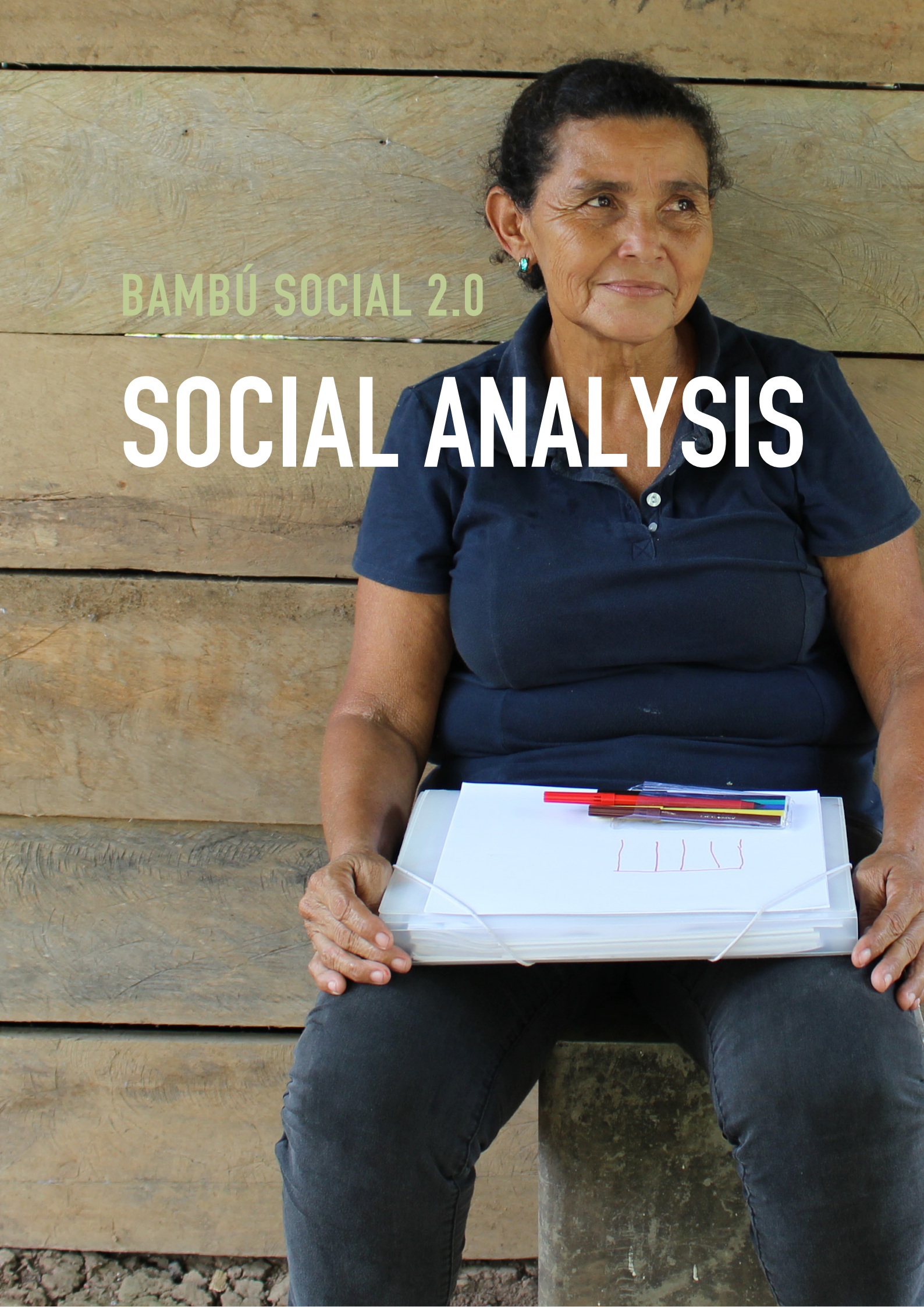


BAMBÚ SOCIAL 2.0

SOCIAL ANALYSIS



COLOPHON



Bambú Social is a foundation with the aim to improve the living conditions through the development and dissemination of sustainable housing from local materials and related systems.

Starting in November 2015, a new team called Bambú Social 2.0 analysed the achieved results of the foundation, concluding in improvement suggestions on both constructive and social level.

This report presents the results of the social analysis. The knowledge shared in this report is a combination of observations, interviews, literature studies and the knowledge and experience of two years of research by Bambú Social in El Rama, Nicaragua.

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CONTENT

SOCIAL ANALYSIS

1. INTRODUCTION	06
2. THE SOCIAL HOUSE	08
3. TARGET GROUP ANALYSIS	12
3.1 The target group	12
3.2 Homevisits	12
3.3 Current situation	15
3.4 The dreamhouse	24
3.5 Financial situation	26
3.6 Target group conclusion	28
4. SOCIAL HOUSING ANALYSIS	30
2.1 The system	30
2.2 The reality	32
4.3 Social housing conclusion	34
5. IMPROVEMENT SUGGESTIONS	36
5.1 Dynamic durability	36
5.2 Prefabrication	37
5.3 Improvement conclusion	37
5.4 Discussion	XX
6. BIBLIOGRAPHY	40

APPENDICES

A. ENCUESTA	44
B. HOMEVISITS	48
B.1 Maria's bakery	48
B.2 Financial aid	50
B.3 One man's living	52
B.4 Three sisters	54
B.5 Moving out	56
B.6 One big family	58

INTRODUCTION

Since 2013, Bambú Social does research on local building materials and opportunities in Nicaragua, resulting in the design and construction of a bamboo model house on site.

This model house intends to show the various qualities of bamboo and to help improve the image of bamboo as a construction material. The construction of the model house also served as an experiment on constructing with bamboo in a local, sustainable and cost efficient way in Nicaragua.

Based on the model house a first draft of a social house was designed, taking all previous lessons into account. Because the aim is to make a design that is easily applicable on a larger scale, the social house has to be an affordable, easy-to-build house of good quality that is matched perfectly to the needs of the target group.

In this research, the first design of the social house was analysed, as well as the target group. The information was gathered by means of interviews, home visits and gatherings with the local people. Their needs and wishes were matched with the features of the social house, as can be read in the following chapters.

However, more factors influence the possibility to apply the design on a larger scale. One of them has to do with the social housing legislation and opportunities in Nicaragua. Therefore, a brief social housing analysis was made, aiming not only to summarize how laws and regulations work, but also how they are applied in reality.

The result of this report consists of a list of improvement suggestions regarding the functional design of the bamboo social house.



THE SOCIAL HOUSE

Bambú Social intends to improve the quality, price and durability of bamboo social housing. In order to do so, it is important to understand the reasoning behind the design, so in this chapter the most important design choices will be explained.

THE FIVE PRINCIPLES OF BAMBÚ SOCIAL

The Bambú Social foundation works according the following five principles. It is important that these appear in every practice of the project.

1. Use local resources
2. Support the environment
3. Create local systems
4. Share knowledge and skills
5. Play, explore and discover

Both the design of the model house and the design of the social house are based

on these five principles. A brief explanation of every principle can be found on the next page.

THE USE OF BAMBOO

The main challenge of the design is a result of the first principle of Bambú Social; the use of local resources. Since bamboo can be found everywhere in Nicaragua, the main resource of the design was set to be bamboo. Apart from the fact it is local, bamboo also has a lot of other advantages. It is incredibly strong, grows extremely fast, only needs few nutrients and helps prevent deforestation of the rainforest. Also, the growth prevents soil erosion and has a high CO₂ absorption, so by using bamboo also the second principle of Bambú Social is compiled (Janssen, 2001).

Not only bamboo, but also all other materials should be easy to obtain locally.

In the selection of connections and ways of construction this first principle played a major role, as described elaborately in the constructional analysis.

A COMFORTABLE CLIMATE

Another important challenge in the design was the humid tropical climate, states Max Verhoeven, co-founder of the Bambú Social foundation. The majority of the houses in Nicaragua is built out of concrete blocks combined with a zinc roof. Perfect for heating up rapidly during the day, and staying warm during the night. In the tropical climate, these houses could easily pass as human ovens.

With an average annual temperature of 27 degrees Celsius and an average relative humidity of 85 per cent, the heat and humidity are unavoidable during all twelve months of the year (WetherSpark, 2015).

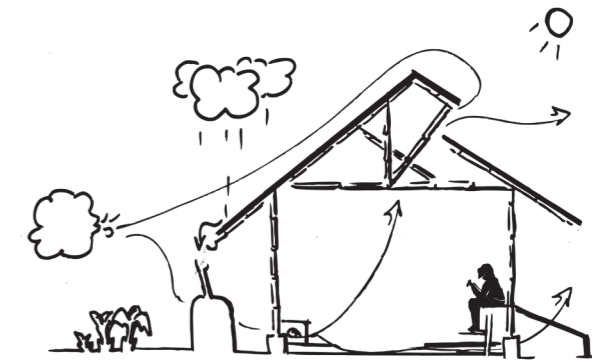


Fig 1. Ventilation flow through sectional view of the social house

Therefore, a comfortable interior climate is essential to create a successful design.

After narrowing down the possible solutions with Andy van den Dobbelsteen, Professor of Climate Design and Sustainability and head of the Architectural Engineering department of TU Delft, Bambú Social concluded that the best solution to create a pleasant climate within the house is by cooling through ventilation. This is the reason why the design process started in a sectional view.



USE LOCAL RESOURCES

The use of local resources and values is the basis of sustainable architecture. This method reduces not only the environmental impact, waste and costs, but also, by including the interests of the local people, creates design solutions that suit the needs and desires of the user.

SUPPORT THE ENVIRONMENT

Not only is it important to be less harmful to nature, but also to stimulate the environment. After years of destruction, Bambú Social believes that the only way to be good, is when the environment benefits from our practice.

CREATE LOCAL SYSTEMS

Decentralized systems can be used to avoid dependence on often unreliable centralized systems (water, electricity, sewage). Decentralization makes the user more independent and responsible for collection and disposal of his own resources.

SHARE KNOWLEDGE

It is a common thought that people can have more if they are willing to share. To contribute to this thought, all results of the work and research of Bambú Social are open for public use (Creative Commons).

PLAY EXPLORE AND DISCOVER

As a young and dynamic team, Bambú Social preserves curiosity and the urge to discover, because the only way to innovation is by learning from our own mistakes.

To stimulate the passive ventilation, the roof contains an open ridge. Warm air can escape and in combination with the correct orientation on the wind, the shape of the roof creates a natural airflow out of the house, so new fresh air will be sucked in.

In order to stimulate the airflow even more, and inspired by the architecture of the indigenous people of Nicaragua, the model house was built on pillars. However, the fundamentals turned out to be significantly more expensive so the social house is designed to be positioned on ground level (Bambú Social, 2014). For the same reason, the social house has only one level, located directly on the ground.

A FUNCTIONAL FLOORPLAN

Another challenge was designing a floor plan that suited the needs and desires of the local people. Prior to the design process, Bambú Social interviewed five families and visited their houses. From this they could conclude that, in Nicaragua, many people spend a lot of time in front of their house, so the porch became the most important area of the design.

A small living room is located directly behind the porch, because it is the least private area of the house. Also the living room was assumed to be less important because people spend most of their time outside.

The bathroom, on the contrary, is said to be the most private area, and for that reason located in the back of the house. The kitchen is placed next to the bathroom to combine wet areas as much as possible.

The remaining space is filled by two bedrooms, both with just enough space for a two person's bed and a small closet. Because in Nicaragua it is common to sleep with many people in the same room, the wall that separates the two bedrooms can be removed. The total surface of the house is 47 square meters.

DECENTRALIZED SYSTEMS

The rainwater and dry toilet system, created in the model house, are included in the design for the social house to fulfill the aim of using local systems, as described in the third principle of Bambú Social. El Rama doesn't have a centralized water system, but does have a heavy rainy season (of nine months) and an average annual rainfall of 4318 mm (WetherSprak, 2015). The link between the lack of water system and

the heavy rainfall is easily made, so with help of blueEnergy a rooftop rainwater harvesting system was integrated in the design.

The dry toilet is also a result of the absence of a centralized water system and the desire to have a toilet inside the house.

ESTIMATED COSTS

According to the calculations of Bambú Social, this house will cost 7400 USD. To bring the price down, different versions of the house were designed. The cheapest version leaves out the rain gutter, the water tank, the kitchen and bathroom equipment and interior walls. Also, the future users of the house have to help in the building process. This version has an estimated price of 4800 USD (Bambú Social, 2014).



Fig 2. First draft of the social house (Bambú Social, 2014)

TARGET GROUP ANALYSIS

When Bambú Social was founded, the intended target group was the bottom layer of society, the poorest of people who lived in nothing more than a small shed. But soon, it turned out that these people were more difficult to reach than expected. They build their houses out of a few pieces of plastic, zinc and other construction waste. Their homes rarely cost more than a few hundred dollars. The availability of funds or financial aid for them is not sufficient to be able to pay a higher price and even by the use of bamboo, it is impossible to build a decent house in this price range.

However, the definition of a decent house differs for each person, dependent on what they are used to, what they wish for and what their possibilities are.

A good and functional design should match perfectly to the needs and wishes of the target group, so a target group analysis is of great importance for the project. For this reason, the main question of this analysis is about the criteria for a decent house, according to the target group. This main question can be divided in three sub

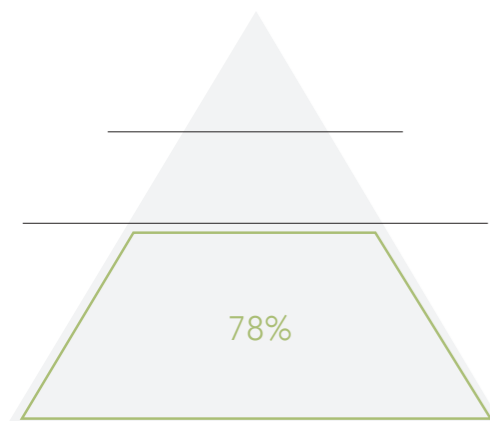


Fig 3. The target group as a part of the pyramid of society

questions; (1) what are they used to? (2) what do they wish for? and (3) what are their financial possibilities? By comparing the answers to these questions we can conclude what their needs and wishes are. In the final chapter will be described how they can be applied on the design for the social house.

The analysis is based on the research carried out by team Bambú Social 2.0, during their three months in El Rama, Nicaragua. The analysis will start with a brief description of the target group in general, followed by the results of 50 conducted home visits. These will discuss the current situation, the dream house and the financial possibilities of the target group. The analysis will conclude in a description of a decent house.

3.1 THE TARGET GROUP

Nicaragua is one of the poorest countries in Central America. There is a great shortage of housing and the existing houses have many qualitative shortcomings. This makes that 78% of the population is homeless or lives in very poor conditions (Room for Development, 2012). Speaking generally, these 4,8 million people are in need of a better house and can be seen as the target group of Bambú Social. Together they cover the main part of the pyramid of society, as shown in the figure below. Some of them may have access to more resources than others.

3.2 HOMEVISITS

To get a realistic image of the needs of the target group, a cross sectional survey was composed, concerning their social and



economic environment. The participants were asked to draw their current house and the house of their dreams, and explain their drawings led by our questions. We used this method to be able to get into detail

on the most outstanding differences in the drawings, but also to set the respondents at ease and trigger their imagination. The complete survey can be found in appendix A (Spanish).

All participants were interviewed personally. In this way we had the opportunity to elaborate on certain topics and we had more control on the proper understanding of the questions. This was important because of the language barrier and the high rate of illiteracy among the respondents. The participants were informed about the purpose of the interview after the last question, to prevent their answers being biased.



ONE OF THE RESPONDENTS DRAWING HER CURRENT HOUSE



GUESTS ARE WELCOME IN FRONT OF THE HOUSE

By visiting the participants in their homes, an observation of their daily environment could be added to the information obtained from the interview. An impression of the six most inspiring families and their houses can be found in appendix B.

PARTICIPANTS

The surveys were conducted at a sample of 50 families. They were selected based on their neighbourhood and the appearance of their house. All families were selected in the municipality of El Rama, a rural town in the RACCS region in Nicaragua.

The percentage of women among the respondents was 84%. This high rate can probably be explained by the fact that the houses were visited during the day, when most men were working, but also because a great amount of the interviewed families existed of single mothers with their children.

3.3 CURRENT SITUATION

At first, it is remarkable that the front of most houses looks way better than the back or the inside. Often, even the higher class houses are only painted or decorated on the front side. On the other sides, the (decayed)



Fig 4. Visited houses in the map of El Rama, Nicaragua

concrete is clearly visible. From this fact, we assume that the image of a house is more important for the 'public' than for the residents themselves.

PORCH AND LIVING ROOM

In almost all cases, the transition between private and public happens gradually, even in the poorest areas, plastic chairs are ready to welcome friends, neighbours or strangers for a coffee on the porch/terrain in front of the house. Also the image of the streets of El Rama gives the impression that people spend most of their time on the porch. However, only 7% of the respondents rate the porch as the most important area of their house. The living room, on the other hand, is said to be most important by 51% of the respondents. Perhaps, this contradiction could be explained by the fact that a large majority of the houses have little to no ventilation (71%) and therefore have a warm and uncomfortable temperature in their living room. Some respondents explained that because of the climate, they prefer to sit outside. They see the living room as the place where the family comes together and

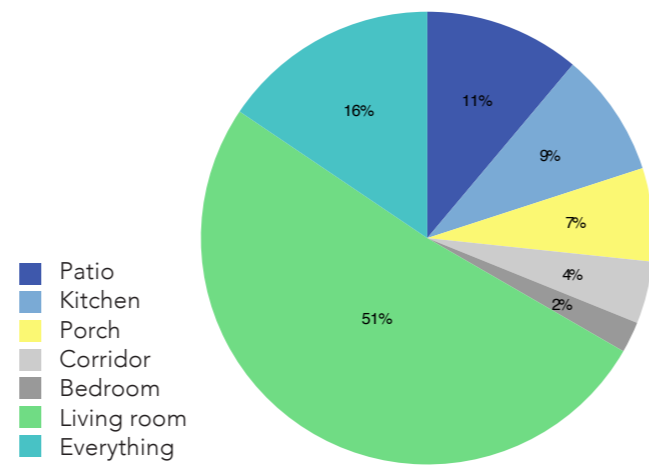


Fig 5. Most important area of the house among the respondents

eats. In addition to this, other respondents point out that eating (and especially what is eaten) is private so it is unlikely to see someone eat their meal on the porch.

KITCHEN

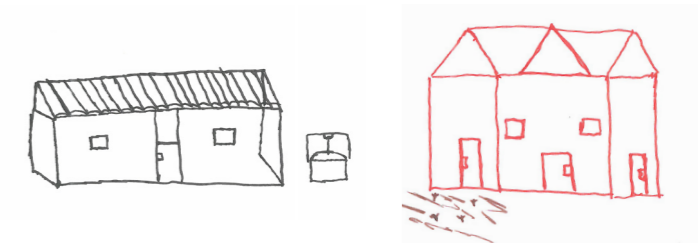
During our homevisits we noticed that meals are not eaten together, and sometimes not even at a table. Everyone comes and goes and eats whenever they want, resulting in the gas/wood stove running overtime.

In the poorest families among the interviewed, the two pit stove is located in



a corner of the (living) room. Pots and pans hanging on the wall, but a sink is nowhere to be found. "El Rama doesn't have a water system", explains Albertina Gomez, one of the respondents. "All water comes from the well, so it's more easy to do the dishes outside... also better because water causes rotting and fungus in your kitchen."

added to the back of the house (separate construction). Some even have a completely separated or shared kitchen. The last option is most frequently seen in the more rural areas of El Rama.



TOILET

To come across a separate toilet is way more common. In fact, only four out of 50 people had a toilet inside of their house; the same houses that had an integrated water system. A toilet with a flushing system is a

Most women agree with Albertina and don't consider the kitchen as a wet area. Others built an easily replaceable wet area extended from their wall, so the dishwasher can drain out and doesn't stay in the house. However, some of the less poor families have a kitchen with an integrated pump and running (grey) water. Others, mostly bigger families, have a more spacious cooking place



Fig 6. Examples of the most commonly seen kitchens



luxury, also because a septic tank is needed. Due to the absence of a sewage, the predominant sanitation system in El Rama is the latrine. "Here in El Rama, everyone has their bathroom outside. It would be really unhygienic to have it in your house. How would you be able to empty it?" questions Petrona Lopez, while holding up the plastic sheet to give us a glimpse of her toilet. She is right, the hole in the ground is visible next to the wooden toilet seat, and the smell isn't too fresh either...

SHOWER

According to our observations, there seems to be no direct connection between the shower and the toilet. In the shower you use water, you get clean. A toilet is just a

toilet. It is the difference between clean and unclean, as explained by Albertina Gomez. For the same reason, the shower gets often combined with the washing area, next to the well. In most cases, the shower has space for one person and a bucket. Of course it also needs some privacy. Mostly obtained by a plastic sheet or canvas stretched between four poles, as can be seen in the on the next page. Also the interviewed families on the south side of the Río Rama, who do have running water, only use the faucet to fill their bucket, as can be seen in the first picture.

As explained in more detail on page 21, the World Bank attempted to give El Rama a water system, working up from the more rural areas in the south. But they stranded at the riverside. In the near future, the prospect of a well-functioning water system at the north side of the river is still not in sight (El Nuevo Diario, 2013).

BEDROOM

As mentioned before, the living room is the place where the family comes together. Yet, the bedrooms shouldn't be underestimated.



Fig 8. Different versions of the most commonly seen shower

Usually bedrooms are shared with at least half and sometimes even the whole family.

This brings us to the average family size, or rather, the number of people living in a house. To the greater part of the respondents this number was difficult to say, or even questionable, because the word family has a broad meaning. Some people live in the house only part-time. Most houses are the home to parents, children, grandchildren, (second) cousins, in-laws and an orphan or two.

The number of people in the interviewed families varies from 1 to 19 and the average number of bedrooms is 1.8. It seems that personal privacy is a rare thing, confirmed by Jusnielca del Carmen. She explained us that before she built her own house at the plot of her parents, at night only drapes and mosquito nets formed the barrier between beds.

However, our data tells us that the number of people per room goes down as soon as the

income goes up. Families with a little more wealth not only have more rooms, but also less children, generally speaking.

Like Jusnielca, we noticed that more young people who do have an income tend to move out and build their own house/ room on the plot of their parents. Sharing bathroom, washing place and sometimes kitchen makes privacy more affordable.

One of the elaborated home visits in the appendix tells the story of Yanina, one of three sisters who bought a plot together, share their bathroom but have their own little house and kitchen.

A frequently seen solution among the houses of the respondents, is the addition of

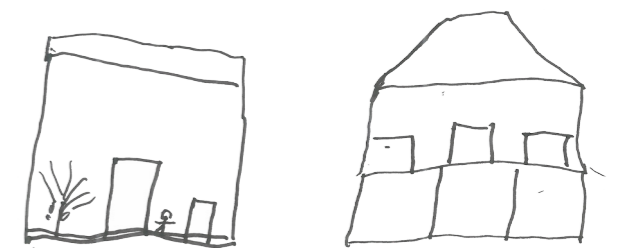


Fig 7. Different verions of a latrine, the most commonly seen toilet

one or two little bedrooms to the back or the side of the house. The construction might be completely decayed, but they do have some privacy and they still live under the same (zinc) roof.

ROOFS

By far the most common construction material in El Rama and the rest of Nicaragua are sheets of corrugated steel (mostly called zinc). Used as roof covering it is an all-time favourite, but zinc can also be used as a material for walls, fences or doors. The biggest advantage of these sheets is the price; 250 córdobas (9 euros) will buy you a new and shiny sheet of 3 by 1 meters. Also, you can it apply it to the roof in no time. This made that a full hundred per cent of the visited families used this material to construct their roof. However, zinc also has its disadvantages. The zinc heats up easily

by the sun, resulting in a warm inner climate. Also, due to the humid climate in El Rama, the durability of zinc is questionable, as corrosion makes its way through the material within a few years.

WALLS

In a few houses even the walls are made out of zinc sheets. But in the center of El Rama, where most shops are located and the

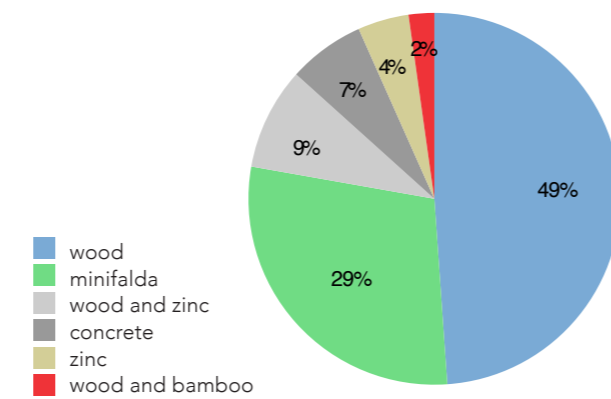


Fig 9. Wall construction material

wealthier people seem to live, the majority of the buildings have walls built of concrete. As soon as you get to the areas just outside the center, tropical hard wood slightly takes over as a construction material. First, this is done in the shape of the so called minifalda construction, as shown in the pictures on the right.

The term minifalda (= miniskirt) refers to the walls, which consist of concrete blocks in the lower part, while the upper part is made of wood. Many minifalda houses were donated after a hurricane destroyed El Rama in 1987.

In the outskirts of El Rama, more and more houses can be found that have the walls constructed out of wood completely. In general, it could be said that the more rural the area, the more wood is used. Half of the homevisits took place in a house completely constructed out of wood, while 30% was a combination of wood and concrete (minifalda).

Our data indicates that the material used for walls is also strongly related to the income of the household. Only 7% of the houses in the interviewed group is built out of concrete; we observed that the wealthier the family, the more concrete was used in the construction. Untreated bamboo and zinc were more present in the poorest families.

FLOORS

Also in the material used for floors we observed differences between location and wealth. In location, the biggest differences were seen between houses in urban (more



MINIFALDA CONSTRUCTIONS WITH ZINC ROOFING



BEDS ARE SEPERATED BY DRAPES OR MOSQUITO NETS



than 1000 people per square mile) and rural (less than 1000 people per square mile) areas (Census Bureau, 2015). The floor of most urban homes is mostly made of concrete, although the less poor families usually have a tiled floor. In the rural homes around El Rama an (elevated) wooden floor or a dirt floor is more commonly seen.

In the table below, the target group is roughly divided in an urban and a rural group. But also in three groups of wealth, according to their saving capacity. The really poor families, who have difficulties in covering their basic needs, the poor families, who just cover their basic needs and the less poor, who have (little) savings capacity. The predominant type of floor is shown for each group.

Floors	Rural	Urban
Less poor	concrete	tiled
Poor	wood (elevated)	concrete
Really poor	dirt	dirt

WATER AND ELECTRICITY

Most citizens of El Rama rely on their (poorly) dugged wells, though some of them invented a way to collect rainwater. At the south side of the river, a project of the World Bank in collaboration with Enacal, the Nicaraguan Aqueduct and Sewer enterprise,

resulted in a water system for around 1000 households. According to official data in El Nuevo Diario the municipality of El Rama has a rural population of over 36.5 thousand people, plus the 21.5 thousand living in urban areas. This means that out of the 58 thousand inhabitants of El Rama, only 1.7% is connected to a water network. However, especially in the summer, this network does not function as desired (El Nuevo Diario, 2013).

The electricity network does function on the north side of Río Rama, although many households installed their own connections and the power cuts off regularly, as we were told. The south side of the river, like most other rural areas, does not have access to electricity at all.

LIFESPAN

Regardless of the age of the respondent, 78% of them thought it was obvious that they were going to live in their current house forever; *siempre* (=always) was by far the most common answer. Only 22% thought of moving to a place of their own, but mostly on the same plot of their parents.

Lelys Leiba, who inherited his house from his parents, explained that most people are born in the house where they live the rest of their life. Houses, if they last longer than one generation, are passed on to the next one.

VALUE

During the homevisits we observed that most people didn't buy their house. Instead, they inherited it or but built it over

time. Because of this, little to none of the respondents had a clue about the value of their current house. Another important reason for this lack of knowledge is the donation of houses after the hurricane that destroyed El Rama in 1987. Many families were supplied of a new home, only having to pay for the working hours of the construction, explains María Vargas.

In addition, some interviewed families were given a plot by the government for an extremely low price, live on a plot without ownership or built their houses out of

donated materials. Therefore, the obtained data about the value of the visited houses says little about the true value.

CONCLUSION

Regarding the current situation we conclude that, generally, even within the target group exist great differences based on wealth and location.

Especially construction materials depend on these variables, but even though the front of the house can look really good, the facilities in the back mostly lack in basic living



ONE OF THE RESPONDENTS DRAWING THEIR CURRENT HOUSE

standards (privacy, safety, security, hygiene, comfort, etc.). The most important findings and observations for all individual topics are listed below.

About the **porch and living room** can be said that the transition between private and public is very important to all households. In the poorest ones, the transition is really gradual while the less poor houses have a more abrupt transition from private to public, so more fences and less openness. The **kitchen** doesn't necessarily need water but a two pit stove is essential. **Toilets** have to be as far from the house as possible, unless they are flushable, but this is only reserved for the less poor people within the target group. **Showers** and wash place are located next to the well. **Bedrooms** are generally overcrowded and most respondents report a lack in privacy. But more income goes hand in hand with less persons per room.



Among the interviewed houses, all **roofs** are made of corrugated steel (zinc), which causes an uncomfortable climate in the house. The material used for **walls** is strongly related to the income of the household; the wealthier the family, the more concrete used. The **floors** show great differences between rural and urban areas, in which respectively dirt and concrete are the most common.

At the north side of the river, **water** is only accessible through digged wells, but **electricity** is available for everyone. At the south side of the river the opposite facilities are available.

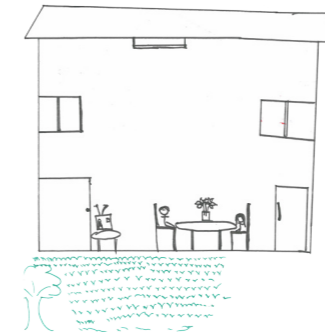
The **durability** of a house is really important since it is passed on generation to generation, and for this reason (amongst others) the **value** of a house is difficult to say.

3.4 THE DREAM HOUSE

After drawing their current situation, we asked the respondents to draw their dream house, as explained in paragraph 3.2 (p. 13). The topics below follow the order in which most respondents described their drawings, since we assume this says a lot about the importance of the characteristics. All the respondents told more or less the same story while describing their dream house. After all, you can dream as wealthy as you want, regardless of your income or location. However, it is remarkable how modest most dream houses are...

SIZE

The majority started to describe their dream house as a one story building, small but



comfortable. They wish for a number of bedrooms that suits their family; couples together and one for each child. According to most respondents, privacy is the thing that lacks most in their current situation. It is the first thing they mention about their dream house.

MATERIALS

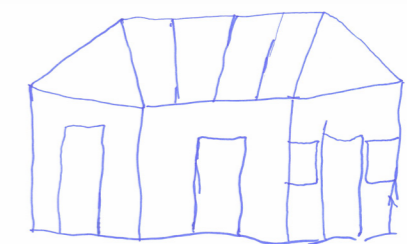
The second characteristic described is the material. Most respondents would like to have concrete walls. Ramón Isidro explains that this is because it gives people a safe and secure feeling. Not only against burglary or violence, but also against the weather and natural disasters. "I would love to have at least a minifalda construction, to prevent that the water comes in during the rainy season" says Ramón. Also as a floor covering, concrete is the most popular choice. It is easy to clean, and bare concrete is relatively cheap.

When asked, a clear majority of the respondents smiles when they think about living in a house made of bamboo, but they don't bring it up themselves. "That

could be beautiful.. very beautiful!" says Lina, like 76% of the respondents. "What I like about bamboo? It looks pretty, and I think it is really fresh." But also, like many others, Lina is not fully convinced yet about the advantages of bamboo. More about the image of bamboo can be found in the Impact Analysis in the Project Report of Bambú Social 2.0.

FACILITIES

Most people we interviewed dream of having all necessary facilities inside. A kitchen with running water, a bathroom with shower inside and a *baño higiénico*, (= a toilet with a flushing system) within their house. But without water, the toilet should be far away from all other facilities. Functionality, especially in terms of hygiene, is what most respondent dream of when it comes to facilities. The shower should be easy to reach for everyone without lugging around with buckets of water, and have enough privacy. Also the kitchen should be



easy to clean, and the stove should be in sight, while keeping an eye on the activities in the rest of the house.

CONCLUSION

Enough privacy, safety, security, hygiene and comfort is the modest dream of the target group. If they start dreaming a little further, running water would be lovely to have (especially to flush the toilet). Functionality is what the respondents like. Their dream house is simple, comfortable and easy to use and construct.

FINANCIAL SITUATION

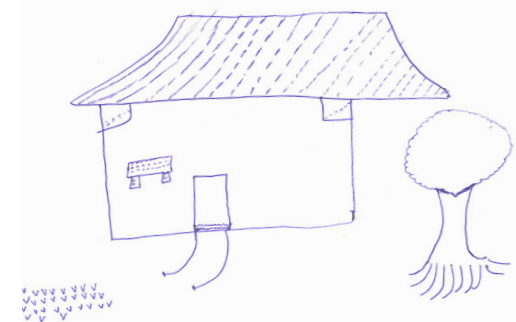
3.5 Poor, poorer, poorest. Within the 78% of the Nicaraguan citizens that are in need of a better house there are great differences in financial situation. Some of the poorest rely on governmental aid, consisting of an amount of rice, beans and oil. Others get a couple of hundred córdobas per month

from a family member. Jesmi and her sister work in a daycare on 'voluntary basis'. Both get a compensation of 2000 córdobas (70 euros) a month. If it weren't for them, the 17 members of their household would only rely on the fluctuating income of their brother in law.

"Aquí en Nicaragua no hay trabajo". Here in Nicaragua are no jobs, is how most respondents explain their situation. The ones that do have jobs, found them in education, construction work or took over the farm of their family. Most of them have difficulties to cover their basic needs, or just manage to cover them. Some of them even have little saving capacity, but they run into other difficulties; most of them do not have any trust in the banking system.

One of the reasons for this distrust could be the result of the financial crisis of 2001, when the banking system of Nicaragua was virtually bankrupt, explains Borgstein. The country had 15 times less banking resources than its neighbours, with only six commercial bank branches compared to the average of 107 per country in Central America (Foundation for Sustainable Development, 2007).

Since Nicaragua didn't have a law to protect bank clients, these bankruptcies were disastrous for people who had their money on the bank. Only after the crisis a client protection law was approved, under which the Deposit Guarantee Fund (FOGADE) was created to reduce the fiscal impact when a bank would go bankrupt. In spite of these

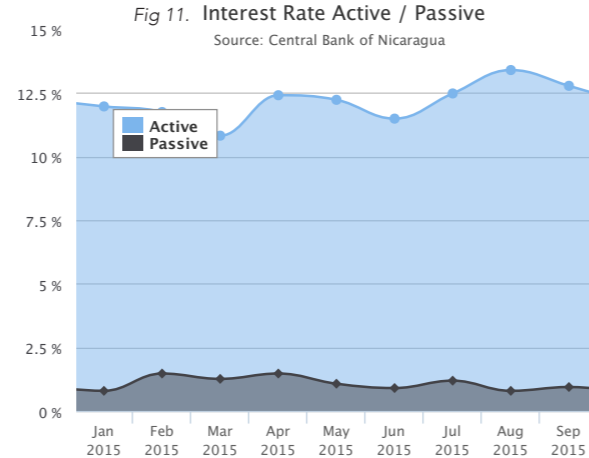
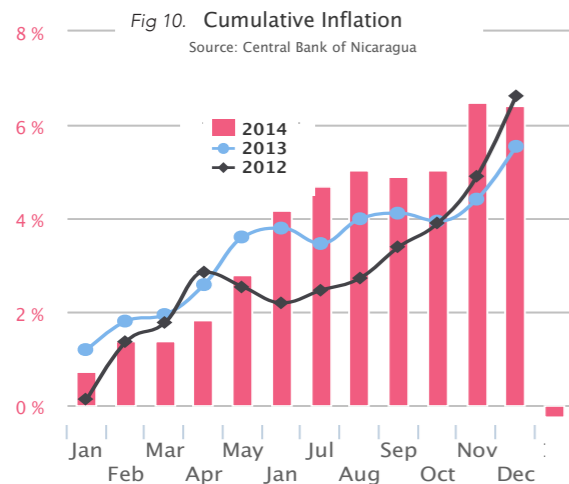


regulations, the faith in banks is far from what it once was.

Another incident that is still not forgotten happened right after the Nicaraguan revolution, when the new government devaluated the córdoba by 50.9 percent against the dollar in state-controlled exchange houses. According to the New York Times, this devaluation aimed at making the exchange houses competitive with black-market rates (New York Times, 1990). Of course, this skyrocketing inflation rate was a tragedy for all Nicaraguan citizens who had saved an amount of money.

At this moment, the córdoba has a fixed exchange rate to the dollar of 5% devaluation per year (Rogers, 2014). Nevertheless, during our homevisits, we noticed that saving money is still known to be unreliable.

“When people save their money, it could be worth half of it the next day”, is how Fernando Echeverria, viceconsul of Ecuador, puts it into words “Lending money, on the other hand, is extremely expensive”,



he explains. Official active interest rates around 15% are usual (Central Bank of Nicaragua, 2015) but can get up to 25% after reading the fine print, says Rudys Miranda of CEPRODEL, the Center for Promotion of Local Development. These percentages are fatal for those who try to climb the ladder of society. “In 2014, the government approved amendment to the Housing Act and provided a subsidy of 2.5% in the interest rate for mortgage loans that are not greater than \$32,000” states Ricardo Melendez, president of the Chamber of Builders in El Nuevo Diario (ElNuevoDiario, 2014). Some banks offer accesible loans, but none of them really help for those who need it the most. Companies like CEPRODEL and INVUR have a more social input. If the situation is favourable, they could make a big difference for those who can ensure that they have repayment capacity.

3.6 CONCLUSION

From the results of our research we can conclude that the target group can be divided in three different segments: those who have difficulties to cover their basic

needs (segment A), those who are able to cover them (segment B) and those who have saving capacity (segment C). Together the subgroups can be seen as one huge ‘bottom of the pyramid’, in which segment C is on its way to climb the social ladder to the middle class. With an average income of 11000 córdobas, the people of segment C could be eligible for some of the more socially orientated loans.

Segment B earns 6000 córdobas a month, on average. For them, this is just enough to cover their basic needs. Without saving capacity it is impossible to pay back loans with a high interest rate, let alone to give any security for the payment of the debts. Therefore, in terms of living situation, this group completely relies on donations of (inter)national projects.

For segment A, with an average income of 2500 córdobas monthly, the same applies. The different possibilities are discussed in more detail on page 30 (Social Housing Analysis). After all, these options are

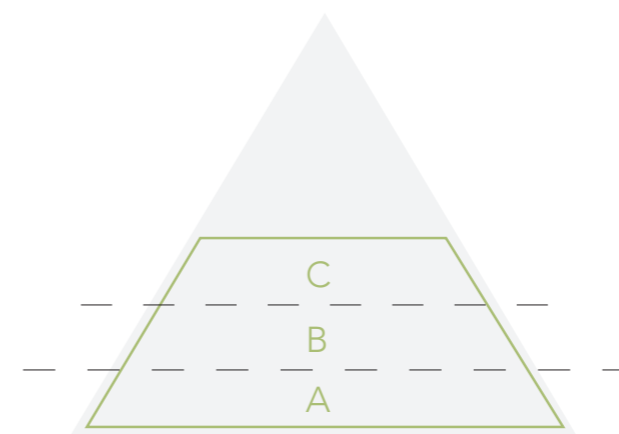


Fig 12. The target group-segments in the pyramid of society

Segment	N	Valid	Missing	Mean	Median	Mode
A No cubren necesidades básicas	8	7		2487,50	900,00	500 ^a
	Cubren necesidades básicas					
	13	5		6015,38	6000,00	6000
B	Tienen capacidad de ahorro					
	11	1		11336,36	6000,00	6000
	C					

Fig 13. Average income of the target group segments

essential for reaching all segments of the target group.

TARGET GROUP CONCLUSION

The main question of this analysis is about the criteria for a decent house, taking the needs, wishes and especially the possibilities of the target group into account.

Based on their financial situation, the target group can be divided in three segments (p. 26). We believe that, to reach all three segments, the design for the social house should be accessible for the poorest, while adaptable to the needs and wishes of the entire target group. Only then, the social house can be called a decent house.

Based on the current situation, the dream house and the financial situation in combination with the first draft of the social house and the results of the social housing analysis, this report will conclude in design suggestions on the functional design of the social house (chapter 5).

SOCIAL HOUSING

Nicaragua has one of the highest housing deficits in Central America. The deficit is both qualitative and quantitative. Aside of the need for 20,000 new houses per year, the country also lacks infrastructure for more than 50 per cent of its existing houses. According to the Central Bank of Nicaragua, there is "...a housing deficit of over 900,000 new houses and home improvements and only 50 per cent of the total need is covered between the private and public sectors" (Inter-American Development Bank, 2014). The other half is to be filled by social housing.

4.1 THE SYSTEM

The term 'social housing' commonly refers to rental housing owned and managed by the local authorities, by non-profit organizations, or by a combination of the two. Homes should be built using a single criterium – lowest cost– but also with consideration of comfort, beauty, sustainability and cultural continuity.

At present, the government of Nicaragua has different policies and programs on social



housing which offer really basic houses. The main purpose of these programs is to provide accommodation that is affordable to people on low or moderate incomes.

INVUR

One of the government programs is the Institute of Urban and Rural Housing (INVUR) who offers subsidies in which the interest rate is lower in case you want to build a social house. These subsidies are requested through financial institutions for Nicaraguan citizens.

The mission of INVUR is to restore the right to decent housing to Nicaraguan families, following the new law on low income housing (INVUR, 2015). The recent modification of this law (no. 667) raises the ceiling for subsidies for mortgages. The maximum value of the house goes from 19 thousand to 32 thousand US dollar. According to Ricardo Melendez, President of the Nicaraguan Chamber of Developers, that would enable developers to construct 1000 more low-cost houses above the 4000 projected for 2014. (Nicaragua Network, 2014)

The government subsidy, funded by the Social Security Institute, cuts off 2 to 3.5% of the interest charged by banks, with the greater reduction going to the most affordable homes. Expanding the subsidy will

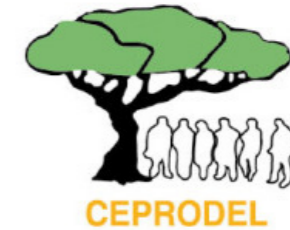
create more demand and on its turn, more demand will create more jobs and reinforce the housing industry even further, states the superior council of private enterprise Jose Adan Aguerri in El Nuevo Diario (El Nuevo Diario, 2014)

CEPRODEL

INVUR also has alliances with other foundations or institutions, for example, with the Center for Promotion of Local Development (CEPRODEL). This microfinance foundation supports social housing for the people of Nicaragua. They currently offer the lowest market interest rate (from 13 to 18%), which can vary a lot during one month of time (Rudys Miranda, 2015).

CEPRODEL funds come from an American NGO (DGHI) who has a portfolio of 8 or 9 million córdobas. Unfortunately, this year they suspended funding in El Rama because

there is a fairly high percentage arrears (delayed payments). The goal is not to expropriate homes but cancel the debts. In January they expect to start financing for the construction of new homes and home improvements (Rudys Miranda, 2015).



This housing finance is provided to families with a minimum household income between 7000 to 10000 córdobas monthly. That is, between 250 to 350 US dollar. If families run out of those resources, the national government in coordination with INVUR can subsidize a portion of the housing finance as a donation, as for example 2000 US dollar for a total of 6000 US dollar.

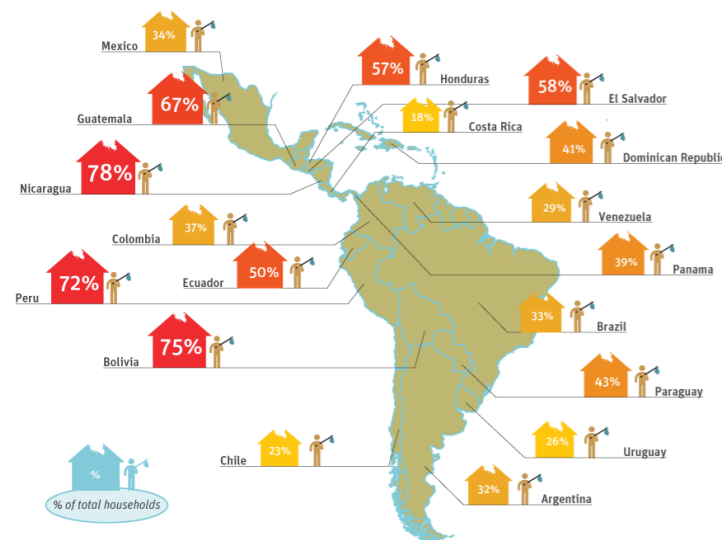


Fig 14. Families that live in poor quality houses (IDB, 2012)



A SOCIAL HOUSING PROJECT BY INVUR

ALTERNATIVES

Other government policies for social housing possibilities are exceptions or reductions of tax (15%) on construction materials and negotiate lower prices with some companies. Another possible alternative is the advance of the liquidation of an employee who has accumulated incentives and wants to pay a premium for building a house.

The amount of housing construction projects Nicaragua receives from other countries decreases over the years. Many bilateral European aids do not longer support Nicaragua, because numbers show that the gross domestic product (GDP) is growing rapidly. However, some countries keep donating zinc roofing through Plan Techo every year (Techo, 2015).

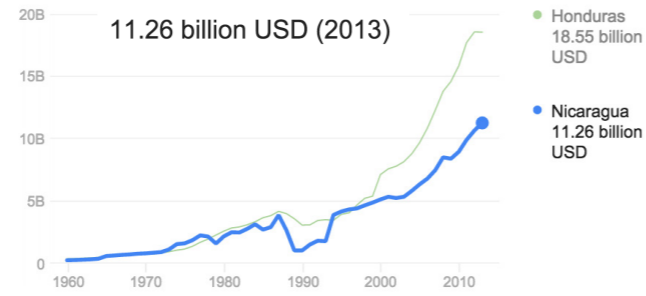


Fig 15. GDP of Nicaragua and Honduras between 1960 and 2010

4.2 THE REALITY

Like the GDP, employment has shown a positive growth throughout the decade, closely following the growth of the total labour force. However, productivity and real earnings have stagnated, states Celestia Gonzalez of the World Bank. Self-employment (with lower average earnings) has grown, which brings the official unemployment rate to only 5.3%.

The average annual income per capita stays 430 US dollar. At the same time, the unemployment rate for educated youth is around 30%, three times higher than the average youth unemployment (The World Bank, 2012).

Even if people have a job, covering the costs of their basic needs is far but guaranteed. "Minimum wages in Nicaragua differ by sector" explains Henky Borgstein, sociologist who has been living in Nicaragua since 1987. According to the Ministry of Labour, the minimum salary for the industry sector is 4594 córdobas (160 USD) per month (WageIndicator, 2015). As a comparison, in the industry sector, a monthly salary of more than 6000 córdobas (205 USD) is considered well paid. However, according to the Instituto Nacional del Desarrollo, a



Fig 17. Exchange rate Nicaraguan córdobas and US dollar in 2015

family needs an average income of 12,223 córdobas (420 USD) monthly to cover their basic needs like rent, electricity, food and clothes (INIDE, 2015). Therefore, not only people without employment, but also those who do have a job have to cut on these basic necessities.

According to Maslow's hierarchy of needs, even within the basic needs, the necessities

How expensive is the cheapest house in Latin America?

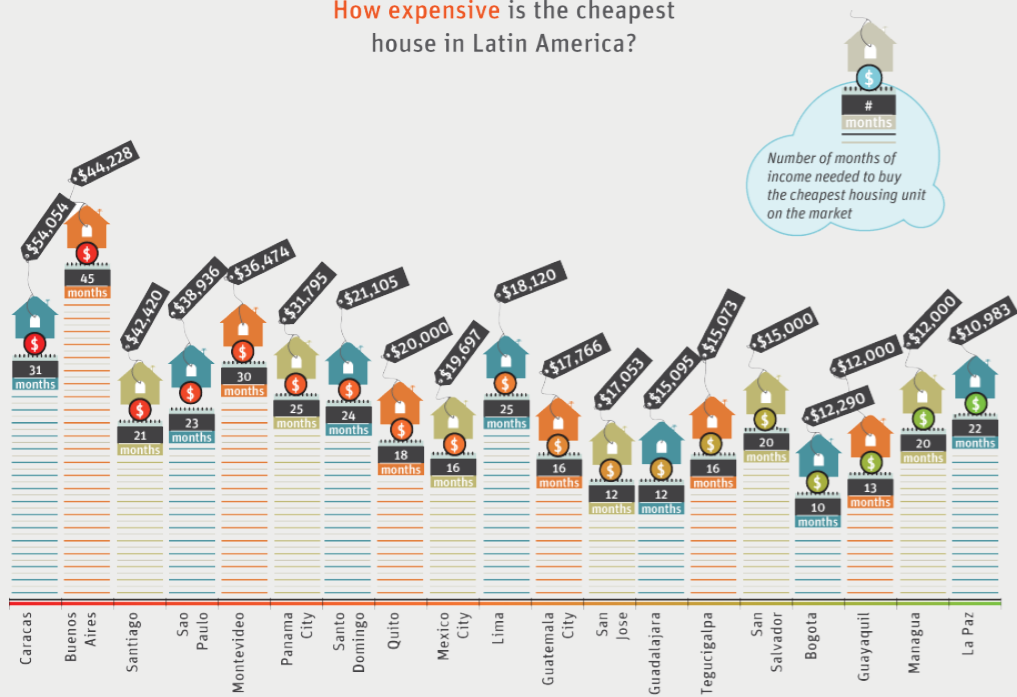
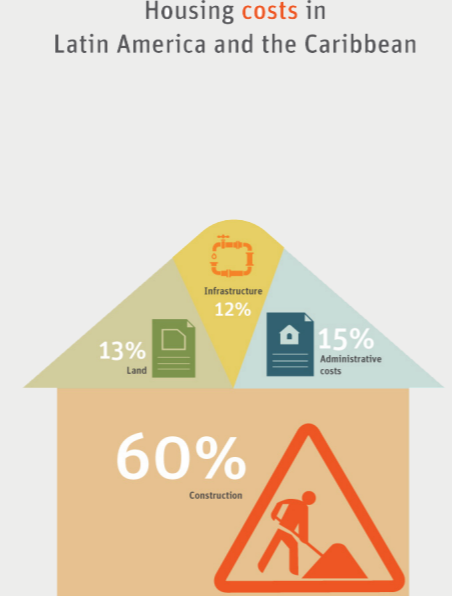
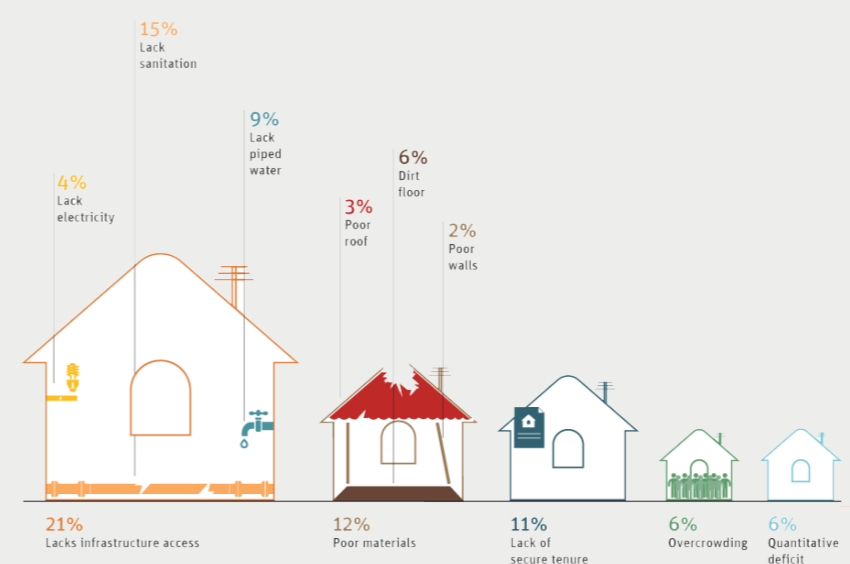


Fig 16. Housing statistics in Latin America (IDB, 2012)

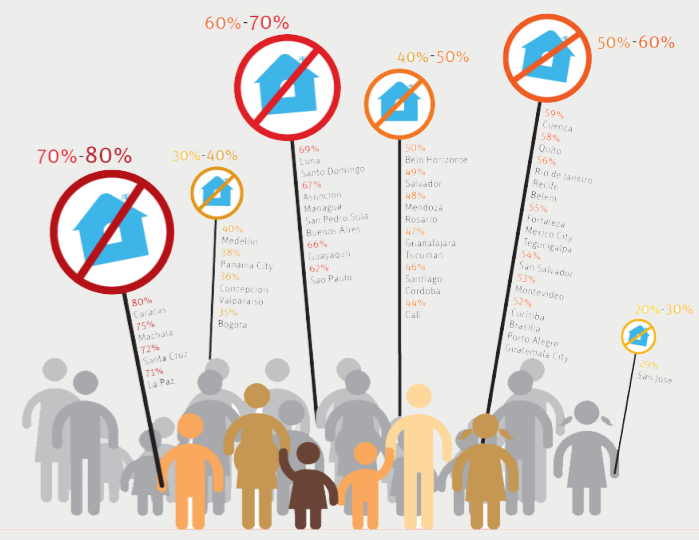
Housing costs in Latin America and the Caribbean



What are the biggest housing problems facing Latin American and Caribbean cities?



How many families cannot afford a house?



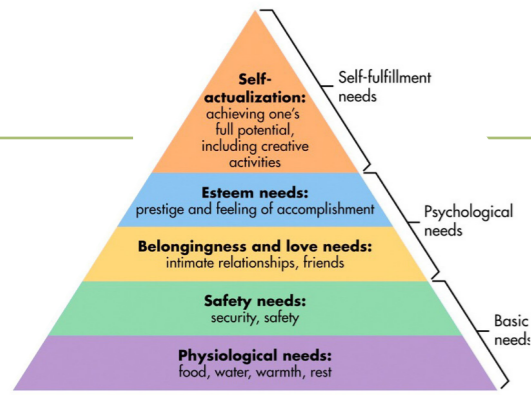


Fig 18. Maslow's hierarchy of needs (Rosen, 2011)

like food and water need to be covered first. To help the people also cover their safety needs like housing, the municipality of El Rama started the *Barrio Nuevo* (= new neighbourhood). In this area the municipality permits occupation of land by families to keep them from living on the street.

To get the official document of permission, they have to pay 1400 córdobas once, says Fusto Espinosa Alemán while showing the documents he received recently. The program aims to give the poorest people of El Rama the opportunity to build a more

decent house, by saving money on their plot. However, 83% of the respondents living in Barrio Nuevo, reported that they still don't have saving capacity and therefore they are not eligible for any fund or other financial aid. Examples of houses in Barrio Nuevo can be found on the next page.

4.3 SOCIAL HOUSING CONCLUSION

It is true that Nicaragua is growing economically but most of the capital stays in large enterprises, states Borgstein. The fact that the GDP is growing rapidly and laws are being improved, does not necessarily mean that families earn significantly more money or live in better circumstances.

Although social housing funds in Nicaragua do exist, many are still unreachable for the

concerning families. The fact that applying for these funds is only possible if your income is above minimum proves that the families who need it the most are not included in the programs of national housing organizations.

We can conclude that Bambú Social is unable to provide affordable housing to the people of segment A and B of the target group. If people have difficulties to cover their basic needs and are not eligible for any subsidy, it seems impossible to build a house within their budget. So to be able to reach the entire target group, including segment A and B, Bambú Social would have to look for ways to provide financial aid, apart from delivering a decent design.

One of the possibilities might be setting up or working together with an existing microfinance organization which focuses on social housing, so Nicaraguan families will be able to construct their own houses with (foreign) aid provided on micro level.

In this case, even though the aid may be foreign, the chain of local entrepreneurship and employment will be stimulated while, at the same time, the demand for (bamboo) housing will increase.

Bambú Social can start with building bamboo houses for the higher segment within the target group (segment C) by working together with the existing national organizations, which definitely has an added value in the first step of the implementation.



THE DOCUMENTS AND THE HOUSE AND KITCHEN OF A RESPONDENT LIVING IN BARRIO NUEVO

HOUSES IN BARRIO NUEVO

DESIGN SUGGESTIONS

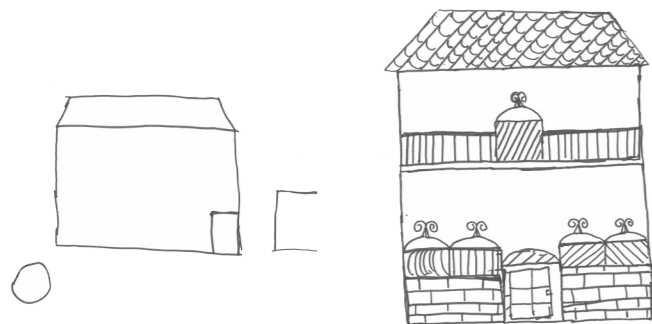
A series of design suggestions on the functional design of the social house was made based on the target group analysis and the social housing analysis. These suggestions aim for a design that is affordable, easy-to-build, of good quality and matched perfectly to the needs of the target group.

According to the target group analysis, the design should be accessible for the poorest, while adaptable to the needs and wishes of the entire target group.

From the social housing analysis can be concluded that making it accessible for segment A (the poorest) depends on the financial aid of other parties. But surely, a lower price of the house increases the financial accesibility.

5.1 DYNAMIC DURABILITY

The first principle of Bambú Social is the use of local resources as the basis of sustainable architecture to, among other reasons, reduce environmental impact, waste and costs (p. 10). In order to be sustainable, a house should benefit from the lifespan of materials as long as possible (durability). After all, the longer materials can be used, the less waste and costs are made.



We concluded from our data that a house in Nicaragua usually stays with the same family for generations (p. 22). Therefore we believe the social house should be dynamic (i.e. flexible, adaptable) and able to grow along with its residents in order to be durable.

The most important aspect of a dynamic house is that it is easy to expand or change after construction. We believe the easiest way to do this, is by a modular design. A modular design is made out of components that, by the use of a grid, can be assembled in a variety of arrangements.

Among the interviewed households the number of inhabitants had a great variety (p. 18). Of course also the budget can be quite different from family to family (p. 26). With just one modular design, different families can choose how many rooms they want, dependent on the size and the income of the family. The size of the house adapts easily to the needs of the user.

Also, living in a dynamic house means that the birth of a new child or a relative moving in, doesn't necessarily mean a decrease in privacy. The house can grow simultaneously with the family. After all, for most respondents privacy was the most important aspect of their dream house (p. 25).

A dynamic house can not only grow simultaneously with the size, but also with the saving capacity of the family. This resolves the problem of unreliable savings and harmful loans, as explained in the target group analysis (p. 26). Because as soon as a family

saved a relatively small amount of money, they can invest it in a new part of the house.

5.2 PREFABRICATION

Combining a modular design with a prefabrication process makes it even more easy to change the house (dynamic). Also, it can drastically reduce the working hours on the construction site, which can reduce the price. On top of that, the construction of the house is not limited to the only three dry months (in El Rama), and the construction on site fastens up. In this way the risk of the bamboo getting wet during constructing can be reduced.

Prefabrication could also have a huge impact on the implementation. The barrier of knowledge transfer gets reduced to the craftsmen, who can make bamboo their speciality. Specialization, on its turn, also has a positive effect on the working hours and thus the price of the elements.

FACILITIES

We believe that not only the space should be adaptable/expandable, but also the facilities of the house. A young couple, for example, could have the wish for their own little house. They might have the budget for a basic house with enough rooms, but can't afford their own water collection and purification system yet. The design should be made in a way that even (a few years) after the house is built, a water and electricity system can be added.

What makes it slightly more difficult, is that the preferred type of toilet and kitchen depends on the water system. A dry toilet

is preferred to be outside (p. 25). But also, a different little toilet unit could give interesting opportunities in sharing with neighbours or relatives on the same plot.

The same applies to a separate shower and/or washing place (wet area) next to the well or even a separate kitchen. In the most simple version of the design however, the kitchen could be just a two pit gas stove in the corner of the living room (p. 16).

MATERIALS

The first draft of the social house uses a minifalda construction with concrete and bamboo. This construction will make use of a local resource (first principle of Bambú Social) while satisfying the wishes of the target group, concerning hygiene and security (p. 24). Also, in case of the more rural areas, concrete columns could be easily used to elevate the minifalda construction and level even the most uneven plot.

In this minifalda construction, the upper part of the construction (skeleton) is made out of bamboo, but the material of the wall elements has not yet been determined. We believe that a very basic but safe and secure (prefab bamboo) wall element, which later can be finished-off with more layers, would be the perfect solution. In this case, even the wall elements are adaptable to the budget of the family at first, and easy to expand later on.

5.3 CONCLUSION

The overarching suggestion for the design of the social house is to make it a highly

dynamic building, so it is sustainable and can last for years, decades and generations. Based on our results, we suggest to start with the design of an extremely basic house that is accessible for the poorest, and make it expandable to fulfill the dreams of the entire target group.

This could be achieved by making a modular design that can be arranged according to the wishes of the family. We believe that, in order to prevent losing the overview of possibilities, the most important part of this design should be the grid. Also, to keep it simple, the amount of modular elements shouldn't be excessive and the most basic house should be expandable without taking important parts down.

An other option is making a series of consecutive designs. In this case the house can be expanded step by step. Even before the construction of the first stage, the possible extensions can be taken into account. In this case, we can imagine a (one-page) menu that summarizes all different options, with a 'shopping list' that specifies all necessary (prefabricated) elements for each option.

CRITERIA BASIC HOUSE

The criteria for the most basic house are based on the current situation (needs), combined with the dreams (wishes) of segment A of the target group. Based on the results of our research, we weighted the needs and wishes against each other, resulting in a list of criteria that make it as financially accessible as possible, while taking

safety, security, hygiene, privacy and comfort into account. The first 'stage' should be both the smallest and the most basic house available.

- lowest possible price
- minifalda construction (bamboo)
- easy to close off
- concrete floor
- good ventilation
- living room is most important
- gradual transition private to public
- interior basic kitchen
- exterior toilet
- exterior wet area

ADD-ONS

For the intermediate options, it is important to remember that size and comfort/luxury are not necessarily related. The first stage is both the smallest as the most basic house. But the next stages can be either bigger, extra comfortable or both. The house should be able to grow in size without having to become extra comfortable, but also be able to extend in comfort without growing in size. That is why, apart from growing in size, it should be possible to add the following elements.

- integrated water system
- (interior) flushable toilet
- (interior) kitchen with wet place
- integrated electricity system (e.g. solar)
- hinged interior doors
- wall finishing (stucco/color)
- floor finishing (tiles)



CRITERIA EXTENDED HOUSE

The criteria for the most extensive design of the house are based on the needs and wishes of segment C of the target group. This house should be affordable, pay attention to safety, security and hygiene, and in particular to privacy and comfort.

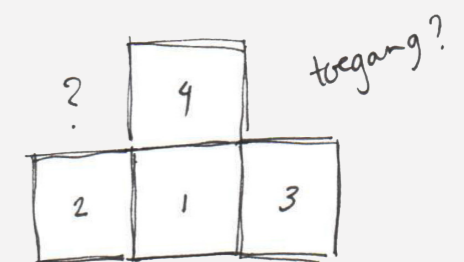
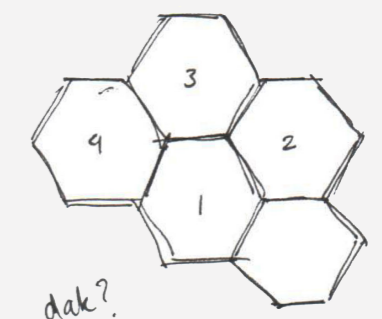
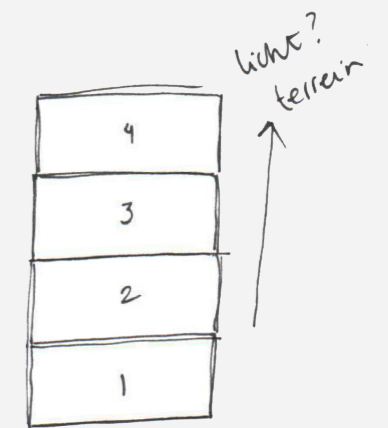
- lowest possible price
- minifalda construction (bamboo)
- easy to close off
- concrete floor
- good ventilation
- living room is most important
- gradual transition private to public
- private bedrooms
- porch
- integrated water system
- (interior) flushable toilet
- (interior) kitchen with wet place
- integrated electricity system (solar)
- real hinged interior doors
- wall finishing (stucco/color)
- floor finishing (ceramic)

REFLECTION ON FIRST DESIGN

The first draft of the social house meets almost all criteria for the extended house, as summed up in the box on page 39. The estimated costs for this house are 7400 USD.

MODULARITY

We believe that the beauty of modular architecture is the possibility to add or remove any component (module) without a lot of effort. Making a good and functional modular design, unfortunately, isn't that easy. Each solution brings up new questions which must be taken into account. The construction is important, of course; in every stage the design should be stable and strong, and the added roof shouldn't leak, for example. But also other functional aspects are of great importance. The house should be adaptable to its surroundings, in order to have the right orientation on the road, the sun and the wind. But also the direction in which the house will expand should be kept in mind; is it adaptable to different plot sizes? and how is the accessibility managed?

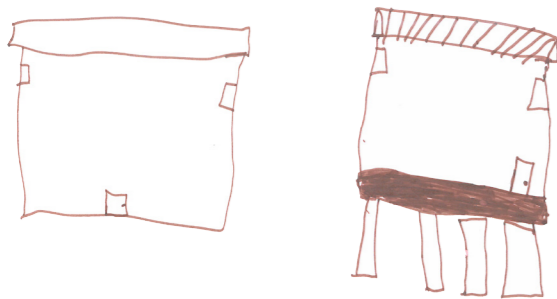


A cheaper design was made by leaving expensive parts out. In this way the costs can be brought down to 4800 USD, as explained on page 11. In short, the first draft of the social house is adaptable to a different budget of the customer.

However, because the first principle of Bambú Social is about sustainability, we suggest a small but important change in concept.

Based on this target group analysis, we suggest to design a house that isn't only adaptable at first, but more importantly, able to grow along with the family and its needs and wishes over the years. We think that focussing on the flexibility/modularity of the house is the best way to make it durable and sustainable (p. 36).

Also, in case Bambú Social aims to reach the entire target group (including segment A and B), we suggest to start the designing process with an extremely basic house. In our opinion, this basic house should be as financially accesible as possible, but expandable to fulfil the dreams of the entire target group, instead of the other way around.



Apart from this conceptual suggestion, we would like to reflect on the main differences between our findings and the design solutions of the first draft of the social house.

PORCH AND LIVING ROOM

The designed floorplan of the social house is based on the assumption that the porch is the most important area of the house, because people spend most of their time outside. However, in our research, the living room is said to be most important by 51% of the respondents. On page 16, we explain this difference by the fact that a large majority of the houses have little to no ventilation (71%) and therefore have a warm and uncomfortable temperature in their living room.

Since the first design of the social house has a well functioning ventilation system the interior climate of the house will be very comfortable (Constructional Analysis, 2016). In this case, we assume, the porch could have less priority in the design.

BEDROOMS AND PRIVACY

The order of privacy-sensitive areas of the design corresponds with our observations. Only the social house has just one or two bedrooms. As confirmed by our data, bedrooms in Nicaragua have a high occupancy. However, most respondents wish for a number of bedrooms that suits their family; couples together and one for each child. Since some households are quite big (p. X) this would mean that the possibility to add more (small) rooms is recommendable.

BATHROOM

In the social house, the dry toilet is placed inside, next to the shower and the kitchen. From our research we conclude that people would love to have a toilet inside, as long as it is flushable. A dry toilet, on the other hand, is not desired inside the house.

SAFETY AND SECURITY

Most respondents attach great value to safety and security. Not only against burglary or violence, but also against the weather and natural disasters. They said to prefer concrete as a building material to give them a safe feeling. However, based on the first principle of Bambú Social, the social house is made mainly out of bamboo. To

combine this first principle with the needs of the target group, extra attention should be paid to the secure feeling and the ability to close-off the house.

DESIGN PRIORITIES

After all, where to set priorities regarding safety, security, hygiene, privacy, comfort, functionality, sustainability and costs is very important. In the first draft of the social house these priorities are mainly based on the five principles of Bambú Social.

With this social analysis, we hope to provide insight into the priorities of the entire target group, so the social house can also be matched perfectly to their needs and wishes.



ONE OF THE RESPONDENTS DRAWING THEIR CURRENT HOUSE

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Vargas	Dora Isabel Soto	Miriam Rejuez	Pedro
Ramón Isidro Ocón	Luisa	Antonia	María
Claudia	Albertina Gomez	Edelina	Nubia
Louisa Campos	Jusnielca del Carmen	Petrona Claudia López	Esther
Yanina Morales	Alicia Pulido	Catalina López	Llurisma
Marina Antonia	Sheila	Mercedes Machado	Giovanny
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María Fajadro	Haytalina	Dominga	



INTRODUCCION

Somos estudiantes de arquitectura de Holanda y España y estamos realizando un estudio sobre la vivienda, con el objetivo de conocer las necesidades de los ciudadanos y de mejorar la situación respecto a la vivienda. Por ello, le agradeceríamos que nos respondiera a las siguientes preguntas. La información que nos facilite es confidencial y está sujeta al secreto estadístico.

DATO PERSONALES

1. Nombre: _____
2. Edad: _____ años
3. Sexo: Mujer Hombre

LA VIVIENDA ACTUAL

4. ¿Podría dibujarnos su actual vivienda?
5. Calidad y características de la vivienda actual:
 - Cuántos pisos _____
 - Cuántos habitaciones _____
 - Acceso a electricidad Si No
 - Patio exterior Si No
 - Material del techo _____
 - Material de paredes _____
 - Material del suelo _____
 - Baño Si, interior Si, exterior No hay _____
 - Cocina Si, interior Si, exterior No hay _____
 - Ventilación Mucha Poca No hay _____
 - Luz natural Mucha Poca No hay _____
 - Privacy Mucha Poca No hay _____
6. ¿Cuál es el área/zona más importante de su vivienda actual? y por qué? _____

7. ¿Quién y en qué año construyó su vivienda? _____

8. ¿Cuántas personas viven normalmente en esta vivienda y cuáles son sus edades? _____

1			6		
2			7		
3			8		
4			9		
5			10		

9. Esta vivienda es:
 - De su propiedad.
 - Alquilada.
 - Prestada.
 - Otro _____
10. ¿Cuánto paga/pagó por ella? _____
11. ¿Por cuánto tiempo le gustaría seguir viviendo en esta casa? _____
12. Situación laboral (de la persona encuestada) _____
13. Si no tiene ningún inconveniente, ¿cuáles son los ingresos familiares? _____

LA CASA DE SUS SUEÑOS

14. ¿Podría dibujarnos la casa de sus sueños?
15. Explíquenos su dibujo:
 - ¿Qué destacaría de la casa? _____

 - ¿Con qué materiales está construida? _____

 - ¿Qué instalaciones tiene? _____

16. ¿Cuánto podría pagar por ella? _____

17. ¿Se imagina que la casa de sus sueños fuera de bambú? Sí No

¿Por qué? _____

El mejor aspecto _____

El peor aspecto _____

18. ¿Conoce la casa de bambú construida por la Fundación Bambú Social? Sí No

¿Le gustaría conocerla? Sí No

19. En términos generales, ¿cuál fue su primera impresión con la casa modelo?

Alto

Más bien alto

Más bien bajo

Bajo

20. ¿Cree que podría vivir en una casa como esta? Sí No

Vivienda actual

¡GRACIAS POR ATENDERNOS Y AYUDARNOS A CONOCER

LAS NECESIDADES RESPECTO A LA VIVIENDA EN NICARAGUA!

Si quiere seguir colaborando con nosotros (entrevista personal) estaremos encantados de contactar con usted.

Nombre _____

Teléfono _____

Si quiere recibir información acerca de nuestro proyecto, facilítenos su correo electrónico:

E-Mail _____

Vivienda de sus sueños

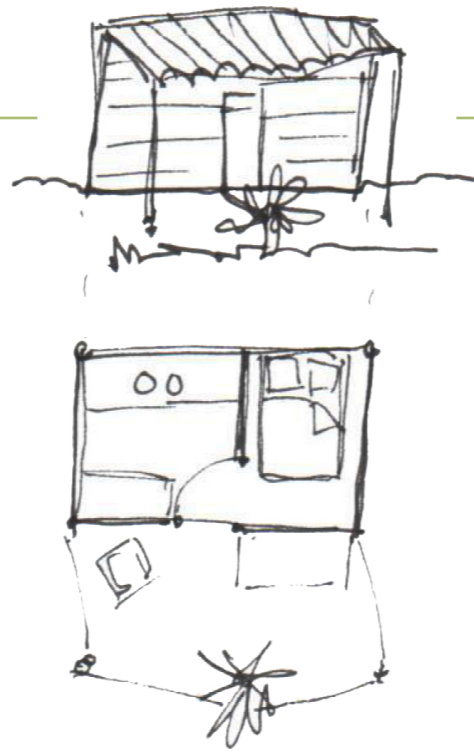
HOMEVISITS

FINANCIAL AID

Inginia Holec Calderón was sitting in front of her house, and at first she wasn't sure if she wanted to contribute to our research. Soon turned out that she has minimum eyesight due to untreated diabetes, so she had to ask her husband to draw for us. While he was looking for a ruler, she started talking.

Just like María Vargas, Inginia and her husband live on this piece of land for years without official documents, but until now, no one came to claim their land.

When her husband found his ruler he starts drawing fanatically. Due to an accident many years ago, his left arm was amputated from the wrist down. Because of their disabilities, the couple receives governmental assistance

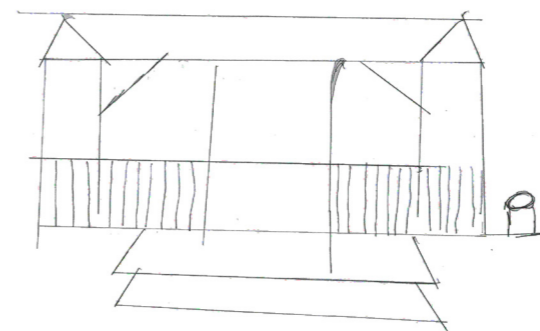
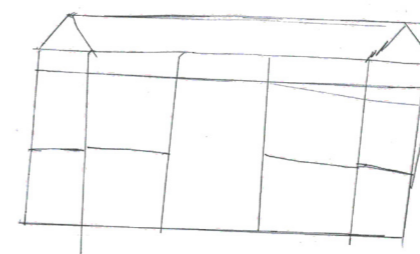


for living expenses. The aid exists of an amount of rice, beans and oil. Just enough to live. They have no access to water or electricity and they use the bathroom of their neighbours. The wood and zinc covered walls are in bad condition and even though they live in the city center, between

shops and concrete buildings, they live on a dirt floor. "Definitely", she said, they would love to move to a more decent house.

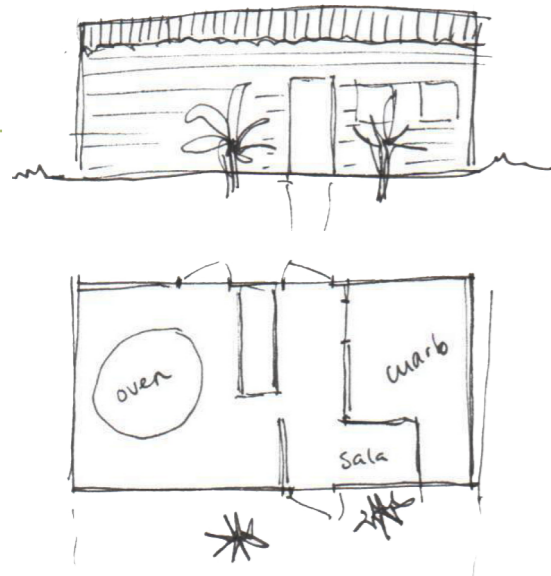
Her dreamhouse is elevated so it is positioned slightly higher than the street, and a few steps are needed to get to the entrance. It has two floors and it is made out of concrete and wood. Although, she said, cheap wood doesn't last long in the climate of Nicaragua, while pointing out a few rotten pieces of wood in her current house. To replace the wood with well treated bamboo would be fantastic.

While finishing the interview it gets dark, but that doesn't keep her from explaining us how they stay healthy, despite their limited diet. The root of a plant in front of their house is the secret. You can make soup out of it, or tea for example. If she had more space, she would love to invite us to taste it one day.



The current situation and the dreamhouse, drawn by Inginia.



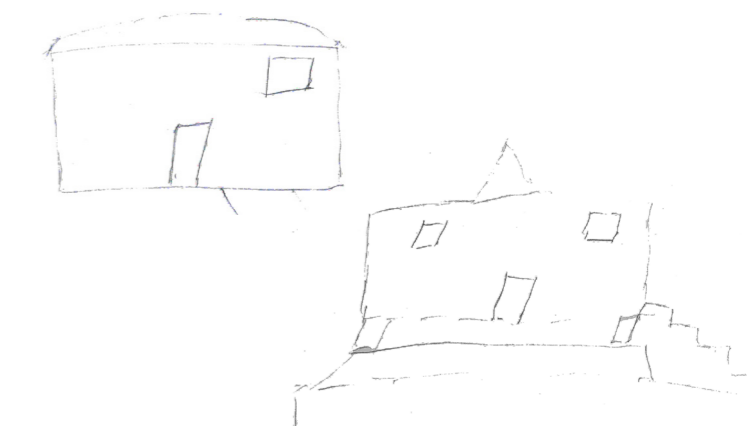
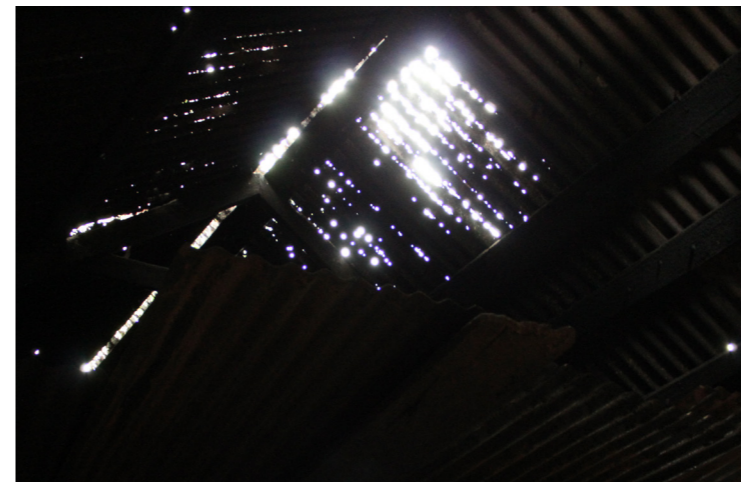


MARÍA'S BAKERY

The main part of María Vargas' living room is filled with a huge oven. María is a hardworking woman and makes the best bread in El Rama. She lives with her daughter, her three grandchildren and an adopted special-needs young man, Don Alfi. "Someone came to me and asked if I wanted to take care of him, so I did, and I still do. Because, honestly, who else is going to do it? The rich people won't, I am sure about that..." explains María, with tears in her eyes.

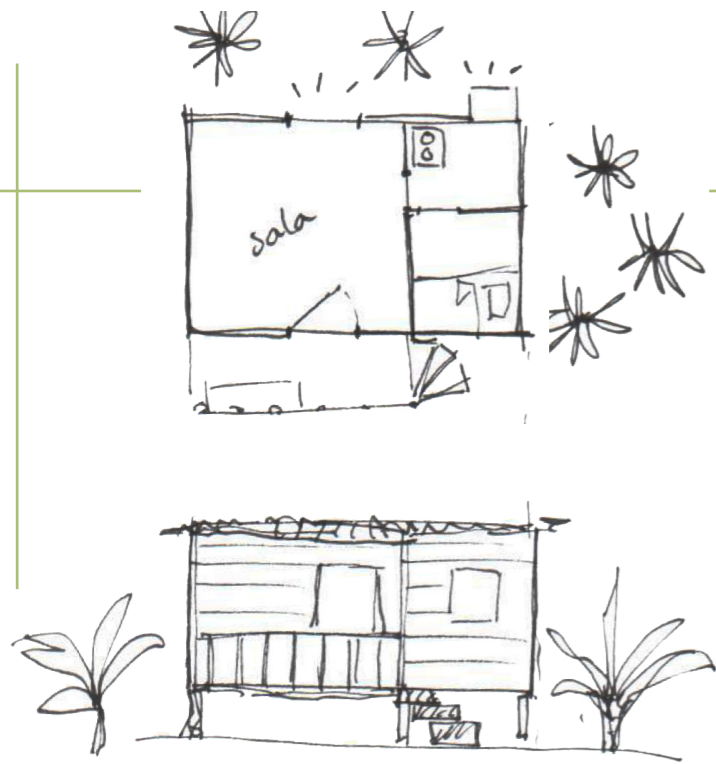
All six family members sleep in the same bedroom. The zinc roof is perforated by rust and needs replacement, but the bakery is still in tact. Yet, María is fighting for its existence, since the house is in dispute. When she was thirteen years old, her family expropriated the plot without official documents. After the big hurricane of 1987 they rebuilt the house, and it has been used intensively all this time. But now, the land is claimed back and a big 'for sale' sign marks the entrance of the plot.

However, she isn't looking for a new place to live. "I don't have any other option. The revenue of the bread is my only income, and after all these years here, they can not just send me away". However, she does dream of a house like the big american ones on tv, she tells us while drawing. "You are architects right? Can you design it for me?"



The current situation and the dreamhouse, drawn by María.





ONE MAN'S LIVING

While welcoming us on his little veranda, Ramón Isidro Ocón tells us proudly that he built the house all by himself and he has the best view of El Rama.

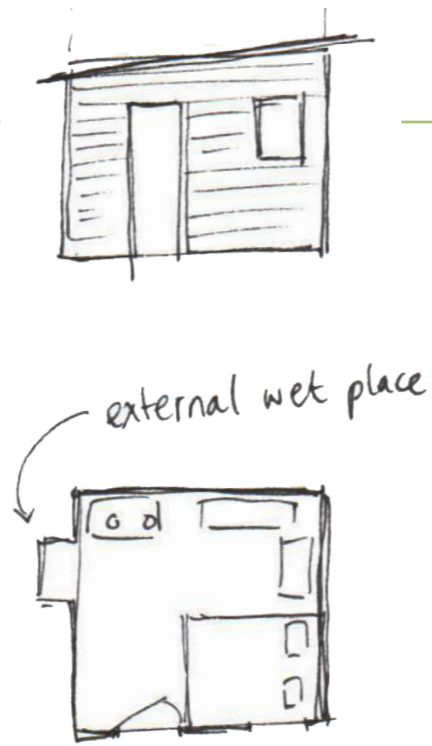
His home is small, simple but comfortable and is surrounded by lots of banana trees. Indeed, he has the most wonderful view on the joining Río Escondido and Río Rama, and nature surrounding him. Also, the breeze that goes through the elevated house, gives it a nice and comfortable indoor climate. For a moment, we forgot that we were

surrounded by the chaotic traffic of El Rama, and we drifted away by the view.

Ramón is a retired, 76 year old man. He lives alone and only needs the minimum: a little sleeping room, small stove, a porch and a chair in every lookout of his house. While showing us around, the love for his house twinkles in his face. He doesn't want to draw his dreamhouse, he says, because he never learned how to draw. Nevertheless, he explains that he doesn't really need more than he has, but his house definitely needs to be repaired in some places. He recently bought two planks to fix the broken ones in his porch. He needs to improve a lot more, he mentions, but his pension just covers the costs of food and electricity so at the moment he doesn't have the money to do it.

Ramón was really enthusiastic with our visit and wanted to know all about Bambú Social. His most important advice was to listen carefully to the people of El Rama, since after all, they are going to be our customers.

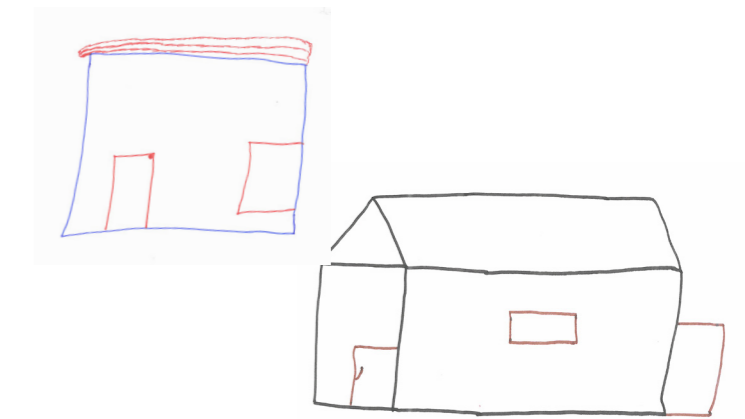




MOVING OUT

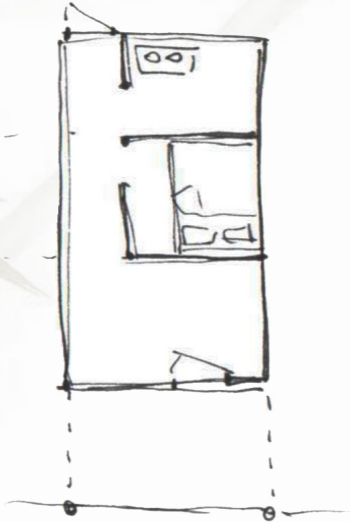
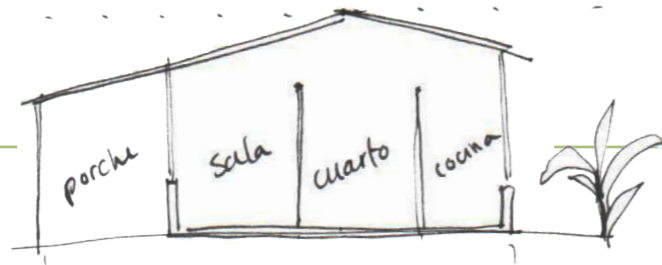
When we walked by, Jusnielca del Carmen was sitting in her doorway, watching her one year old daughter while chatting with her mom. When she got pregnant at 18 years old, she and her boyfriend decided they wanted to move out and raise their child together. However, with their income they couldn't afford to buy a plot and build their own house. Finally, they used second hand materials to build their own place at the plot of her parents. In this way, they save costs on the land. Also, they don't have to dig their own well or build their own bathroom and on top of that, once in a while, they can take advantage of the presence of her mom to watch the baby.

Their house is small and exists of only one room with a simple stove and wet place in the corner. Nevertheless, they have the privacy and independancy they hoped for. "I do not have work, and my boyfriend is a construction worker. I'm really glad we found a cheap and comfortable way to live and raise our child together."



The current situation and the dreamhouse, drawn by Jusnielca and her sister.





THREE SISTERS

Yanina Morales lives with her husband and her daughter in a simple, three persons living with all that comforts them. They have a concrete floor, as a part of the minifalda construction, and the wood of the walls looks new and fresh. "The house was built recently" she explains, "It still needs to be painted.

She works as a teacher and together with her husband they earn 10000 córdobas (345\$) monthly. They have enough money to cover their basic needs and have little savings capacity. Together with her two sisters they bought a plot, on which they all built their own house. "Because we share the bathroom and washplace in the patio, we had more financial possibilities to build a nice and spacious house."

They chose to share the bathroom and washplace, but they all wanted their own kitchen. "It gives each of us more

independance. We can cook what we want without getting in each others way and we can keep track of our own expenses."

She doesn't want to draw the house of her dreams, because it is exactly the house she lives in now. "Ofcourse it could also be made out of bamboo. Like the model house of Bambú Social. It looks really fresh, but I prefer a concrete floor."





ONE BIG FAMILY

At the south side of the river, the notorious Miranda family is well-known. The head of the family, Esther Miranda, had no less than nineteen children. Since they all started their own families and built their houses in the neighbourhood, Esther can proudly say she herself populated the whole area 'up the hill'.

The part of El Rama on the south side of the river exists of one long, dirt street. Going slightly upwards from the place where hollowed trees transport people, provisions and cattle across the river. Esther's

husband works in one of those boats, while she controls the household. To provide all children with food, she explains, they added a separate kitchen a long time ago. It is constructed out of bamboo and zinc, and over time, all kinds of materials were added to strengthen the construction. The main reason to extend the kitchen from the house was for the smoke, since she cooks on a wood fire, but also because the space inside the house was needed to sleep in. Over the years, they added four little bamboo bedrooms to the back and the side of the house. But still there is only room for 7 persons. Especially in former times, many family members had to sleep in hammocks in the living room.

Like all other households at the south side of the river, the World Bank built a toilet for them as a part of their water project (p. 22).



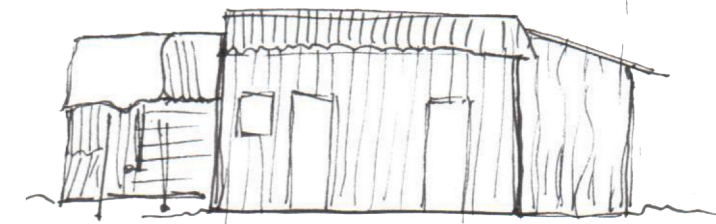
KITCHEN OUTSIDE



KITCHEN INSIDE



WET PLACE KITCHEN



AN ADDED BEDROOM



SEPERATED TOILET



THE LIVING ROOM



THE BACK SIDE OF THE HOUSE