorefinery in Colombia or in the coffee axis.

**The investment?**

Yes. What kind of investment are you talking about?

**That’s the first point?**

The second thing, I don’t know at what stage is a project like this one. Is it a research project or is it a business proposal?

**(Siban) First we are investigating the potential and then, if it is possible, understanding the feasibility, what are the challenges, what are the opportunities, everything. And then, potentially finding local stakeholders who might be interested in this kind of project and then take it further. To get the land, to build the value chain.**

Yes. It is in the initial stages of information recollection and understanding the working potential this might have. But I don’t know if there are already small-scale models, working, producing, that biofuel for…

**(Siban) If there are any existing in the world?**

Yes.

**(Siban) In the world, yes. Yeah. They use the same technology with forests residues to produce modern biofuels. Yes**

**In Norway there is a biorefinery, one like this, that produces biocrude from *forest*…**

From wood.

**Meaning, yes, wood. Residues from the forest. Yes, residues from the forests. So the is. The technology exists. Everything is there and they are in the first stages of potential and viability.**

I would say that there is a big utilization potential in biomaterials. Actually, Latin America produces a large amount of biomaterials that are not used. You can see non-wood products that could be used for this, right? This, in order to leave the wood related ones in peace, for them to be the lungs, not touching them for the wood industry but to instead use different things. Rather than taking huge plots of eucalyptus and pine tree for the paper industry. Yeah?

**Siban and Susan propose in this grid, a relationship between actors in the cocoa sector, where they relate with power vs interest. High and low. High and low. And the actors they identified as being active in the sector, being this one, liquid transport, the one over here, the crude transport, the biomass collectors that don’t exist currently, although we already had a meeting with Interamericana… I mean, “Interandina de transporte and they said “well, it is very plausible, there are significant challenges in the tertiary roads but it is possible”, and the biomass collectors take it from the countryside all the way to the biorefineries. And, which is the other one that isn’t there yet? Oh, yes, the communication platforms. These are how all of this is made known and not only how all of this is made known but also how it would end up working, with these communication platforms. So, these are the ones that, up until now, don’t exist as such. For the rest, the actors are there as they understood it. In this part here, the first question is, who is missing here? Regarding the actor that interact. Or who should be here and why, that is not here, from the actors around coffee?**

Well, there is one too much. Or better said, this one doesn’t exist. Cenicacao does not exist.

**Ah, allow me to explain. When they were investigating, they learned about Cenicafé and they homologated what they found for coffee with cocoa. That’s what it says Cenicacao. It should be the Cocoa Investigation Center.**

Yes. And that one is one of the proposals that are being worked on. And I think that your university, at the agricultural sciences faculty, has worked on a project with royalties, last year and they are still working on it, with the goal to create cocoa research centers, but it is incipient. I don’t know how to place here one thing that is key. Look, without a doubt, the thing that hits the most a project working with biomaterials is the transport due to the high humidity content. For example, a cocoa peel has 86% humidity. 82, 84, 86. To transport 86% humidity in the project, means I am transporting water for this project. At the costs being charged in Colombia, it is too hard. That hit the project very hard. Very hard. It is like transporting water, right? Well, if it was drinking water, it wouldn’t be too bad, right? Because a 600mL water costs 1000 and something, 18000 pesos. That is different. But to transport water? That is mortal. Ok? The second issue is how spread are the cocoa plantations in a place like Colombia, with mountains and such things. Well, that requires such a internal transportation logistics that also costs. It is the same case as with milk, where they have to go to the countryside and collect it. It is hard. In the case of cocoa, there should be a way to transform at the countryside those materials, for you to be able to transport them. Allow me to explain myself. A cocoa peel requires of a lot of space due to its shape. Ok? A large volume. So you would be transporting a very bulky product, with a lot of water. They are two factors that strongly impact costs. To transport them to a zone where a biorefinery could be set, well, that’s a completely different issue in costs. Very hard. And I mean hard, hard.

**That would be regarding the biomass collectors?**

Yes. But there is another important factor here and it is the cocoa transformer. Because this is not… The cocoa is not a thing that you come, cut it, throw it away and store the product to be transformed alter. Cocoa requires of a fermentation, which is very important. The fermentation is carried on by microorganisms and has to be carried on in very specific conditions for that cocoa to develop the special aromas and flavors that give it its characteristics and value. I mean, you cut the peel or you cut the cob, you take out the beans and, on the other side, you get the cocoa. That peel has to immediately be organized, cut, transformed and taken out. Ok? Because that is an infection focus for the farm itself. And this cocoa has to be taken out immediately to be transformed. What does this mean? This means that, if you want for this to properly work, you would have to make cocoa collection centers but you would also have to do cocoa beneficio centers, because it has to be process there, at the same spot, right? So we need to develop new technology on how to make the cocoa fermentation elsewhere. Otherwise, there would have to be a plot here that produces a little. Getting 40, 50 or 100 kilograms from this little. Then going there for another 50 or 100 kilograms but that wears you off badly.

**Additional to that, who else is missing here? Who else would you put here?**

Missing… The transforming sector. Colombia is a country very into cocoa transformation, compared to Ecuador and compared to other countries. If I had been prepared… We did a very deep study on the cocoa value chain, right? Yeah, here it is cooperatives rather than associations, right? There are different things. Fedecacao, very important, I see it here. Biomass collectors, I don’t know how they might operate. These biomass collectors. What is liquid transport and storage companies?

**It would be from here to here.**

Oh, ok. The finished product?

**Yes.**

Ok. In specific conditions?

**Yes, of course. All of this transportation requires of special conditions.**

And it would be through maritime means?

**That would be all the way here. For the crude to be refined, which are the refineries that Siban mentioned. It could be the already existing refineries, such as Ecopetrol, or to export the crude as such, for it to be refined elsewhere.**

And would it be transported it via sea?

**It is transported by maritime means or it is used. If there is a refinery in Colombia…**

Like Ecopetrol

**And it would be used as such in the maritime industry. If it is exported, then it would have to be transported by maritime means, because of the characteristics and cargo conditions.**

This would have to work with Ecopetrol next to it?

**Yes.**

According to the new statutes from the new government, I think it goes towards this direction. Towards the production of different… Like Petro said, the production of biofuels, different to the oil production.

**Fossil fuels.**

Right? Because, if the commitment is at he says, and as the USA says, about having to work on the reduction of the emission of greenhouse gases and all those kind of things, he said that he would be closing these refineries no later than in twelve years. And it actually seems like he is making it happen because they were saying in the news that he was going to change all of the Board of Directors. Looking for different people that goes after energy sources different to oil. We would have to look into more detail about who is involved here, because… who plays an important role and it is the cocoa marketers and intermediaries, right? Because they are a strong group, running this business. You still have to look more into it but I do see that the people who has to be there is there. Although you are still missing the people who transforms the beans and who ask for a very specific bean quality, which is the way it is currently being commercialized.

**And what about the positions? Meaning the power position, and by power we mean the decision making in the sector. Regarding the power-interest relationships, do you consider the actors to be properly positioned?**

I would say that, in my opinion, Fedecacao should be in a higher position. It plays a very important role. There are other entities that play a very important role. Like Ika, like governmental research sectors that play a very important role. Agrosabia plays a very important role. Agrosabia or the government, through Agrosabia, won’t allow a single bean to be moved if there is no transparency with Agrosabia. Ok? Since it is the agricultural research entity in the country. I don’t see it here but it will play a major relevant role in the decision making, and in the technoscientific decision making, such as this one. That’s why they will be important, right? And all of the associations involved in social management. Social management in all of this. All of the structure from the agricultural ministry, which I don’t see here. It says national government but what is the national government? Well, yeah, they are there, but for this… MinAgricultura, all of the entities that have to regulate everything related to agriculture in the country, they will play a very important role. They are not there. This still requires a lot more work in order to be able to properly understand it. Because, otherwise, you won’t be allowed and the project would die, from the government side. That is why I was telling you to be careful with everything related with government and how things interwind. Otherwise you wouldn’t be able to do this. You know what? You actually would require to get in through the government, in order to articulate a project of this size in this field. Right? Tgat is the… Look, I’m telling you this based on my experience. When we went to manage, from the Luker perspective, large projects, I don’t know, with 1 000 hectares, 500 hectares, it was not easy. It is not easy to manage the culture, the ways of thinking from the region you are going to work with. Despite it being projects with 1 000 hectares. You would expect it to only impact in a small amount. But when you have farmers here, farmers there, dispersed through all of the department or the country, it won’t be easy. And remember, we are in a country with guerrillas and all these kinds of things. These associations are missing here. Or, better said, this is being looked from the industrial perspective. Like saying “Yes, as industry I need from this one, this one, and this one”. It is not that simple. This is a very simple value chain. Very easy. But it is still missing a lot of research, if you look at it from the doing an industrial project perspective, ok? Because they play an important role. That’s why the aspects of sustainability is not a topic… I insist, it is not a topic where you just go and say “Oh, I want to be sustainable”. It requires of deepness. Of a lot of deepness. For it to touch all the things. Do you remember how at the beginning I told you about three fundamental columns? There is a social one and it is an extremely important one.

**Right now, with the consultancy service you provide, whit which of these actors do you relate with and how are these relationships?**

Look, Fedecacao is important because it links a large part of the cocoa farmers in Colombia. Just like it says, Fedecacao. This is important, too. But let’s change Cenicacao with Agrosabia and entities from the agricultural ministry, who are the ones in charge of all this area of research, ok? And actually, one of the strong research groups from Agrosabia is focused on cocoa, because they see a big potential in cocoa. You have to interact with this one. You have to interact with this one. With the national government, who has a role with the agricultural ministry and the UMATAs and all of that. They are things you have to work together with. How to handle the associations? Not really cooperatives but more like associations. People tends to associate and there is a large number of agricultures, which are partially managed by Fedecacao. And transport, that is clear. No… There has to be a very obvious relationship with all of the actors that play an important role in the agricultural value chain. Not only for cocoa. Just like for cocoa there are… it is a national concept, on how to create aggrupations.

**(Siban) I have a question. So, Casa Luker actually has farms… yeah, farms that cultivate cocoa, right? So what kind of… Who owns the land? So, Casa Luker owns the land or it has connection with the farmers?**

Both of them. Casa Luker has very large plantations. 1 000 hectares plots, projecting to 1 500, and 2 000 and more hectares. Because… Due to all of the experience I mentioned, to handle associations is not easy. Therefore, on one hand an industry has international commitments to fulfill, right? And on the other hand, there are associations and farmers that go by the circumstances according to the government. Therefore, it can’t be given as granted, important decisions on the cocoa supply, based on certain given social issues. That is why they have to own at least part of their cultivation. Even a little, to sustain a part. But without a question, it has its own plots and it might need to increase them, just as it has connections with all of the farmers and associations in Colombia. In fact, it has a lot of cocoa buying centers dispersed throughout the country. Ok?

**(Siban) So, when Casa Luker actually connects with those farmers, it is like a contract? Like, “ok, you’ll give me whatever you produce”. Like, what kind of contract or agreement do they have? Is it a short-term contract, a short-term agreement, or a long-term agreement? Let’s say, if I am a farmer in Casa Luker, so, if you want me… If I want to sell the cocoa or you want my cocoa beans, what kind of… Let’s say, is it a one-year agreement that I would sell? is it renewed every year? Or is it one for five years? Or what kind of… is there any agreement between the farmers and Casa Luker?**

Let me see if I understood. The question is if there is any agreement with the farmers, that could be for 5 years, or for a single year, or four years, etc.

**Yes, what kind of contracts are there when they buy?**

No. No, because a cocoa farmer won’t sign a contract for 5 years. The farmer’s mentality is living day by day. But, attention, where do the large industries play an important role? In the credit, in the money they can get through banks. For example, I am a farmer and I will sell to Casa Luker… In Colombia there are two major companies. Casa Luker and Nacional de chocolate. They are two large companies that buy almost 80% of all the cocoa. So I am a farmer and I tell Casa Luker “Casa Luker, I sell my cocoa to you. I want you to be my support to tell the bank that you will be buying the cocoa from me” and Casa Luker will say “Yes, sir. I will buy your cocoa”. This represents some sort of contract but people don’t really sign contracts. And so they go to the bank and say “Yes, sir. I will be your guarantor”. They go to the bank and say yes and all of that. They serve as a support, but not… I don’t know how to say the word in English. Guarantor, or responsible from the credit they get. They simply say “Yes, I will buy all the cocoa you have to sell” and the bank says “Oh, ok, the farmer has someone to buy from him and therefore he has how to take responsibility on the credit I will give him on cocoa, to plant cocoa, that I will give him”. There it plays an important role. Another important role that the industrial companies play is due to the fact that no one has… Or the farmers don’t have too much money to buy cocoa. I’ll explain myself. I need to buy 20 tons. They will cost, let’s say, 2 000 million pesos. A farmer doesn’t have that. Or an intermediary, who also play an important role, won’t have that money either. But the big companies will and they will say “I’ll give a part in advance. Go buy and I’ll later give you the rest of the money I owe you”. And so the companies provide part of the money. They obviously won’t lend to anyone but to the ones that had already worked with these companies for a long time and they are acquainted with. So they give money in advance and that is the way in which they can manage work around cocoa farming. That is why I say there are many things missing, because without these actors, there wouldn’t be no one producing cocoa, nor commercializing cocoa, nor circumstances that allow for the planning of new plantations for a cocoa farmer to expand or sustain his crops. He needs someone to lend money, someone to buy the production, someone to buy supplies, etc.

**To finish, this is a scheme, a map, developed by Siban and Susan where you can see some of the raw materials or the residues that they plan to use. You can find the pulp, it is here, the peels, the coffee grounds, including the cocoa peels, the cizco, between other things, all that comes from the countryside comes to the biorefinery. In this biorefinery water and gas are reused, that is why they are not shown here, and as a result you obtain biocarbon**

Yes, the biochar

**Which can be used for soil improvement, etc. and the biocrude, which is the main protagonist. That biocrude, at the end, is pretended to be used in the maritime industry and the aero-industry, without forgetting that this biocrude could be used for biofilms, for bio-packaging and single use in general, and also in plastics, textiles, adhesives… Everything that a fossil crude could be used in, but coming from the bio field. So, this is an scheme of what they want to achieve with the project.**

Perfect. Yeah, this is what you could imagine could be happening with a biorefinery. Yes, yes. You have to remember, too, because the political aspect plays an important role in that value chain, as we said. Remember that, not long ago, they approved a law in Colombia for the use of single used plastic materials. It pretends to drastically reduce plastics, right? So, in Colombia the plastic must be reduced. Not only in Colombia but in the whole world it will go down. As such, you really have to take this into account. Regarding textiles for clothing, it is an important thing. Also for wheels. Cosmetic is another important thing. It is a very important industry. The adhesives are also a very important thing. Fertilizer is another thing that the government is promoting. All of this as a result of the Ukraine-Russia issues, and how it has hit, and also due to the pandemic. It is not as the previous scheme, two years ago, where the ones that knew how to produce, produce and we will buy. That is going to change because of obvious reasons. And so, yes. I completely agree and this is what I would like. Ok? Yes, yes. Here I see some pictures. This is palm residue, right? It does not go here. This one does, this is coffee. Well, coffee grounds. Very good.

**Do you maybe have any specific question for Siban?**

Well, I would say that the idea is clear. It is what you might always hope for. To develop projects where you use residual materials from farming. Using them in an industry where you can find applications. In the specific case of cocoa, from my own perspective, regarding scientific research we have always tried for… just the way they are talking about petrochemical, oleochemicals, we have always wanted to come up with cocoa-chemicals. Because, from cocoa, there is a large number of important components. If you look at the cocoa cobs, you can see different colors. Yellow, green. These are important antioxidative substances. Cocoa is one of the products that has the most antioxidants. And when you speak about antioxidants, it means that these antioxidants can be used for… for example, for the skin. Because they have antioxidants that block the UV rays. In fact, there are projects to work with natural sunscreen components. The consumption of cocoa and other biomaterial components, could produce, let’s say, beneficial effects on cancer control. If you wanted to work with cocoa residues, cocoa has, or that cocoa peel has a big pectin content, which works as thickeners for soups, or thickeners for jam, marmalade, etc. Right? For the production of biochar, it is also important. But a biochar to be used on the face. Or also as a material to help on the agricultural soils. It has a big potassium content, ok? And so, you might say that it is has a large potassium content it is because it has extracted a large amount of potassium from the ground that should be but back into the soil. And potassium is a very expensive fertilizer. One of the most expensive ones. So you realize, they are so many ways to use biomaterials that can be obtained from cocoa. It can be used as bio-strengthening material that could be used in combination with other polymers or biopolymers, and be used for the fabrication of car parts, right? The dashboard, the bumper and different parts from the car. When talking about cocoa. But if you look at other things, ther are also other materials that could also be used, right? A large number of materials being produced in this tropical region, which a lot of things could be done with.

**(Third person joining) Hello, how is it going? How has the morning been?**

Everything is fine, everything is fine.