



Problem Framing Brief
Palm Processing in the Luangwa District
Opportunities and Challenges for subsistence farmers in South Eastern Zambia



October 4, 2013

Background Informatoin

Introduction:

The Chitope area of the Luangwa District in Lusaka province, Zambia consists of subsistence farmers who supplement their daily household income and welfare through weaving and selling of palm leaf products such as mats, hats and baskets. Palm material is readily available based on natural local supplies and current demand. This area includes villages like Linga, Chuzu, and Mwavi. Many villagers are subsistence farmers who engage in other activities to supplement income. Village weavers struggle to generate the income needed to maintain the quality of life they desire. Our research suggests this is primarily due to market constraints, but significant improvements in weaving experiences may be garnered through focused technology based solutions.

Palm Production:

Palms are readily available all through out the region. According to interviews with villagers and observations while in the field, palms grow wild, are not harvested with sensitivity to later crops, and are not viewed as a limited resource. Furthermore, weavers currently do not produce enough palm products to compromise their access to raw materials. More research needs to be conducted in this area. If weavers in the area achieve deeper and new market penetration, raw material constraints and management will become a key issue. Succinctly put, raw material supply is not an issue in the minds of weavers as there is no demand pressure generating awareness.

Our observations suggest income from palm weaving is at its highest and most stable during the dry season when procuring, processing, producing and storing palm products is relatively easy in terms of weather constraints. Wet conditions create significant problems in the production chain from start to finish. During the rainy season production and income drop off steeply as humidity increases as figure 1 indicates.

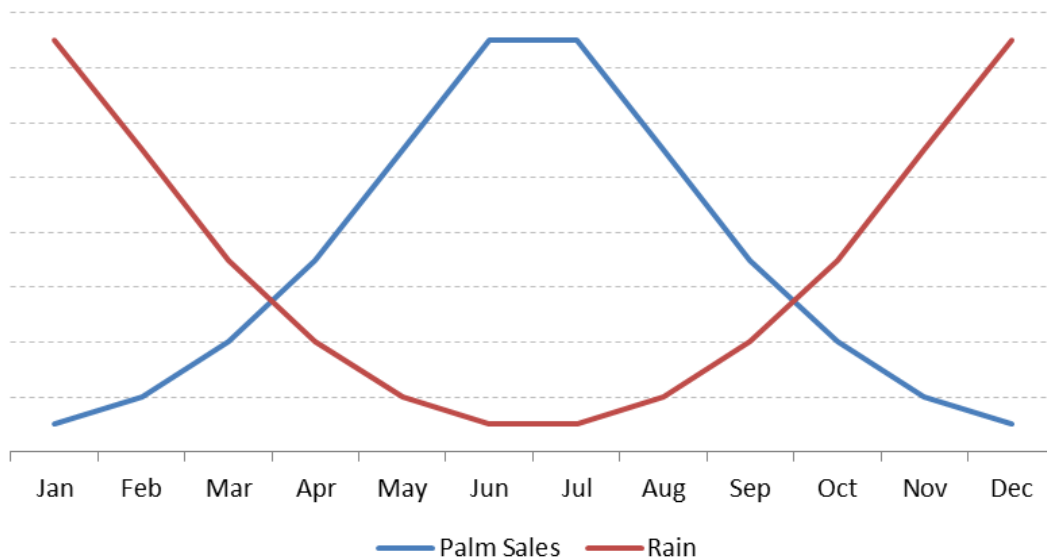


Figure 1. Monthly palm sale and rainfall estimates.

The wet season is characterized by a diversion of labor resources to agricultural production, in most cases maize, at the expense of weaving. The opportunity cost for subsistence farmers to farm versus weave is too great. This is compounded by suboptimal weaving conditions, and even worse storage conditions. Palm products mold and discolor quickly when exposed to moisture for any period of time. Marketers and consumers find this mold and discoloration undesirable and will not purchase products in this condition. Additional opportunities may exist addressing product environmental susceptibility in terms of locally sourced lacquers, resins, or even packaging.

Stakeholders:

Due to the nature of the IDDS summit, our team was unable to devote significant resources to stakeholders in the palm product value chain other than weavers. Our main focus was to facilitate the improvement of production efficiency and experience among weavers. This stakeholder has already been introduced but the following stakeholders could be researched for a more holistic view of the palm product value chain in Zambia. There are no shortages of stakeholder analysis research opportunities.

- Palm weavers
- Middlemen
- Transporters
- Small market sales personnel
- Large market sales personnel
- Craft and boutique sales personnel
- Customer Segments
 - B2B/B2C channel exploration
 - Domestic
 - International
 - Function focused
 - Form focused

Supply Chain:

Our research suggests that home or farm based palm producers sell products as individuals to market agents at very low prices. The market agents then in turn sell these products for a much higher price in the nearby markets and Lusaka City area as functional products to the end users.

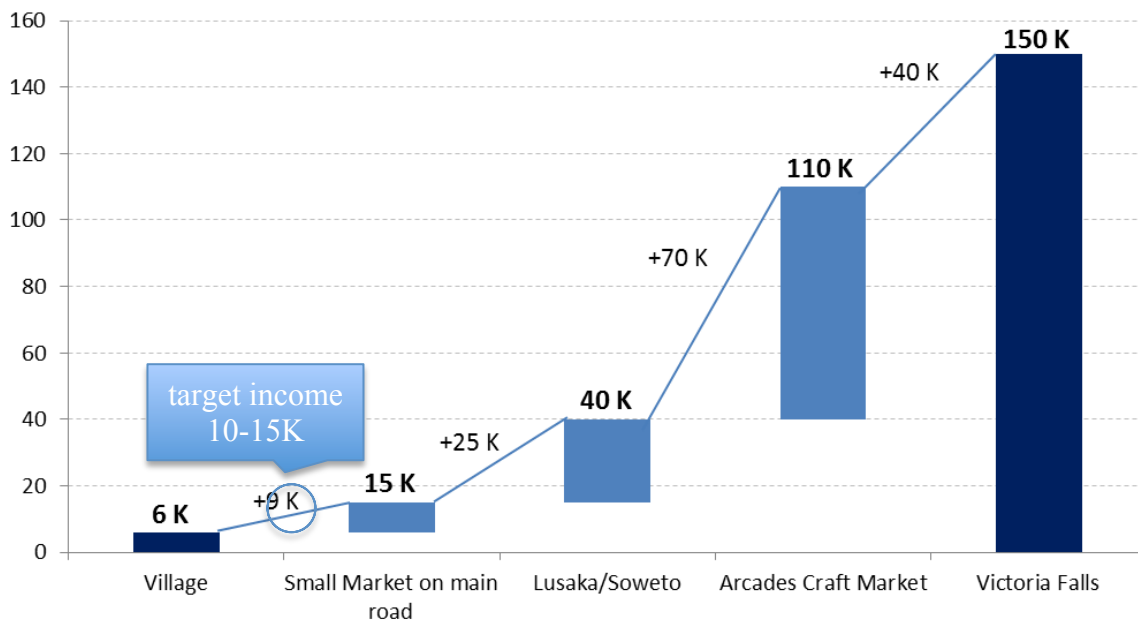


Figure 2. Sale price in Kwacha of medium basket relative to distribution channel

Market Access:

Based on community interviews and observations the main problems palm weavers face are market access related. Based on asymmetrical market information as well as a lack of access to transport, producers have little knowledge of how much items like baskets cost at different markets across the country or how to get products to those locations. Weavers have a priority of seeking higher income than what they currently receive. The table in the previous section illustrates some pricing across the country. Chitope area weavers seek an increase of income capture between 50 to 100%, which equates to 10-15 Kwacha per basket.

Health Issues:

Weavers traditionally work outdoors during the dry season. They sit on small stools, or lean up against trees using old clothes as cushions. Long hours are spent in hunched positions repeating the same set of movements thousands of times. Weavers indicated that they experienced significant pain in their necks and backs. This pain negatively impacts performance in terms of quality and quantity.

Infrastructure:

The Luangwa area has minimally developed infrastructure. There are no municipal utilities, most homes do not have electricity, and none have running water. Those that have electricity use generators, this is only among the most privileged citizens. Water is drawn from borehole wells. Roads are primarily dirt and are often in significant disrepair. Circumstances such as these make transportation and supply chain management quite expensive.

Primary forms of transportation in the village are by foot and some bicycles. Our team observed a large road construction project through out the district. According to respondents, the road is being constructed by a Chinese contracting company for the Zambian government and will connect a larger community with a hospital to the main highway going to the capital city. Preliminary research suggests this could significantly impact the way people live in Chitope across the board. In terms of implications for palm weavers, this could increase their access to markets, decrease the cost of one leg of the supply chain, and increase their exposure to a greater range of people, for better or worse.

Problem Framing

This research focuses on discovering the complexity and options for subsistence farmers who weave raw palm leaves into artisanal crafts. While the purpose of this exploration is to determine how to maximize value, output and market access for weavers, palm production is but one locally derived solution set to problems associated with a lack of access to financial resources and income.

Problem Statement

The Luangwa district in Zambia is home to subsistence farmers who generate supplemental income through activities like palm weaving to meet basic needs and pay for childhood education. These palm weavers face a range of challenges that prevent them from sustaining a higher quality of life. At a structural level is access to markets and a holistic understanding of their products in the value chain. Below that are issues concerning production efficiency, quality, diversity, and comfort.

Opportunity

Our team seeks to identify and address opportunities that can be met with technological solutions co-created with the community. Furthermore we hope to identify key stakeholders at the village level as well as domestic and international partners to collaboratively address market issues and additional revenue streams. Finally we hope to identify resource and funding opportunities to carry the palms project through early research, implementation. This project represents an excellent impact opportunity for individuals or organizations with an artisan focus, understanding of supply chain management, strong local context, experience business modeling, and who are dedicated to transparent communication with local stakeholders.

Theory

Intermediate technology, appropriate, alternative, local, social or endogenous terms are used to determine a technology designed for the environment in which they will act, produced in order to solve a specific problem site with local inputs, and replacing the inadequacy of conventional imposed by large centers, by developed countries, which valorize capital and reduce labor.

Bonsiepe (2012) posits transfer of technology from developed to underdeveloped or developing almost exclusively benefits urbanites. These populations already enjoy greater purchasing power, and said tech transfer generates little employment or capita for those who need it most. Furthermore, he suggests externally developed solutions often lack a focus inclusive of locally available materials or sociocultural constraints. In summation, the needs of developing societies often differ so greatly from those of developed ones that direct transfer of technology belies and may even complicate positive development processes. For this reason technological solutions that are created or adapted with local stakeholders in their local context may have higher adaption rates. Guimarães (1995) adds to this suggesting that design methodologies are not only the domain of professionally trained engineers, architects or designers. Rather “professional boundaries,” should be discounted for inclusion of knowledge and experience held by local stakeholders and end users. External conceptions of informational hierarchy do little to foster impactful solutions and should be disregarded in the spirit of the holistic pursuit of knowledge. Puerto (1999, p.20) summarily adds that the role of design is to participate and collaborate in the emergence of technological innovations as part of interdisciplinary working groups aiming at the emergence of innovations.

Methods

Data Collection

Our team conducted a range of interviews and focus groups with 30 individuals over the course of our field season. Some of these interviews were at the individual level while others were much larger. We spent time in the community building empathy and learning through participant observation.

This information was used in the field and at the Natural Resource and Development College (NRDC), of Zambia to identify the most important problems to address given constraints of time and focus during IDDS. Figure 3 Illustrates what issues we discovered and allowed us to discuss how technology and design based solutions could be implemented.

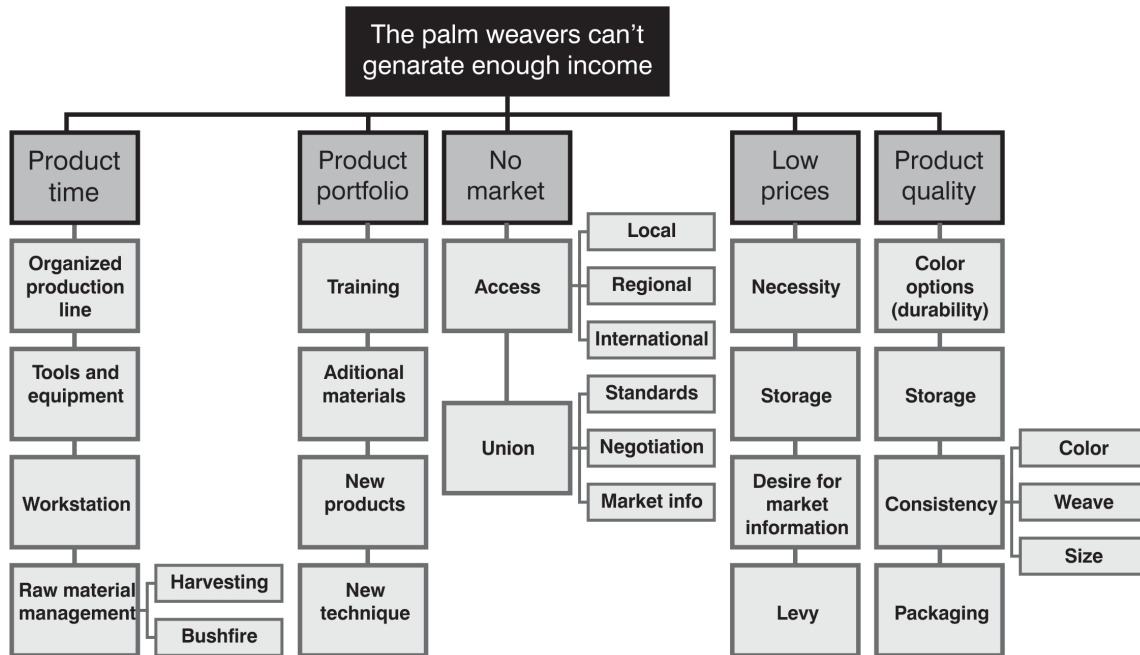


Figure 3. Palm Weaver complexity diagram

This framework allowed us to determine where to focus given the scope of IDDS as well as the constraints of time and resources. Our team identified market issues as being most important to weavers, but determined that several other areas were more addressable through our format. Those areas were production time/efficiency; product variety, and

Technology Design

The design is made from a methodology that strives not only by the interaction with the user, but mostly for their active participation in all stages. The user is the one who best knows your needs, so who better can suggest in the planning process of the product that will benefit you. According Thiollent (1997), this is a kind of empirical social research that is designed and carried out in close association with an action or solving a collective problem and in which researchers and participants representative of the situation or problem are involved in a cooperative and participatory. Using this method of cooperation, the relationship between researcher and participant becomes closer and more dynamic. This is a core philosophy of IDDS and the following solutions were produced using co-creative methodologies espoused by MIT's D-Lab. It is also a fundamental truth of business, respond to and dialogue with customers and end users to develop products or services that are desirable and impactful.

Technology and Solutions

This is a compilation of technologies co-created with weavers in the Luangwa area. Each of these has gone through several iterations with significant feedback and represents versions that are in demand by weavers. The technologies that received the most attention were the sack chair, stripper ring, and weaving stand.

Sack Chair: 5 iterations

During the team observation and information gathering phase, we realized a critical problem related to ergonomics and healthy issues among the weavers. The weavers in Chitope usually work under trees sitting on the ground in places that do not provide the correct ergonomics position to work the whole day. There are problems related to back pains due this situation and that affects



productivity and healthy in long term. We developed a low cost chair using only local materials (natural resources and easy to find materials) looking for help them with those issues.

The Sack Chair is made with a maize sack, dry grass and palm frond stalks, and some string or twine. It costs between 5 and 10 Kwacha to produce, depending on how many maize sacks are used. Based on discussions with weavers this represents about 2 days worth of labor, a price that they are willing to pay. Weavers indicated that they would prefer to trade baskets directly for maize sacks, the most expensive component which can cost 3 Kwacha per bag (20 kg sack, empty).

Weaving an internal frame out of dried palm stalks (thorns removed) and putting this frame into a maize sack is the first step. Next the sack is tightly packed with grasses, taking care to keep the frame in the middle. The top may be left open or sewn shut. This process is repeated a second time. A smaller sack may be used. Some farmers indicated that they preferred two large sacks to produce one comfortable weaving chair.

Weaving Stand: 4 iterations

After some participant observation and discussions with weavers making baskets, hats, and trays, we noticed several things related to hand positioning relative to the product. All weavers we observed either held the product with one hand or left it in their laps. We suggest that these positions do not maximize production efficiency or comfort. From this our team developed a stand that helps weavers by providing a support that is both horizontally and vertically adjustable allowing a more comfortable and efficient position. Importantly, the stand frees up both hands for weaving. In our early experiments the weaving process was 20%-30% faster with the stand. This was corroborated by field tests with weavers. Another variable to consider would be the learning curve.



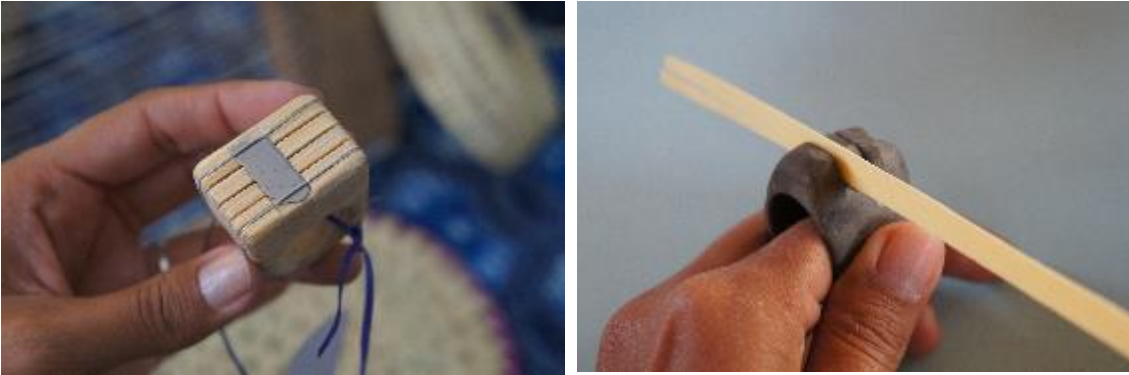
Looms: 2 iterations each

Local weaving techniques and product diversity have changed little over time. It has been suggested this is due primarily to a lack of demand for new products. Based on experience with international value chains supplying woven crafts from Botswana, our team introduced and adapted nail and stick looms to increase product diversity for Chitope weavers for similar markets.



Products made on looms employ palm leaves and other locally available natural materials like Baobab string. Weavers appreciated the new technology but improvements are necessary to address efficiency, ergonomics, and product variety. Discussion of mechanization and other advancements are in discussion.

Stripper ring : 5 iterations



When stripping dried palm leaves, Chitope weavers have historically used whatever sharp instruments are available, usually knives. This can be a hazardous process and unless the weaver is skilled, producing even and consistent strips of palm for weaving may be quite difficult. The stripper ring addresses this need by fixing a sharp blade perpendicular to slots of varying depth such that dried palm may be consistently and evenly stripped. This technology was met with great fanfare. Weavers mentioned that they would like the ability to strip multiple strands of palm at a single time. This is an area of potential improvement.

Next Steps

After developing a working knowledge of the area, identifying problems, and co-creating solutions with the community, we have compiled a number of key findings and suggestions to move the project forward.

Key Findings

- In terms of the major challenges facing palm processors in Mwavi, we repeatedly validated our hypothesis that access to markets was the major problem. This is a complex system that primarily has to do information asymmetry and supply chain management. These constraints are typical for the base of the economic pyramid and beyond in Zambia.
- Production efficiency may be a problem in the future, but currently weavers do not meet demand. This is complicated by seasonal storage options in the rainy season. Many middlemen take advantage of this and other factors to drive the price down.
- If production volume increases, palm availability may become an issue in the future. Again, sustainable sourcing is neither a priority nor a dialogue, based on our preliminary research. Furthermore there is an abundance of palm in the Chitope area now. Palms are not replenished on a consistent basis, as there is no

perceived need to do so.

- All weavers engage in this activity as a way to supplement their livelihood. All of them are subsistence farmers, with various volumes and complexity of production. All subsistence farmers interviewed grow the regional staple, maize. Of the farmers interviewed many lacked the agricultural production capacity to cover family needs. It is unknown whether weavers as a group are above or below the global poverty line, but based on preliminary observations, there is significant opportunity for economic development within this population. There was significant variation among the sample, but none for example had electricity in their homes. All were subsistence farmers. The wealthiest weaver we met was an active member of the church, self-appointed professional palm weaver, and clearly had significant power in the community. He was an elder in a large family of weavers that we encountered across several villages in the Chitope area.
- As mentioned in the supply chain section here is a large road being constructed through the area that will bring in many more people, and potentially new channel opportunities.
- Weaving is common in the area as is brick making, and charcoal production. The three most remarked upon weaving villages were Chuzu, Linga, and Mwavi. The church is a powerful force in the Chitope/Luangwa District. Weaving is taught by family and in schools. Some families specialize in particular products

Continuity

These are the suggestions our team has come up with for any organization or individual taking the Palms project forward. There are several areas that we have covered and are as follows:

- Connect palm weavers with a range of trade associations.
- Help palm weavers form co ops for leveraged buying and negotiations.
- Source a truck or greater control of supply chain for Mwavi area.
- Identify more key stakeholders and key community members that can increase acces.
- Stay Connected with the Tembo family. Particularly Darlington Tembo of Chuzu village. He is a connected weaver.
- Talk to agents at bridge and at other markets to identify needs.
- Talk to all other stakeholders and potential stakeholders.
- Make “how to” video/ brochures for technologies and give to gatekeepers

Suggestions and Other Design Opportunities

Take the weaving stand, stripper ring, and maize sack chair further. These were definitely well received. Develop business models to address international markets.

Research Targets

- The power of churches in the area
- The power of indigenous spirituality and culture
- Deeper understanding of cultural complexity
- Non palm based solutions
- Complexity in the rainy season: raw materials, production, storage and market access
- Other raw materials and resources in the area
- Safety and health concerns for palm procurement and processing
- Increasing the life of palm products through adding processes or substances to combat effects of moisture, sun, or use.
- Other materials or business opportunities for subsistent farmers
- Supply chain management
- Other stakeholders in the vegetable value chain
- Access to information
- Previous projects in area: Why they succeed, or failed.
- Loom Automation/ Weaving technology
- Other weaving cultures/techniques
- Zambian, regional and international markets
- B2B/B2C Distribution channels
- Trade and Craft Co Op models
- Add a “project importance” column to the potential partner section.

Potential Funding Partners

- UNDP
- USAID
- Rotary International
- IDIN network
- Continuity Partnerships
- Power dynamics within the villages
- Power dynamics between stakeholders on value chain
- NTBC

Lessons Learned

- Conceptualizations of work, time, and commitment differ across cultures. Intercultural teams must find ways to account for this when working with each

Work Cited

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24. Disponível em: <<http://web.ua.es/es/revista-geographos-giecryal/documentos/sociedad-naturaleza.pdf?noCache=1330087864628>>. Acesso em: 12 jun. 2013.

Appendix B: Adjusted Interview Protocol

These questions have been adapted from the originals employed in the field. The spirit of analysis as well as scope remains the same, but these variants offer the opportunity to add richness and complexity in answers.

For problem framing:

1. What is important to you/ What things occupy your time most/what things occupy your mind most?
2. What are the biggest challenges you face in your day-to-day life?
3. What do you do to address these issues?
4. How does palm weaving fit into this? Why do you weave palm?
5. What are your biggest challenges in the palm weaving process?
6. What are your biggest challenges in taking palms to market?
7. Where are your biggest successes in weaving palm?
8. What are your biggest successes in taking palm products to market?
9. What is your favorite part of palm weaving?
10. What do you like least about palm weaving?
11. What is the best experience you have had weaving palm?
12. What is the worst experience you have had weaving ?
13. Given what we have discussed is there anything we did not cover that you feel would be beneficial to our conversation, or help us understand what is important to you?
14. How do you feel about this interview?

For technology testing/ co-creating

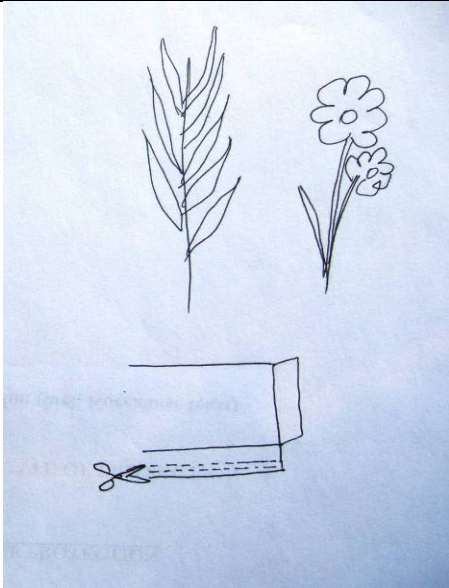
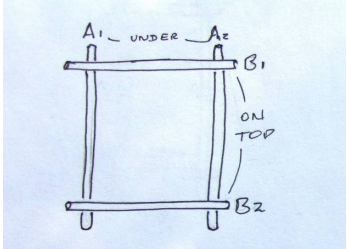
1. Are you familiar with this technology?
2. (If yes) when and what were you using it for?
3. (If No) what do you were you using it for?
4. (If No) Do you want to try it?
5. (If yes) How do you think it can help you?
6. What do/don't you like about this technology?
7. What or how would you change this technology?
8. What other things technologies would you like?
9. What other materials could we use to make it?
10. Do you feel that it addresses some things that are important to you?

Appendix C: Loom production example and instructions

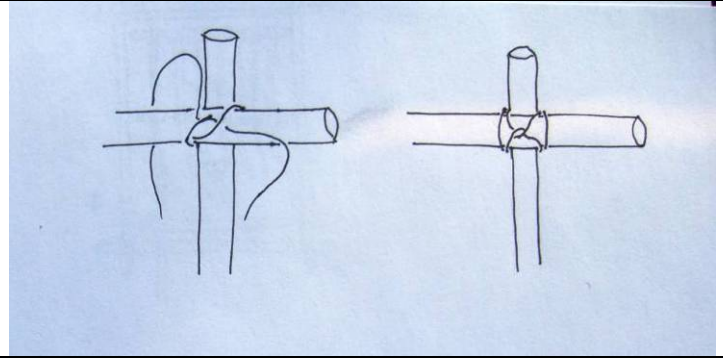
Example of other weaving techniques and products from Botswana used to address international and tourist craft markets.

[Valarezo, C, 2010, Weaving with Sticks manual, Botswana Society for the Arts 2010.](#)

“I saw people all over the planet weaving with the most basic methods, which gave me the inspiration to make this leaflet to explain how you can weave under any circumstances... ..The tools and materials are available to anybody, especially if you use recycled materials. It is a good way of avoiding the current excess waste, the lack of work and doesn't require a special place to do it. It is also a practical option for working with children or vulnerable people, and a great challenge for your own creativity.”
(Camola Valarezo, 2010)

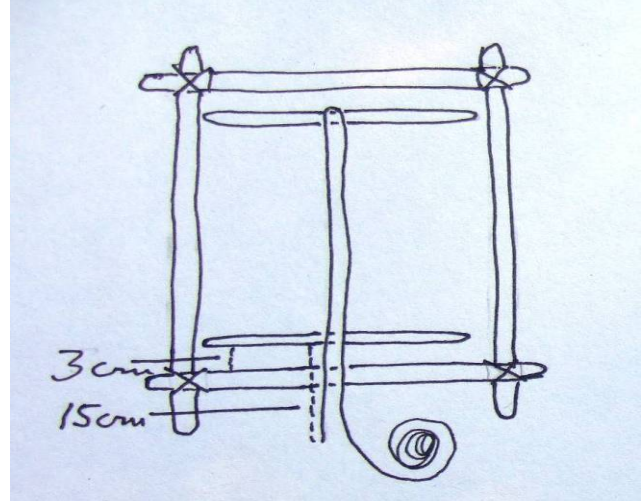
<p>Materials:</p> <ul style="list-style-type: none"> • 3 pairs of straight sticks between 30cm to 50cm. • 1 straight, slightly pointed stick of around 30cm. • Rope to tie up. • Yarn, cotton or wool. • A ruler. • Straw, palm leaves or any long shaped leaves. • Cut strips of cardboard from colored packing boxes, covers of old magazines or any packing material. • Attractive small branches, flowers or similar. 	
<p>Building the frame</p> <ul style="list-style-type: none"> • Place the longest sticks A1 and A2 vertically parallel. • Place the second longest set of sticks B1 and B2 horizontal on top of A1 and A2 to form a frame. 	

- Cut 4 pieces of string 25cm long and 4 18cm long to tie up.
- Place one string 25cm long under the crossing sticks, and tie with a firm knot, then turn it under and tie again.
- Continue with alternating knots. At the end make a double knot or a firm bow. You need to obtain a strong frame.

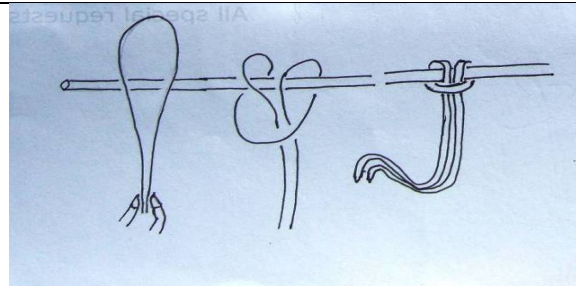


Measuring and making the warp.

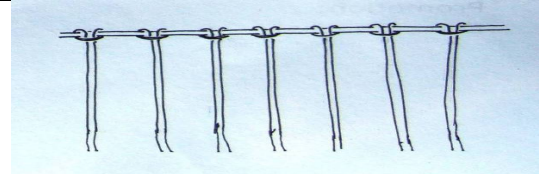
- Place the third set of sticks, C1 and C2, horizontally inside the frame, one at the top and the other at the bottom, 2 or 3cm from sticks B1 and B2.
- Take the yarn and place it on top of C2, leaving about 15cm outside the frame.
- Hold it down on C2 and stretch the yarn till it reaches just above C1. Then bring it down until it reaches the first end, making a double length.
- Cut it, and this is the size you need for building up the warp.
- Cut 10 to 20 strings of this length.



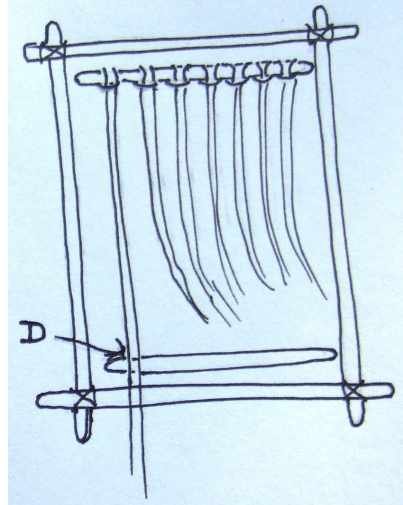
- Take one string and fold it in half, holding the ends together.
- Place it on top of B1, loop it around B1, pass the two ends through the opening and tighten. Make sure the ends stay together.



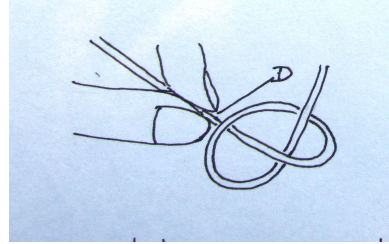
- Do the same with all the strings.



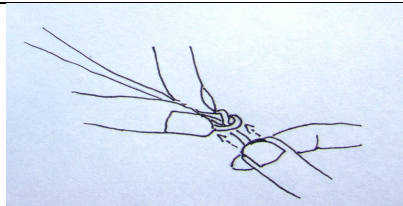
- Place C1 with the strings and C2 back in position.
- Stretch the tied strings to reach C2 and measure at point D. Hold the pair of strings between the fingers of one hand at (D) and don't let go until the knot has been tied.



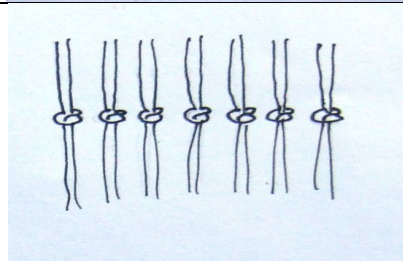
- Make a knot in the first double string just above C2 on point D.



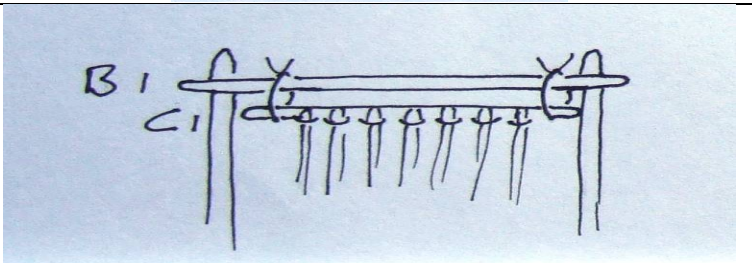
- With the other hand form the knot as in the drawing and push it up till it touches the point D.



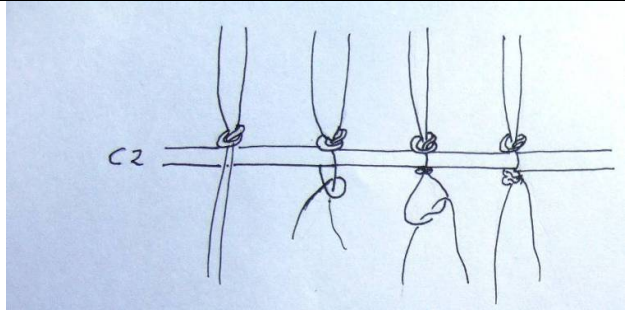
- Take away C1 and put it flat on a table. Make knots on all the strings. All the knots should form a straight line.



- Tie each end of C1 to B1, leaving a space between the sticks.

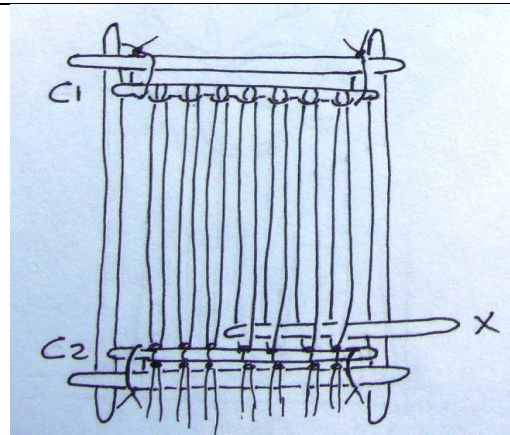


- Stretch the first strings, making sure they are not twisted, with the knot lying above C2, and tie them to C2 using a double knot. All strings must be equidistant and parallel.
- Tie the ends of C2 to B2. The warp must be stretched quite tight.

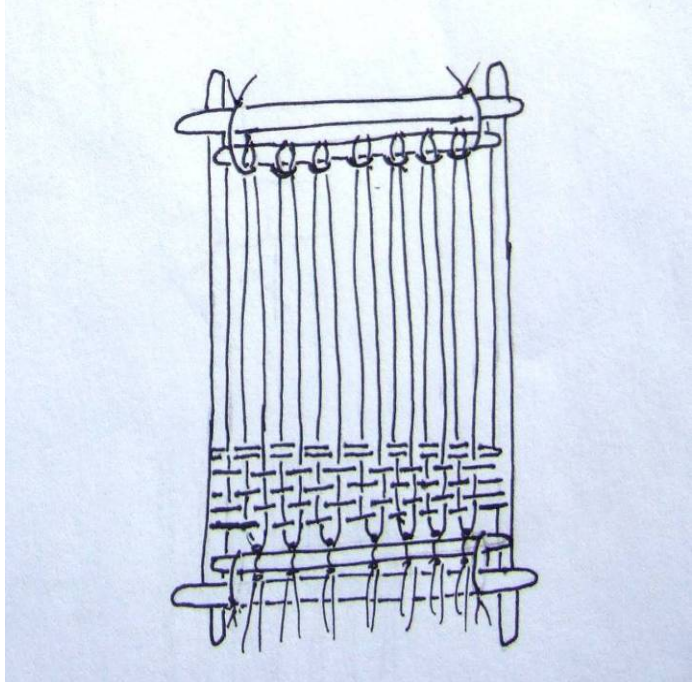


Ready to start

- Take stick X and with it lift one string of each pair.
- Through the space created pass a piece of straw or any other hard material, reaching a bit further than the other end.



- To start with you should use any hard or stiff material for a better hold. Make 4 rows with it.
- Take stick X out and press down the straw with your fingers.
- For the next line, with X lift the second string of each pair, leaving the first strings down, and pass another piece of straw or any other type of material through the space. Take out X and press down the straw, leaving them tight.
- Repeat the operation till the warp is completely full to the top.
- Decorate your work by adding extra sticks or flowers.

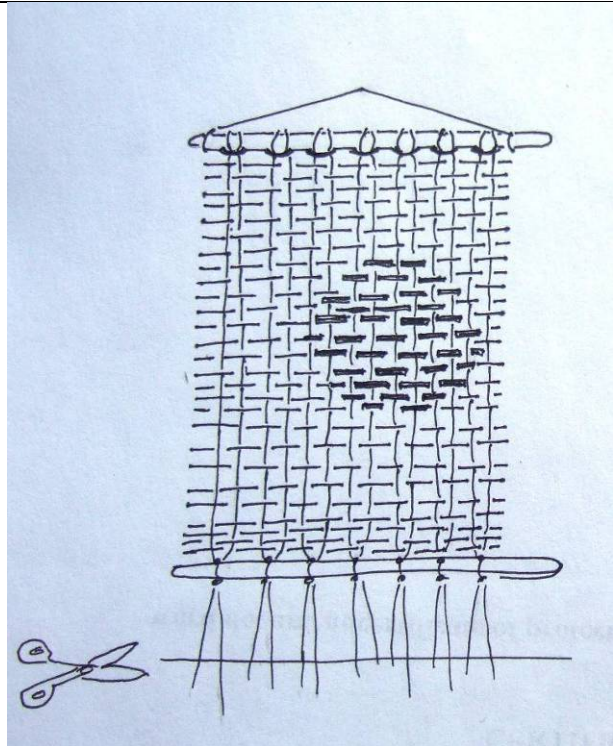


- When you think your work is ready, check that all materials and threads are properly placed and correct any imperfection to your satisfaction.
- **To fix the work.** Place the work face down on the table.

Dilute 1 part of white glue to 2 of water. Use a brush to apply a smooth layer over the cotton line, applying sparingly and making sure to cover all joints. Don't let the glue drip on or wet the front of the work. Let it dry in the frame.

When dry, take it out from the frame. Untie C1 from B1 and C2 from B2. Use scissors to trim left and right sides in a straight line or how you prefer. Lay your work on the table and straighten the hanging strings. Using your hand to flatten them, cut them in a straight line. Carefully slide the threads from C1 and C2 onto the final sticks that will hold the work. If the threads in the upper part of the work are too long, make a knot next to the last woven line.

- The frame and sticks C1 and C2 are now free to be used again.



Congratulations! You have completed your first piece of work!

