

CONTINUATION

During the preparation research, the evaluations stage and activities with local families, students and craftsmen, we have learned a lot about the project and the country. We see a lot of opportunities for the future that can contribute to the continuation of the project and even further to the development of Nicaragua.

1. Direct implementation
 - a. Four groups of focus
 - b. Continuation processes
2. Constructional continuity
 - a. Bamboo suppliers
 - b. Bamboo clients
 - c. Bamboo prefab company
3. Research continuity
 - a. Universidad Centroamericana
4. Contribution to development
 - a. Development through business
 - b. From project to development

DIRECT IMPLEMENTATION

The goal of Bambú Social Foundation is to improve the housing conditions in Nicaragua by sharing knowledge and expertise about the use of local resources for sustainable and affordable social housing. Throughout the report we concluded that direct implementation is needed to get to this goal. In the Impact Analysis four groups of focused are defined. As for our project, we already tried to focus on all four groups. The activities with and involvement of the four groups of focus are summarised below.

FOUR GROUPS OF FOCUS

Target group

During the home visits there was a direct contact with the target group and Bambú Social. Because of this we had the opportunity to actively invite them all to a final event of Bambú Social 2.0 (see General Continuity). By sharing information and feeling welcome, we believe that the families will feel involved in the project and will be open to bamboo housing.

Students

Since the execution phase, students have been involved during the designing process. Among thirty architecture students we shared our thoughts about bamboo housing during the UCA Design Case. Later five UCA students actively contributed to the bamboo development by finalising the design of an alternative social house. This house can now be integrated in the future plans of Bambú Social.

Craftsmen

Through interviews, local craftsmen helped us with the constructional analysis. With this input, we came up with recommendations and new connections. These were tested in experiment Techito which was built with the help experienced bamboo constructors, and of which the bamboo was cut with the help of craftsmen.

Bamboo suppliers

In our search for bamboo we explored where we could find the right bamboo and on what farms. During business meetings we learned about future collaboration opportunities for Bambú Social, with both bamboo supplier and future clients.

BRINGING THEM TOGETHER

FINAL EVENT

According to the impact analysis families will feel more involved in the project if they get actively invited to

Mensen moeten wonen in de bamboo huizen: maar dat kan nog niet huis is nog niet af.

One step towards deze implementations ...

To get their families really involved in the project

Finally, the interviewed families, students and craftsmen, the local government and our new partners came together during our final event.

...

According to the introduction meeting it will contribute to the demand if people see a family living in a bamboo house. Also organising meetings in which the families get actively invited will promote bamboo as a construction material. By sharing information and feeling welcome, we believe that the families will feel involved in the project and will be open to bamboo housing.

...

CONTINUATION PROCESSES

In the project plan (2015) we defined two processes of continuation: the constructional continuity and research continuity. The students contribute to future research, and the craftsmen and bamboo suppliers contribute to the constructional continuity.

In the coming chapters, further implementation steps are suggested. These are ordered by the continuity process of which Bambú Social can focus. In the final chapter these processes are brought together in the national innovation system for Nicaragua.

CONSTRUCTIONAL CONTINUITY

The constructional continuity includes all opportunity in the chain of bamboo, from harvesting the bamboo to the construction itself. In the process of constructional continuity collaboration opportunities with eventual bamboo suppliers and clients are discussed. In the final part the business model of a bamboo prefabrication company (Bambú Bueno) is presented.

BAMBOO SUPPLIERS

In 2014 Bambú Social experienced for the first time the process of harvesting bamboo. At the end of the project, it was recommended to buy the bamboo that we needed at a farm owned and run by INTA (Instituto Nicaragüense Tecnología Agropecuaria) in El Recreo (thirty minutes by car from El Rama).

Before our arrival in El Rama a prepayment has been transferred for a total of fifty bamboo culms of *Guadua Amplexifolia*. In November, this bamboo was in very bad condition and little amount. A species where we looked at was *Dendrocalamus Asper*, with a significantly bigger diameter and less durable compared to the *Guadua* species (see Constructional Analysis).

When we arranged the bamboo cutting, it was cancelled by the farm, because the right tools were missing. Because of a tight planning and reckoning with the moon, we start looking at other possibilities. We also understood that the farm currently focuses more on experimenting than on selling agricultural products. On page ... is described how the invested money will be used.

The second option was a farm in Magnolia along the river of Río Escondido (one hour driving from El Rama). When we contacted the farmer to arrange a meeting, we found out that the bamboo was burned down from the river banks, as the very fertile soil was more useful for other crops.

The third option was a farm at La Fonseca along the river of Río Kama (two and a half hour driving from El Rama). We met with the farm owner Juan and he was cooperative and excited as his bamboo on his farm was never bought before. In two following trips to La Fonseca, the bamboo was cut and collected.

For our experiment Techito, the amount of fifty cut culms was enough. For future project where more bamboo culms are necessary, some further exploration of bamboo farms must be done.

ECOPLANET BAMBOO

This is a worldwide organisation that recently has invested extensively in the bamboo industry. They are focusing on the production of pulp and paper, textiles, bioenergy and engineered timber. For like this it is important to maintain their local image.

In November 2015 we met with the general manager, financial manager and other board members.

They own a bamboo farm stretching from El Rama along the river to La Fonseca (1100 acres). For Bambú Social it would be interesting to partner up with EcoPlanet Bamboo. In the process of up scaling Bambú Social needs a farm that can guarantee to have enough bamboo.

Right now (end of 2015) they're focusing on producing charcoal/active coal and pallets. They will start harvesting in 2017 until now they're experimenting with the productions.

At the moment they have about 1100 acres, and they will keep expanding each year with about 25% until 2022. On their property they have *Guadua Aculiata* and *Guadua Amplexifolia* available. They are also planning to plant *Guadua Angustifolia*, but this species is flowering at the moment.

They have this principle: not only getting revenues but also socially correct. In South-Africa (for example) they're investing in education and health of their employers. After March 2016 the world-wide board will decide how to invest their funds in 2017. Therefore during February/March we have to deliver a draft plan of the project and the demand of the coming years.

For EcoPlanet Bamboo we need a business contract. The company benefits from us, because of their good local image, and Bambú Social can benefit from them because of a fixed low bamboo price. Keep in mind that for this company, the profit over processed bamboo is higher than over raw material.

BAMBOO CLIENTS

For Bambú Social it is very interesting to cooperate with local businesses and foundations because of their knowledge of the country and culture Nicaragua. By partnering up, we hope to collaborate with parties who could help us to stimulate the social acceptance of bamboo.

CEDEHCA

CEDEHCA stands for Centro de Derechos Humanos, Ciudadanos y Autonómicos and its mission is to contribute to the empowerment of indigenous people, Afro-descendants and Misquitus at the Caribbean Coast of Nicaragua through education and defence of Human and Autonomous Rights and influencing public policies that strengthen their cultural identity.

We visited the farm in Bluefields where they set up an agriculture program for young people in the region. Together with the program PREVENIR, Prevención de la Violencia Juvenil en Centroamérica, courses are provided for vulnerable youth to secure a better future. Last year the first group arrived and got an official degree in agriculture of INATEC (Instituto Nacional Tecnológico).

Coming years more students will arrive so that they are empowered to be able to start their own small business in agriculture and farming. Michael Campbell, representative of CEDEHCA, explained that the housing conditions on the farm should be improved so they are able to facilitate the educational program. By using bamboo as main construction material, CEDEHCA could send a good message for sustainability. The farm could become a model farm, an example for small producers. Furthermore, bamboo is a very strong, local and durable construction material that could be used on a large scale. Bambú Social is interested in constructing several houses on the farm because it helps the foundation to scale up the project and promote the use of bamboo.

We believe that the farm is a very good match because of the importance of education for both parties. Bambú Social puts a lot of effort in exchanging knowledge with local students and craftsman. Sharing

knowledge is a really imported step towards the implementation and acceptance of bamboo. The construction process on the farm could even be used as an educational process so the youth (potentials for the future) gets involved in this 'new' kind of material and introduces it into society. Michael mentioned that creole people are used to working with bamboo, but the knowledge has been lost over the years. It would be nice if this knowledge could be reintroduced and add to the living standards.

For further collaboration it is important that CEDEHCA sets up terms of reference for the buildings on the farm so Bambu Social can see how they can help. During our meeting CEDEHCA wishes the farm to be ready next year January – March 2016 to receive the students.

However, before the construction on the farm there should be an analysis of the area. In combination with the Program of Requirements designs can be made. The construction itself process (including harvesting and treating the bamboo) would at least take six months. We concluded that the construction is not feasible in 2016.

It would be possible to supply a course on bamboo (and sustainable construction) as a first introduction of bamboo. During the course the students could get practical education by working in a workshop and making prefabricated construction parts that could be later used for the construction of the buildings on the farm.

For Bambú Social it is important to discuss what we can deliver, taking into account the supply of bamboo and the availability of skilled people. We are very content about the meeting, and we believe that CEDEHCA is an important partner for the future.

BAMBOO PREFAB COMPANY

As explained earlier, Bambú Social is working on a manual for an affordable prefabricated social house. The manual will explain step by step how to connect the prefab elements and how to build the social house. The distribution of the manual enables craftsmen in Nicaragua to build their own house or for other families. These craftsmen can become entrepreneurs who set up (local) companies that can for example produce prefab bamboo elements. Specialisation has a positive effect on the working hours and thus the price of the elements. As it adds to the image and accessibility of bamboo, Bambú Social can support these kinds of initiatives.

During our stay, we did not notice any entrepreneurial activities focused on bamboo. We think this has to do with the current image that bamboo has. "The image will improve, if people start working with bamboo. I have never heard of the idea to offer prefabricated construction elements, but it sounds attractive as it saves time and money", explained Lester, local craftsman.

"I think that a modular prefabricated construction system is a pragmatic process that could contribute the housing projects. Each family or applicant can control the stages and complexity of construction. The costs however, have to be kept low, so it will be accessible for social housing programs" says Emma Grun.

In October 2015 a business plan for a prefab bamboo elements producer was written. This prefab company, named BambúBueno, is an important factor for achieving the mission of Bambú Social, to improve the housing conditions in Nicaragua by creating a sustainable, affordable and comfortable house. This company is needed for the continuative process of up scaling and upgrading. In the chapter Contribution to development is described how Bambú Social and this prefab bamboo company can work together.

The business model canvas is based on *The Startup Owners Manual* (Blank, 2004) by Steve Blank. This is presented next page.

RESEARCH CONTINUITY

Research consists of everything that has to do with the development and innovation of bamboo construction.

UNIVERSIDAD CENTROAMERICANA

Architecture and engineering students are the designers and builders of the future. The involvement of students is very important for Bambú Social (see Designing with students).

“Knowing that there are organisations Bambú Social who are willing to contribute to the expertise of students, to improve sustainable construction processes, is amazing”, said Emma Grun. “We must continue to explore how to take advantage of opportunities, not only like internships and thesis topics, but also with workshop, forums and many other ideas.”

By supplying official internships, Bambú Social contributes to the curriculum of architecture and civil engineering students. Like this more students gain experience and knowledge about the use of bamboo in constructions.

The internship during December 2015 to January 2016 was not officially recognised by the university. Bambú Social did provide recommendation letters. In the future, official internships and maybe thesis projects will contribute to the research continuity.