

PARTICIPATORY PLANTATION FORESTRY PROGRAMME

RAPID ASSESSMENT OF CARPENTRY SMEs IN MAFINGA TO INFORM TERMS OF REFERENCE FOR FURNITURE DESIGN SPRINT



United Republic of Tanzania MINISTRY OF NATURAL RESOURCES AND TOURISM Forestry and Beekeeping Division



Embassy of Finland Dar es Salaam

Rapid Assessment of Carpentry SMEs in Mafinga, to inform Terms of Reference for Furniture Design Sprint



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1. Introduction

PFP 2 is investing in the capacity of small and medium enterprises in the Southern Highlands engaged in the forest value chain in order to increase income, create employment and reduce poverty.

Market research conducted by Finnish consulting firm, Leapfrog in 2020-21 highlighted the untapped demand among Tanzania's urban middle classes for lighter, more European styles of furniture which can be more easily shipped and moved, e.g. when the owner moves home. Traditionally, customers have favoured hard-wood furniture for its higher quality and durability and also imported furniture from China which fits the modern aesthetic they are looking for. Soft woods e.g. pine that are readily available in the Southern Highlands are seen as lower quality and value. This has also been evidenced by the distribution in sales of different wood products by species at the PFP 2 carpentry workshop, where teak is a preferred choice of wood for furniture. Leapfrog proposed developing a new value chain which would increase business opportunities for carpenters in the Southern Highlands by selling high quality, modern designed products made from locally available species. The 'Afrifurniture' concept was to change perceptions of local pine and eucalyptus furniture and drive demand, as a more sustainable alternative to indigenous hardwoods. The concept also involved an Ikea-style business model with components produced in the Southern Highlands, shipped in a flat pack form to Dar and other markets, and assembled by the customer. The products would be marketed and sold through a website which promotes both the products and the local artisans behind the products.

The work has been proposed in a set of work packages, of which one is a series of design sprints to create a branded furniture range for the proposed middle-class market. As planning progressed, PFP became aware that the business development aspect would be as crucial as the quality of the designs. Several aspects of the proposed project are new, and therefore potentially challenging for the SMEs:

- Producing components for self-assembly requires a higher level of precision than currently required when they assemble furniture at the workshop, and can make necessary adjustments
- Collaborating between SMEs to jointly produce for one company, requires cooperation rather than (currently) competition
- Producing for a branded product range, meeting high quality, externally defined specifications, with exclusive use of the design that cannot be copied for other customers, is a rare if not unprecedented set up for SMEs in the southern highlands context
- Selling to external markets (beyond Mafinga) through an online platform, without direct contact with customers
- Producing stock for a showroom (very few have done this or have enough working capital to do this)

PFP organised a team to do a rapid assessment of the SMEs to understand their current level of operation, potential fit for the proposed 'Afrifurniture' concept, and level of capacity building required if they are to engage in the project so that this can be considered in the Terms of Reference shortly to be issued for the design sprints for the project. While assessing the carpentry workshops, we also considered other potential stakeholders for the

project. The premise of the Afrifurniture concept is that no companies are currently offering modern designs for the middle classes made from sustainable Tanzanian woods such as pine and eucalyptus. While the research was based in Mafinga, we also briefly considered existing modern furniture traders in Dar and how the proposed Afrifurniture project would potentially collaborate or compete with them.

The Afrifurniture concept assumes designs of solid wood furniture, primarily pine and eucalyptus. Given the existing experience and success of carpenters using engineered wood for furniture, and the easy availability of materials in Mafinga, the team also considered the potential for expanding the use of engineered wood and improving designs and carpenters' skills in using and finishing engineered wood products.

2. Current status and capacity of carpentry workshops

2.1 Products and customers

Workshops visited in Mafinga were all providing similar products for customer demand: doors and frames, beds, cupboards, wardrobes, dining and coffee tables, and sofas.

While products were similar, we saw a wide range of workshop capacity, from barely viable to a thriving business with a smart showroom and supplying furniture to other regions of Tanzania (right).

Maximum order sizes ranged from 300,000/= to 5,000,000/=. Some carpenters have been operating since 1981, and the newest started in 2019. All carpenters were operating as sole traders, with enterprise size ranging from 1 person to employing upto 9 people. In Annex 1, we have profiled carpenters with a high, medium and low level of capacity.



High quality finishes at Tino's showroom

We found carpenters with different degrees of innovation, while there were a couple of carpenters looking for new ideas and producing highly creative products, the majority were manufacturing conventional designs, which require relatively low levels of innovation. It was also interesting to see carpenters experimenting with engineered materials to create very innovative products. For example Calson, a young carpenter showed us an unusual rotating table made from MDF, and modern seats upholstered over recycled oil drums.



Rotating table and oil drum seats

Many of the carpenters reported having under-utilised workshops. They have the capacity to produce more products per month, but don't have enough customers. Some carpenters bring in assistants and pay them as day labourers for the work they do, but only when the work is available. Several of the carpenters interviewed currently had no orders.

None of the workshop owners are keeping financial records. One carpenter reported his frustration that he had been keeping records, but had still not got a loan, so saw no point in continuing to keep records.

Customers show a preference for painted furniture, which seems to emulate the imported furniture styles. This presents a great opportunity for using composite materials as well. Quality and style of painting was generally very good. One potential challenge is that they are able to cover up poorer quality joinery work - in the picture (right) there are many blemishes that are covered by the paint. Potentially, designs for the Afrifurniture concept that use only varnished wood will require higher standards of carpentry.



Blemishes on furniture are concealed by painting

2.2 Materials and Equipment

The carpenters visited were mainly using pine and eucalyptus as well as some engineered woods. Materials are considered in more detail in section 4.

The major challenge carpenters face is well known - they cannot afford to buy timber that has been kiln-dried e.g. at Sao Hill and many do not have enough working capital to buy wood and wait for it to dry in the sun. Even transporting wood to PFP's Forest and Wood Industries Training Centre (FWITC) may be impractical for their current product prices for the local market. Without dry wood, carpenters will not be able to create the product quality and finish required for the higher priced products intended for middle class markets, and so access to dry wood is one of the most urgent issues to be addressed in order to make the project viable. Potential areas of future support can be identifying mini or solar kiln dryer systems or methods that can be setup at timber yards by existing timber traders.

In terms of machinery, Mafinga town has many timber processing service providers - which at least include a surface planer, thickness planer and table saw. Most of them have a mortising machine and profile moulder (especially for door component manufacturing) and only some a band saw. These timber processing machines enable the local carpenters to manufacture a range of wood-based designs - without having the need to own any machinery. Local SMEs mostly have smaller power tools such as electric routers, drills, sanders and compressors for spray-painting. The addition of one or two hand tools, such as a track-saw and biscuit jointer - might improve jointing and surface finish at relatively low investment cost compared to the improved quality and potential market benefit.

2.3 Health and Safety

Based on the visits to carpentry workshops, there were various health and safety concerns. Starting from PPE for workers all the way to electrical wiring, machinery safety, first aid availability and waste management. The most obvious challenge was waste management at the processing service providers, with large piles of sawdust and wood waste observed at every workshop.



This can lead to fire hazard, health problems (given the small confined spaces carpenters work in) and injuries from slippages and falls if the area is not kept clean. There seems to be a cleaning service for collecting the waste, however it is either not regular or insufficient with the build up of waste.

Assuming this being a bottleneck beyond the control of the SMEs, there were significant shortcomings on the safety of electrical wirings, with exposed electrical cables, no signage or protection. Only one carpenter seemed to have any form of health and safety practice with overalls, use of ear protection and eye wear for part of his employees. If these workshops want to participate in the PFP program, they will have to invest in health and safety standards and training at the minimum, with the objective of reducing risks and injuries.

The majority, if not all of the carpenters were using service providers for machining services such as table saws, planners and profiling machines. This implies a significant role of such centers in the value chain and their need to also adhere to health and safety standards. Especially because most woodworking accidents occur on 3 machines: surface planers, circular saw benches and vertical spindle moulders. The machinery across the board was without safety guards and emergency stops, thus the possibility of accidents is very likely.

Main areas of concern:

- 1. Machinery Safety Risk High
- 2. Wood dust Hazard Risk High
- 3. Slips and Trips Risk High
- 4. Noise Risk Medium



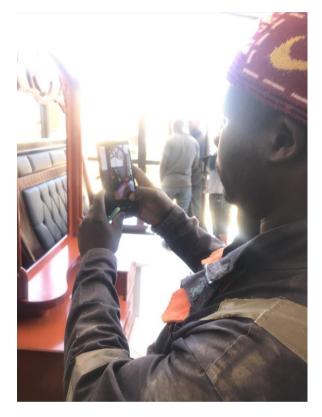
Wires and equipment were blocking the entrance way of this workshop with timber and other products haphazardly distributed across the shop floor.

2.4 Use of digital technology

Low (or non-existent) levels of English plus low levels of digital literacy are a challenge for many people in Tanzania in accessing knowledge and ideas through the internet. Searching

the internet often requires knowledge of which apps are available and best suited for their research and which English search terms to use to generate results. We were interested to see the carpenters' current use of the internet, as it indicates their self-driven interest in new product designs and exposure to styles beyond their immediate market and community.

For **product research**, some carpenters use the internet on their smartphones, and some carpenters use standard designs or rely on images brought by customers themselves through their own internet research, which is driving new styles and trends. We found two good examples of carpenters using the internet for product research and inspiration.





Creative use of pinterest using images to

search rather than text

Tino (above) takes a picture of one of his existing products, enters it into Pinterest, where the app algorithms generate 'More like this'. This is a clever workaround where he has limited English, and possibly even low literacy overall, as he left school in Standard 6. In Tino's case this has not been a barrier to his progress, and he was the most successful carpenter met in the rapid assessment, as described further below.

Another (young) carpenter we met said he uses google to search for products in Swahili (e.g. "modern cupboard") and generate images.

For **product promotion**, Whatsapp is still a preferred tool for promoting products to customers, because it enables direct communication in Swahili. Navigating tools such as Facebook and Instagram requires a higher level of digital literacy.

3. Existing market and opportunities for forward linkages

Based on field research, it was observed that having access to a showroom and display floor seemed to be an important component in advertising and promoting products. According to one of the carpenters, there has been a cultural shift in consumer behaviour who prefer convenience over customization, thus affecting many SMEs ability to grow due to lack of funds to carry stock. Thus the PFP intervention is timely as it fits well into the plans for the design project, with the aim of having a centralized distribution centre and an online presence for ease of customer access and marketing. Further, based on discussions with the sample of carpenters, it was observed that not all of them want to produce furniture due to inconsistent demand from individual orders; rather many may opt to work on consistent orders fulfilling specific components orders or standardized products.

In order to expedite the process of SME integration into higher value addition products, it would be wise to immediately start a carpentry hub by linking the willing workshops with existing market players with design, warehousing, distribution and marketing capabilities. This will allow the SMEs to obtain valuable linkages in the supply chain of ready market drivers and increase consistency of work, higher incomes and learning from experienced furniture makers with knowledge for local taste and preferences. Below is a list of potential partners who should be engaged at the early stage of the program in order to have ownership and long term stake in the project:

1. Discount Centre - this is a well established network of furniture and household items stores with a purchasing office/ presence in Mafinga. They have been buying timber, and composite products to manufacture into furniture at their Dar es Salaam workshop, which boasts 3 Indian and 1 Turkish Expatriate carpentry and design experts. With close to a dozen outlets in the country, they have an excellent understanding of the middle income market and potential opportunities in the furniture sector in Tanzania. As per most recent information, they are in plans to open up a furniture workshop in Mafinga to service their clients in Dodoma and Mbeya. The PFP consultant team has made initial contact with the owner of Discount Centre to see if they will be ready to engage with PFP for potential collaborations with respect to providing designs, templates and standards for buying components and parts for their furniture lines.

https://web.facebook.com/discountcentreltd.tz/?_rdc=1&_rdr https://www.instagram.com/discountcentreltd.tz/?hl=en

- 2. Furniture Centre This is another brand of furniture makers with a nationwide presence making them potentially a good partner too. They have in the past tried to procure components from Mafinga for products such as office chairs as they have a high quality upholstering facility in Dar. This presents an interesting opportunity to produce cold pressed components made from composite/ engineered wood products for supply to value add manufacturers. http://www.furniturecentre.info/
- 3. Nusu Nusu workshop this is a carpenter who was a former employee of The Green Room making high end designs from reclaimed wood, and high value timber. He is

now operating under his own brand in Dar es Salaam with exceptional quality and finishing. His experience and journey can be a potential case study, inspirational story and partner to engage as a mentor to the carpenters in Mafinga. https://web.facebook.com/105376871299143

- 4. Edosama Furniture/ Palray Furniture/ Jaffari's Furniture All these manufactures make composite products from engineered wood and metal works for school desks and chairs. They are potential partners who can support the Mafinga industry in value addition.
- 5. Moko Furniture a successful project that has executed modern designs for the mass market focusing on sheek styles and online marketing is Moko of Kenya. They have a good online platform, understand the growing middle class economy in the region and could be potential partners for developing a similar project or expansion into Tanzania. Their involvement would be valuable from the start to prevent repeating mistakes that can be avoided. Though there are cultural differences between Kenya and Tanzania, their success in raising significant capital is an important learning opportunity.

www.moko.co.ke

 Neema Crafts - a Iringa based furniture and crafts business with an outlet recently opened in Dar. Directors showed willingness and interest to work together where possible. <u>Neema Crafts</u>

4. Competition model

A potential alternative approach that we would like to suggest is a competition-based strategy that involves various players in the value chain, however is driven primarily by the private sector.

To entice the private sector to increase their risk appetite by engaging the SMEs, PFP 2 can run a competition targeting specific objectives for the development program. The program can decide on the amount of funding that can be awarded to the businesses based on strict eligibility criteria. The benefit of running competition driven development is:

1. Encouraging private sector to take risks which they would otherwise not without external support

2. Direct long-term impact on targeted group through market driven forces

3. High probability that the project will continue even after completion of the funding period, since the private business must prove sustainability

4. Selection of projects based on strict criteria that address specific socio-economic challenges, which would not have been addressed in absence of external support.

5. Moves the burden of development from public sector to private sector

6. Efficient use of resources through private incentives of cost minimization and profit maximization

Funding process:

Stage 1 – submission of initial application forms where the applicants write about their business ideas and about their company on a template provided.

Stage 2 – short listed companies submit a more comprehensive business plan for assessment.

Stage 3 – project site visits to understand the model.

Stage 4 - Investment committee selection.

Stage 5 – contracting and staggered disbursement of funds (grants/ soft loans or a combination) based on key performance indicators.

Stage 6 – Bi-annual evaluation of the project through self-reporting and site visits for verification.

5. Raw materials and design capacity

Mafinga region has abundant solid wood and sustainable resources. Pine and eucalyptus wood comprised more than 90% of the solid wood raw materials in the Mafinga SME carpentry workshops. Most, if not all of the SMEs mentioned the issue of wet or semi-dried raw materials. As wood dries to equilibrium moisture content (EMC) that might be around 12% in this area, from wet state (+25%) significant volumetric shrinkage occurs and as a result the drying defects hamper quality surface finishes. In addition, proper sanding and high-end surface finishing, requires dry timber. Dry timber (at least EMC) resources are essential for higher end (solid wood) furniture design and finishes. This will enable fewer comebacks and greater future clientele.



Local plywood and veneer plant

In general hardwood (i.e. Eucalyptus) and thicker boards (2inch) requires more time and thus costs to reach dry (EMC) usable furniture timber. While softwood species such as pine and cypress at thinner dimensions (1inch) will require less time and thus costs to reach EMC. Air-drying of lumber is the most used practice in Mafinga timber markets and carpentry shops. This method can be more than sufficient if EMC is accurately measured before further processing of the raw materials for furniture (semi dried wood is less of an issue for construction and low-quality furniture).

The following three options are recommended to address the wet wood (raw material) and associated quality issues:

- Moisture content measuring training and services (how to measure EMC of air-dried lumber)
- Kiln drying training and services (current providers and micro/open-source solutions)
- Engineered products use (Local producers i.e. plywood, veneer, pine-FJ-board. Regional import i.e. teak lam board and MDF)



Semi-dry eucalyptus wooden doors - natural drying process/defects will lower the finished product quality

Moisture content measuring training and services (how to measure EMC of air-dried lumber)

If SMEs are interested in producing quality furniture from suitably dried timber, moisture content determination would be critical. Theory on EMC and actual moisture content measuring can be a part of the planned 'Afrifurniture' design training course at FWITC. Here the students will learn how to use a handheld moisture meter or determine it by oven drying method. With this added skill some SMEs might decide to offer such services and invest in a handheld moisture meter.

Kiln drying training and services (current providers and micro/open-source solutions)

At this stage two kiln drying facilities exist, at Sao Hill Enterprises and at FWITC. Sao Hill focuses on pine timber only, whereas FWITC has experience in drying various species. Sao Hill would be able to supply large volumes of kiln dried pine and planed or machined to certain selected dimensions. And in theory FWITC would be able to do the same for various species, but at lower volumes compared to Sao Hill.

Affordable container dryers (low tech/low cost) could be an option for some SME to investigate if properly dried timber becomes a higher demand product. In this case open-source plans should be available.

Engineered products use (Local producers i.e. plywood, veneer, engineered pine board. Regional import i.e. teak lam board and MDF)

According to observation, the top Mafinga SME furniture in terms of quality and design incorporated MDF (as doors), plywood (as backing) and Engineered pine board into their designs. Engineered wooden products (EWP) have the advantage of being dimensional stable, large flat surfaces that are easy to machine and finish, compared to semi-dry solid wood. Mafinga region is well supplied with EWP i.e plywood, veneer, engineered pine board and has supply access to MDF and teak lam boards. Although these raw materials usually come at a premium, they enable a range of possible high-end design options in a short time.



Engineered wood is popular for school and conference tables and chairs



Local design capacity

The Mafinga SMEs showed diverse and relatively high levels of design capacity in terms of design complexity and finishing. Finishing materials such as varnish, sanding sealer and paints seems to be readily available. Normal wood glue (PVA) and polyurethane (PUR) glue for hardwoods and exterior use are also available at many hardware stores in Mafinga. Small changes such as glue and screw vs nail or glue only in some instances will significantly improve durability. Selected allen-key fasteners, cam-fittings, draw-runners, hinges and door handles will also significantly improve design elements and sourcing of such components would be possible through at least one or two local hardware suppliers.

Considering the level of workshop infrastructure, the general product quality is impressive. The majority of workshops are poorly covered against rain and have a dirt floor with no or limited flat work benches. Most of the furniture SMEs outsource wood processing to the many wood planing and machining service providers across the road or nearby. Only one or two SMEs have their own processing machinery - the rest rely mainly on power tools (i.e. drill, router, grinder-sander, compressor, etc.) to construct and finish the final product. See the Excel carpenter profiles sheet for specific tools and design lists for each SME.

Production capacity and inventory storage below roof, might be a challenge for most SMEs if higher production is required. Expanding or advising on the importance of proper infrastructure (i.e. concrete floor, proper roof, flat workbench) would also be an important next step. These changes do not need to require huge capital but will be critical to consider. Alternatively, container storage or local storage solutions provided by the buyer or reseller could provide an affordable and safe space.

6. Recommended criteria for SMEs joining the project

The main objective to have a selection criterion for participating in the design sprints and product development is to ensure that valuable development resources are not wasted on individuals looking for free hand-outs (the problem of adverse selection) and or using the resources for other objectives then the one PFP wants to emphasize (the problem of moral hazard).

Criterion	Justification
Demonstrated growth since operation	Has increased their market, increased their employees, and equipment since starting operation. This demonstrates a business owner with drive, ambition and operating a viable business that is already delivering quality products in response to demand from customers.
Demonstrated interest in innovative design	The project will require hard work to reach the quality standards required for the market beyond Mafinga. The carpenter will need to have a passion and genuine enjoyment in the process of learning new techniques and designs and working hard to continually improve their products. We recommend that all applications prepare a profile of their work to be shared by whatsapp with their top 5 best products for review.
Demonstrated record keeping	In order to qualify for the training program it is vital that the carpenter shares a minimum of his most recent job work records. This can be in any format as long as the carpenter has put in the effort to provide some data, especially since many of them have already done such training with PFP and claim to have benefited from it. Yet, on physical inspection, no one was able to provide any records. This task can be retrospective or for their current job.
Willing to commit to the program	Individuals who do not complete a minimum number of attendance days for in class training should not be awarded a completion certificate and or removed from the group of carpenters who will get further design and practical training support.

7. Concluding Remarks

- The team feels that there is a scope for PFP 2 intervention, particularly with respect to training and access to market linkages.
- While the purpose of the exercise was not to do a selection of carpenters to participate in the project, it was useful to get a sense of how many carpenters from the pool of those interested might have the experience and outlook required to make the project successful. Among the carpenters who have expressed interest in the project, we identified a couple of 'high flyers' who demonstrated a positive mindset, good business growth and an interest in quality and innovative furniture. They seemed to be a good match for the project, and would be able to benefit from and utilise the training and market linkages to be provided. There were a number of carpenters we saw as 'medium' who may take off if provided support and training, and also a number who were not well suited to the project.
- None of the carpenters currently keep financial records, though some have recently been trained by PFP and expressed an intention to start. One carpenter commented that as the only point of record-keeping is in order to secure loans, and he has not got a loan, he sees no point in continuing. We recommend that only those SMEs with an intention to grow and professionalise are suitable for inclusion.
- Design elements should be considered in conjunction with existing local players that have an online presence, knowledge of local taste and preferences and can guide the design element of the project.
- Through establishing existing market linkages, there will be two main gains, first, SMEs will have access to a ready market for their crafts and second, the private sector will be the driving entity behind what the market wants as opposed to potentially having to educate the market on new tastes and preferences.
- PFP 2 can play a very important role in this linkage by being a matchmaker, providing important technical know-how, access to education resources and potentially supply chain risk sharing through some subsidisation schemes or insurance mechanisms.
- It might be useful to advertise a competition based selection criteria to furniture manufacturers in Tanzania who could apply for a grant/ soft loan if they are able to show a plan/ mechanism that integrates woodworking enterprises in the Southern Highlands. PFP 2 would then be involved in selecting the best partner, providing TA and other services mentioned above. Such a method has proven to be successful in the agriculture sector where larger enterprises enter into riskier contracts with small holders which they would have not done so in absence of the financial and technical support.
- With respect to a TOR for the design phase of the project, it is highly recommended to involve local furniture manufacturing partners from the start, so that one can leverage existing channels and demand and not re-create the market.

Annex 1: Profiles

High performing carpenter: Tino

Age	33
Education	Primary Standard 6
Year workshop started	2010
Facilities	Workshop and smart modern showroom
Equipment	Small hand machines, table saws, no planer.
Digital / Social Media	Takes photos on his smartphone to generate similar images and new ideas from Pinterest. Clever work-around for internet searching without using English. Uses word of mouth and whatsapp to promote products, but not Facebook / Twitter
Products	His speciality is wardrobes/ cupboards, beds, and coffee tables. Also finishing products for other carpenters.
Employees	9
Biggest Order	2 million
Market	Mafinga, Dar, Tanga, Arusha
Observations	He has a sharp mind and entrepreneurial spirit. His use of different mediums made his product finish and quality significantly better and appealing relative to his peers. This was evident in his orders from across the country and an excellent showroom. He had the largest number of employees and the biggest shop floor, and the only carpenter who had enough working capital to generate standing stock. In addition to doing his own work, he was also doing job work for others - highlighting his ability to manage multiple orders and tasks. With a limited education (less than primary), he has been able to self teach use of social media, pinterest and other media for learning and growing his carpentry.

Medium performing: Nico Sanga and Omary Mbalinga

Age	33 and 24 respectively
Education	Primary Standard 7
Year workshop started	2019
Facilities	Operating from a workshop where planing services are provided. They pay per plank to plane there.
Equipment	Small hand machines.
Digital / Social Media	Use smart phone to google search in swahili e.g. 'modern cupboard' and get pictures to inspire their designs. Use word of mouth, do not have a social media presence.
Products	Speciality is doors, but also produce beds, bedside tables, coffee tables, wardrobes etc.
Employees	0
Biggest Order	1.2 million, to make boxes for transporting avocados
Market	Mafinga
Observations	They are doing fine, and seem to have a productive and happy partnership working together, and they seem to be getting lots of word-of-mouth orders from customers, suggesting that customers are happy with the quality of their work. They have a few specific designs of doors, which could be a sign of focus or lack of initiative. As they have not yet expanded on volumes, it could be the latter.

Low performing: Aaron

Age	41
Education	Incomplete technical training
Year workshop started	2005
Facilities	Small office, brings tools outside to work
Equipment	Small number of hand machines, lack of equipment is holding him back. Previously had compressor but had to sell it because he needed money
Digital / Social Media	No
Products	Wardrobes / cupboards, beds, coffee tables
Employees	0
Biggest Order	650,000/=
Market	Mafinga
Observations	Aron's business is barely viable. He took a loan but used it to cover operating costs, rather than buying the tools he urgently needs to grow his business. Despite the fact that he had been trained in a European workshop (under Tom Duvelle) and has been operating for 16 years, he has not been able to successfully establish his workshop. Not recommended fit for Afrifurniture project, but may benefit from training at FWITC.



