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Unexplored avenues of adornment: a study of craft-related uses of the Makalani seed.

by

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DECLARATION

I, Michelle Olga van Wyk, declare that the contents of this dissertation/thesis represent my own unaided work, and that the dissertation/thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

11 June 2015

Signed **Date**

ABSTRACT

Unexplored avenues of adornment: a study of craft-related uses of the Makalani seed.

Vegetable ivory is the generic term used when referring to the nut of palm trees. Although their outward appearance varies depending on the variety of the palm, the nuts are all known to be hard, ivory-like in colour and lend themselves to shaping in various forms.
The craft-related use of vegetable ivory in Namibia has been limited to carving in the past. The nut, known locally as Makalani seed, is the seed of the Hyphaene Petersiana palm fruit.
Vegetable ivory products found globally prove that this non-timber forest product (NTFP) has greater potential than what is currently being explored by Namibian crafters. Similar nuts are found across the globe, including the South American tagua nut. The tagua nut has a pronounced role in the craft-related market place due to its popularity as a sustainable alternative to animal ivory. It has also provided many locals with employment and a stable form of income. Globally, focus has expanded to address the sustainability of the integrity of forest systems, as economic profits to be gained from timber-producing trees, no longer take sole priority. Rural households are making use of NTFPs as a source of income and often use the money generated from trading as a safety net in times of economic challenges. Developing management strategies for addressing global climate change has become an increasingly important issue influencing forest management around the globe. Participatory forest management is one of the strategies developed for addressing issues arising from global climate change. It is aimed at rural development, by involving locals living in the area, in programmes that involve domestication of indigenous fruit trees. By means of participatory action research (PAR) and co-design sessions, the study looked at expanding the scope of manufacturing techniques used when crafting the Makalani seed. The list of sustainable manufacturing practices generated from the data informed the creation of the crafter's product. Expanding the range of manufacturing practices feeds into the potential the seed has as an income-generating product. These techniques contribute to the body of knowledge of craft in Namibia by addressing the issue of sustainability by exploring the potential of the Makalani nut as a crafting material as well as a medium of teaching various crafting skills. It also engaged the researcher in contributing towards social upliftment, while allowing crafters to engage in experimenting with new sustainable techniques used globally on similar seeds that could benefit their generating of income. By assessing data gathered in the co-design sessions, recommendations were made towards elevating the Makalani seed from its current craft level to that of a well-used NTFP craft material. The nature of participatory action research required analysing gathered data to feed into a solution for solving a local problem. The study is of a qualitative nature, and involved a case-study of one, a local crafter. Participatory action design was the framework for the research, as both researcher and crafter explored how the Makalani nut lends itself to techniques used on the tagua nut. It is through this lens that the study speaks to the practices of respect and responsibility, as well as that of sustainability within the parameters of a Namibian context.

Keywords: *Sustainability*, *Non-timber forest products (NTFP)*, *Namibia*, *Craft*, *Hyphaene Petersiana (vegetable ivory)*

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DEDICATION

For my parents
Thank you for always believing

CLARIFICATION OF TERMS

Aggregate fruit	*Botany* (noun) meaning: A fruit formed from several carpels (*structural units*) derived from the same flower, e.g. a raspberry http://www.oxforddictionaries.com/definition/english/aggregate-fruit [15 January 2015]
Bakelite	A brand name for any of a series of thermosetting plastics prepared by heating phenol or cresol with formaldehyde and ammonia under pressure http://dictionary.reference.com/browse/bakelite [16 May 2014]
CBNRM	Conservation-based natural resource management (Mosimane & Silva, 2012:25)
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora (Reeve et al, 2007:i)
Drupe	*(noun).* [A] fruit in which the outer layer of the ovary wall is a thin skin, the middle layer is thick and usually fleshy (though sometimes tough, as in the almond, or fibrous, as in the coconut), and the inner layer, known as the pit, or putamen, is hard and stony. Within the pit is usually one seed… (Britannica Encyopaedia, 2015) http://www.britannica.com/EBchecked/topic/172140/drupe [15 January 2015]
Ekaka	Traditional wild spinach, collected and dried (mainly) by the Oshiwambo tribe in Namibia. Dried spinach cakes can be stored and eaten at a later stage. *Ekaka* is the Oshiwambo name for spinach. Travel Times Namibia, 2012. http://travelnewsnamibia.com/news/oshiwambo-cuisine-mopane-millet-marula/#.VWKMsUY2VOI [18 August 2014]
Ekipa	*(noun) Ekipa*: *ekipa* (plural)/*omakipa* (singular) – a fairly large button carved from ivory and decorated with various patterns. Sizes vary between 6cm in width to 12cm in length.
Endocarp	*Botany (noun).* The innermost layer of the pericarp which surrounds a seed in a fruit. It may be membranous(as in apples) or woody (as in the stone of a peach or cherry) http://www.oxforddictionaries.com/definition/english/endocarp [15 January 2015]
FAO	See Forestry and Agricultural Organisation of
Green Economy	…[an] economy … that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive. http://www.unep.org/greeneconomy/AboutGEI/WhatisGEI/tabid/

	29784/Default.aspx [15 January 2015]
IK	Indigenous knowledge
In domo cultivation	Indigenous domestic cultivation (Cheikhyoussef & Embashu, 2013)
Infructescence	*Botany* (noun) meaning: An aggregate fruit. See Aggregate fruit. http://www.oxforddictionaries.com/definition/english/infructescence
NDP	National Development Plan (Namibia)
NTFPs	Non-timber forest products
Ondelela	Traditional Oshiwambo fabric. "*There are three different combinations of stripes, representing the three different Oshiwambo tribes – the Kwanyama, Ndonga and Ngandjera. Traditionally the pink colour was obtained by grinding a stone, and the fabric is known as Ondelela*." (Travel News Namibia, 2013). http://travelnewsnamibia.com/news/ondjaba-art-shop-namibia-crafts-centre/#.VWZT9EY2VOI [20 August 2014]
Onyoka	Traditional Oshiwambo necklaces made from mussel shell beads that can be dyed pink with *Otjize* (Travel News Namibia, 2013). http://travelnewsnamibia.com/news/onyoka-a-proud-tradition-by-the-sea/#.VWWHyEY2VOI [20 August 2014]
Otjize	A natural pink powder made by Oshiwambo women from a natural material found in Namibia. This powder is used as a natural dye. There is insufficient evidence in literature to confirm what the powder is made from. Some Oshiwambo women believe it is a finely ground stone, others believe it to be bark that has been dried and ground down.
PAR	Participatory action research
Pericarp	*Botany* (*noun*) The part of a fruit formed from the wall of the ripened ovary. http://www.oxforddictionaries.com/definition/english/pericarp [20 September 2014]
Sanding (with object)	(*verb*) meaning [to] Smooth or polish with sandpaper or a mechanical sander http://www.oxforddictionaries.com/definition/english/sand?q=sanding#sand__14 [16 August 2014]
Scroll fret saw (mounted)	A type of saw, with interchangeable blades. Usually mounted to a stable surface for increased stability.
SES	Single experimental session conducted by researcher or master crafter
Silviculture	(Silviculture) practice consists of the various treatments that may be applied to forest stands to maintain and enhance their utility for any purpose.(Smith, D. M., 1986)

Sustainability	[a policy that] creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations. http://www.epa.gov/sustainability/basicinfo.htm [31 May 2014]
TES	Team experimental session conducted by researcher and master crafter in Windhoek, Namibia

LIST OF FIGURES

LIST OF TABLES

TABLE OF CONTENTS

CHAPTER ONE
INTRODUCTION

1.1 Introduction

William Morris believed that there are two kinds of work. In his work "*Useful Work v. Useless Toil*" which was first published in 1889, Morris held that worthy work carried within it the promise of hope (Morris, 2008:8-10). His fundamental role in the Arts and Crafts movement during the 19th century held this hope as its core message. The hope of being able to use creative skills, the hope of being able to use the beautiful objects created and the hope of enjoying the pleasure of rest. Craft has long had its roots deeply embedded in specialised skill. Craft allows us to focus on the ornamental side of life, and thus, if we approach work willingly and enthusiastically, we are able to build up ourselves, as well as our neighbours. It is this understanding of craft which pushed back against the practice of mass-production and married the visually appealing aspect of manufactured goods to the functional side of adornment (Morris, 2008:8-10).

Nature has long been one of society's richest resources of physical and inspirational sustenance. From providing food and shelter, to unashamedly offering herself as an all-round muse for creating beautiful objects and role model for problem-solving systems (Visser; Benyus, 2009:104-107). It is with this understanding and appreciation, after years of increasing global consumption, that we, as custodians of the planet, have awakened to the disheartening truth of Nature's finite ability to accommodate our continual practice of unsustainable habits. It is no wonder then that the concept of Sustainability has become a widespread topic of discussion (Fiksel, 2006:14-21). In the United Nation's *Brundtland Report*, it was stated that humanity's inability to fit into earth's cloud, ocean and soil patterns was leading to the fundamental change of planetary systems. This change created a worrisome reality that urgently needed to be addressed (UN, 1986). The dynamic between mankind's need to improve and make progress toward a better life, and nature's imposed limitations are addressed in this document. Sustainability touches on everything human-related, including design (Papanek, 1972:-1-5).

The term Sustainability was first used in the context of forestry, where the core idea is never to harvest more than what forests are able to yield in new growth (Kuhlman & Farrington, 2010:3436-3448).

Guenter, Stimm and Weber, (2004:3), state that attention is no longer paid solely to the economic profits to be gained from timber-producing trees alone, but has expanded to address the sustainability of forests. Silviculture, defined as the theory and practice of controlling forest establishment, composition and growth, is an expression of this shift in focus (Smith, 1986).

Developing management strategies for addressing global climate change has become an increasingly important issue, influencing forest management around the globe (D'Amatoa et al, 2011:803-816). Participatory forest management is a strategy aimed at rural development by involving locals living in the area in managing forests (Inoue, 2000:299-300). Domestication of indigenous fruit trees has proven to be successful with other species in combating issues of sustainability. Domestication of indigenous trees is an expression of participatory forest management. Examples, such as the Marula tree (Sclerocarya *birrea* subsp. *caffra),* have indicated that domestication of indigenous trees is a possible and economically feasible way of creating sustainability. It proves that such domestication can be streamlined regarding productivity and uniformity of the product and encourages local farmers to plant the trees on their farms as an economic incentive.

In order to meet the present threat of species extinction of indigenous fruit trees, due to unsustainable harvesting practices in the past, people are encouraged to plant a variety of species (Cheikyoussef & Embashu, 2013:34).

This Master's research report is an ethnographic study within the field of craft in Namibia[1], with specific focus on the case of the sustainable uses of the Makalani nut as a non-timber forest product and crafting material.

Preliminary investigations indicated that working with one master-crafter best suited this research, as he taught all the younger craftsmen who work with him. His skill and understanding of the Makalani nut informed the study, as well as the practical collaborative work done with the researcher. Collaborative work took place in Windhoek (Namibia) and Cape Town (South Africa).

By means of Participatory Action Research (PAR), the aim was to explore various manufacturing techniques which had been pioneered by the famous and economically successful tagua[2] nut craftsmen. Despite the fact that the Makalani nut is also vegetable ivory, it has yet to be established whether it will lend itself to manufacture as extensively as the tagua nut did (Acosta-Solis, 1948:46-57, Barfod, 1990:300).

1.2 Problem statement

The craft-related use of vegetable ivory in Namibia (Makalani nut) has been limited to carving in the past. The extent to which vegetable ivory products is found globally proves that this non-timber forest product has greater potential than is currently being explored by Namibian crafters.

[1] Namibia is a country in Southern West Africa

[2] Tagua is found in several countries in South America. However, this study limits the focus area to Ecuador - South America.

1.3 Motivations for research

In the effort of tackling the high unemployment rate in Namibia, tourism has been selected as an avenue to be explored. With the emphasis placed on all Namibians to participate in building the future that they would like to see, the various Ministries and all their stakeholders have aligned their institutional aims and missions with those stipulated in the Namibian Development Plan (NDP4, 2012). Namibian ministries, such as the Ministry of Trade and Industry (MTI) have set aside budget allocations for Small and Medium Enterprises (SMEs) to benefit from financial assistance, if they propose to align their business goals to address the four main foundation issues listed in the NDP4. These are: Logistics, Tourism, Manufacturing and Agriculture (NDP4: x). By means of their Equipment Aid Scheme (EAS) the MTI offers support to SMEs to expand their product range and improve their confidence in the quality of the goods and services they provide both locally and internationally. This is done by providing financial assistance to lessen the impact of the many difficulties faced by new businesses.

By incubating the potential in the crafters, the hope is that this research will contribute to revised approaches to the development of (informally) skilled crafters and a thriving craft industry.

A new world of possibilities could open up for the Makalani nut, when the wide range of crafting techniques used on and products produced from the tagua nut are introduced to Namibian craftsmen. The goal was to explore the creative possibilities of using a locally sourced, natural and sustainable raw material to create authentic Namibian crafts. By involving local crafters in the process of adapting the tagua-craft techniques, in a manner that would suit both their immediate skill set *and* the material, it was hoped to find a process that would be sustainable in the long term for both crafter and material. The research produced findings that expanded the ways in which Makalani nuts could be used, as well as initiating conversations around sustainable practices, challenges when crafting, needs and possible avenues for solutions .

The results of this research could add to the tacit indigenous knowledge of the master-crafter, Erwin. R. ≠Eichab, and is a crucial first step to the possibility of expanding the craft-related uses of the Makalani nut. By varying the techniques used on the Makalani nut, the aesthetic of the nut changed and stretched the context in which the nut can be used. This generation of crafting knowledge would widen the scope within which the Makalani nut is used as a crafting material.

1.4 Background of research problem

Tourism and forestry are two of Namibia's largest possible sources of employment and income. A prominent sub-culture practice of tourism is to buy locally made products – be it food or artefact - thus establishing crafts as an important factor in tourism (NDP4, 2012:92-96). Drawing on knowledge (including skills) passed down from generation to generation; many local people have

generated income from selling products made by employing their indigenous knowledge (IK) of materials found locally. These products often incorporate traditional crafting skills (Cheikhyoussef & Embashu, 2013:2-4).

The importance of non-timber forest products (NTFP) has started to play an increasingly prominent role globally, as well as in the craft sector in Namibia (Shackleton et al., 2011:3-21). Materials, such as wood, palm leaves, reeds, pods, seeds and nuts are used to manufacture a variety of handmade products. Materials are readily available to rural people who gather them from the surrounding areas in which they live. These crafts are produced in order to sell them as a form of generating income (Sullivan et al., 1995:357-370). NTFPs have an immense potential to contribute towards the economy of the country as a whole. Brazil is such an example, with the exportation of the Brazil nut (Ros-Tonen, 2000:196-201). Even on a smaller scale, short term benefits of trading with NTFPs, such as the ability to generate an immediate income, often outshine the seemingly lesser notion of forest conservation amongst local communities (Setty, R.S. et al., 2008:19). Namibia's socio-economic use of the Makalani nut is fairly recent in the context of vegetable ivory as a crafting material. An excellent example of the potential found in vegetable ivory is seen in the *Phytelephas Aqequatorialis* palm nut - or *tagua* nut. The tagua palm is indigenous to Panama, Ecuador, Peru and north-west Brazil.

Vegetable ivory is a NTFP that has seen many local communities generate an income from its commercialisation. The variety of vegetable ivory found in Ecuador, the *tagua* nut, has gained great popularity across the globe (Runk, 1998:168-182). This is due to its being marketed as a sustainable alternative to the highly sought-after elephant ivory. Harvesting of the tagua nut is done with minimal impact on the palm itself and the surrounding environment. Each fruit from the palm yields several nuts and extraction does not destroy the palm itself (Acosta-Solis, 1948:46).

Several varieties of vegetable ivory are found across the globe stemming from various palms. Another example of this ivory alternative is the *Hyphaene petersiana* palm nut, or, as it is locally known, the Makalani nut, found in Namibia. In their research conducted on indigenous fruits in the northern regions of Namibia, Cheikhyoussef and Embashu (2013:1) note that 61.4% of locals who were included in their study believed that no conservation efforts were made regarding indigenous fruit trees. The Makalani palm was among the top four trees which need to be conserved. This highlights the issue of sustainability, especially seeing the palm is both used as a source of food and to generate an income (Cheikhyoussef & Embashu, 2013:4-6). The north-central part of the country has a dense population of palms due to three main factors, namely seed distribution as a result of flood waters, conservation of palms by locals, and the disposal of seeds after having eaten the fruit (Fujioka, 2005:89-105). The north-central region, however, has suffered deforestation due to being densely populated by local tribes, which can be attributed to

the more favourable agricultural conditions, as water is more readily available here in comparison to the rest of the land (Erkkilä & Siiskonen, 1992:244).

The National Development Plan (NDP) addresses unemployment in Namibia, stating that the high unemployment rate has prompted the Namibian government to develop policies that address this issue (NDP, 2012: vii; 121; 125). Rural-to-urban migration continues despite increasing deterioration of affordable living conditions in urban settings, which suggests that the rural perspective is that economic opportunities are more promising in urban areas. The latter appear to be a better option compared to staying in economically pressured rural environments (Frayne, 2005:51). A consequence of this migration is that rural crafters then begin to sell crafts in urban areas in order to generate income.

The Makalani palm tree is one of Namibia's many indigenous trees which the local people use for both household and economic purposes. The palm is used to make traditional alcohol, provide shelter constructed from its palm leaves and nutrition from its fruits (Sullivan et al., 1995:357-370). The Indigenous Knowledge (IK) possessed by the locals is a rich resource, to be drawn from when conducting investigative research to increase and deepen the understanding of the NTFPs of Namibia. With medicinal IK having been identified as a growing focal point of research in Namibia - where most of the medicinal plant species are found in the same area in which the Makalani palm thrives - the potential economic development and important issues of sustainability are increasingly being highlighted (Cheikhyoussef et al., 2011:1-11).

The need to address NTFPs within the context of Silviculture and sustainability, brings with it an opportunity to not only apply solutions to the problem of un-sustainability but also to develop them by incorporating previously neglected resources such as IK (Gadhil et al., 1993:151-156).

1.5 Research questions

1. What are the current craft-related uses of the Makalani nut within Namibia?
2. How can the crafting techniques of other vegetable ivory products found globally, inform the exploration of manufacturing techniques regarding the Makalani nut?
3. What crafting techniques and practices have been successful with the tagua nut found in Ecuador, South America?
4. How can experimentation with the craft techniques add value to the craft products made from Makalani nuts?

1.6 Objectives of the study

The objective was to determine the (most prominent) craft-related uses of the Makalani nut and what techniques and resources are used when crafting them. By using recipes and techniques that

are used by Ecuadorian tagua-nut crafters, a list of methods was generated and used as a guideline to inform the practical experimentation with the Makalani nut. This informed the craft-related data of the Makalani nut, with regard to functional and decorative contexts. Several crafting techniques were applied to the Makalani nut. Both the researcher and master-crafter participated in exploring new techniques with the nut. The process was documented and recorded as new data to inform and refine the process of manufacturing. The findings of the practical experimentation added to the body of craft-knowledge of Namibia. This is *in addition* to the already existing undocumented, indigenous knowledge of the Namibian people. The possibility of highlighting universal manufacturing techniques, whilst establishing an aesthetic that speaks of Namibian origin, was an additional outcome.

1.7.1 Selected methodology

The study is of a qualitative nature and involved a case-study of a local master crafter.

Data collecting methods included episodic interviews, which involved exploring the research issue by inviting answers in the form of brief narratives, focusing on experiences with the Makalani nut within the context of crafting. Multiple sources of evidence were used in this study to feed into its analyses (Flick, 2000:75-92; Yin, R.K, 2009:2-4).

Participatory action design was the framework for the research.

Observations were made of crafting techniques of the Makalani seed, which informed the planning for the practical component. Both researcher and crafter explored how the Makalani nut lends itself to techniques used on the tagua nut. This included a variety of practical experiments informed by techniques and practices such as carving, polishing and dyeing, to name a few. The results were documented and then analysed. All documentation was recorded by means of video recording, audio recording, photographs and documenting in the form of written notes. Several practical experiments were conducted, with the results feeding into the next planned session for action (manufacturing).

Each new session of practical experimenting was informed by the findings of the previous session. The sessions were numbered chronologically, along with their findings.

Triangulation was used as a means to eliminate bias from the study and refine the outcome of the research. This was done by assessing collected data from literature that pertains to the study, and the implicit knowledge that the researcher and the main participant contributed towards the research. The researcher contributed by drawing on her knowledge of jewellery design and manufacture. The main participant contributed by drawing on his knowledge of the Makalani seed. All data – including the results of the practical workshops were compared, with similarities

and differences in the findings being noted in the study. This was to ensure the quality of the findings sifted from the data (Brown & Duguid, 1991:40-57).

Ettiene Wenger defines communities of practice as "*groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly*" (Wenger-Treyner, n.d). This Master's research taps into the IK of crafters as a community of practice. The study draws on their knowledge (data) that is created socially to facilitate the process of validating and understanding the data that resulted from the practical experiments with the Makalani seed.

1.7.2 Research methods

All practical procedures pertaining to the crafting of the Makalani nut were documented by means of photographs and video recordings. Both the process and end products at various stages were documented in order to generate a chronological order of process development. Thus an ethnographic approach best suited the first stage of the data collection, by observing and documenting Mr Erwin.R.≠Eichab's current crafting practices. This was done by means of interviews, filming and written notes (Blomberg, 1993:123-155). Comparisons between existing literature pertaining to the tagua and Makalani seeds, as well as to practices and indigenous knowledge, was documented. This fed into the practical experimental sessions.

In a set number of workshops, collaborative manufacturing using Makalani nuts took place between Mr Erwin.R.≠Eichab and the researcher. Techniques applied to the tagua were tested on the Makalani nut in various experiments including shaping, colouring, finishes, relief-carving, shaping on a lathe and polishing. Manufacturing also included several jewellery-making techniques, such as burring and sanding. Processes and techniques were refined according to the results of each set experiment.

Zimmerman et al. (2007:493), states that design research is not necessarily limited only to working towards product development but also wishes to make a contribution towards a body of knowledge. The results were documented and all findings were analysed to develop a list of potentially sustainable manufacturing techniques that apply to Makalani nuts. Recommendations for further investigation of the Makalani seed and practices linked to it are also made.

1.8 Significance of the study

The research contributed to the overall body of knowledge in the following ways:

By working in collaboration with local crafters, the aim of this project was to explore a variety of successful manufacturing techniques used globally on similar nuts. The testing of the various techniques on the Makalani nut both informed the crafters and contributed towards the collective knowledge of vegetable ivory, and more specifically the Makalani nut. This highlighted universal techniques of manufacture pertaining to vegetable ivory, but also emphasised the culture-specific aspect of local (Namibian) aesthetics.

By conducting interviews with crafters, the researcher was able to assess what was being done in the field of Namibian craft, what skills were being used, as well as identify what aspects could still be explored and developed. Having done this, the researcher was able to draw on the collected data and make recommendations. These recommendations included the acknowledgement and respect for the Namibian crafter, as well as sensitising him to the responsibility which he carries regarding the conservation of the Makalani palm. This research also fed into what is known as the Green Economy Initiative. The United Nations Environment Programme (UNEP, 2015) defines the Green Economy as *"one that results in* ***improved human well-being and social equity****,* ***while significantly reducing environmental risks and ecological scarcities****. In its simplest expression, a green economy can be thought of as one which is* ***low carbon, resource efficient*** *and* ***socially inclusive****".* The exploration of techniques with a local material to produce local products developed a discourse between the master crafter and researcher that highlighted key talking points. These talking points could offer valuable insight into how unemployment can be addressed by supporting and developing existing indigenous skills that Namibians possess.

This study contributes to the body of knowledge of craft in Namibia by addressing the issue of sustainability and participatory design, while allowing crafters to engage in experimenting with new techniques that would benefit their craft – and thereby their generated income. The nature of participatory action research requires analysing gathered data to feed into a strategy for solving a local problem. By using this approach, the researcher was able to create discussion around the Makalani nut and unpack the current challenges faced by the master crafter and linked to crafting. These conversations allowed both the researcher and master crafter to identify what crafting techniques would best suit the crafting of Makalani nuts.

1.9 Limitations of the study

The research was limited to the Makalani seed as a NTFP within Namibia. The tagua nut was only included in the study to draw a parallel - from which to a gauge a benchmark for the practical capabilities of vegetable ivory. This was to inform the practical exploration sessions involving local crafting. The researcher worked with one master crafter to conduct a case study.

Although the study had a rich practical component, which took on the framework of Participatory Action Research (PAR), no physical models will be formally submitted with the thesis. However, the data generated from the PAR were included in the findings of the research report.

1.10 Ethics and storage of data

The research has a practical component that relied heavily on visual documentation in order to present the findings of the data accurately. Due to the explorative nature of the practical experimentation with the vegetable ivory, it was best to document processes visually and through written notes. This ensured maximum capturing of data embedded in the manufacturing processes (practice).

Documentation was done by means of audio recordings, video recordings, photographs and written notes. All forms of recorded observation were outlined in CPUT's Personal Information Statement and Consent (PISC) form.

No sensitive matter was covered in this research and all participants were older than eighteen. No minority participants were involved in the study. Although the option to ensure privacy by preservation of confidentiality and anonymity was made available to the master crafter, he permitted the researcher to use his identity and photographs in the research. All participants were requested to sign a PISC form.

Participant involvement was completely voluntary, and all who partook in the study were informed of their right to withdraw from the study at any point without reason. All research data collected up to the point of withdrawal would be destroyed, should a participant choose to withdraw. No financial inducements were offered to any participants. All '*uncrafted'* Makalani seeds used in the design and manufacture workshops, were bought from the crafter as a raw material prior to commencing with the study.

Records and databases were consulted in order to gain a solid understanding of the research area. All references made to the data collected from these records and databases, are listed in the Reference section. All research data collected are stored at the location stated in the PISC form (submitted to the Ethics Committee), on a password-protected personal computer, to which only she has access. All data will be stored for five calendar years for audit purposes. Any further publishing that may result from this thesis will be presented for approval to all participants involved in this study, prior to publishing.

1.11 Structure of the study

Chapter ONE gives an overview of the structure of this body of work, beginning with a brief introduction to the Craft Movement and the importance of recognising the impact which the

human race has on the planet. The problem statement looks at why crafting techniques with the Makalani nut have been limited to carving, when literature reveals that several crafting techniques have successfully been used on other vegetable ivory found globally. The field in which the research problem is situated, is within a Namibian context. The motivation for the study is to collect and analyse data which will throw light on what the current craft-related uses of the Makalani nut are, how crafting techniques used on other vegetable ivory species can inform practices around the Makalani nut, and how informed experiments with crafting techniques can add value to products made from Makalani nuts. The research objectives were to determine the most prominent crafting techniques used to manufacture products from the Makalani nut, as well as identify other possible crafting techniques that could inform the crafting process of Makalani nuts. This knowledge would then feed into the existing body of craft knowledge in Namibia. The chapter concludes with a brief summary of the research.

Chapter TWO looks at non-timber forest products as a sustainable resource, and the increasingly important role they play as a tool to address various challenges found in communities that utilise them. With the term NTFP covering such a vast range of products harvested from forests, this chapter narrows the focus down to the use of NTFPs within the context of Namibia. There is a deliberate focus on a specific NTFP harvested from the *Hyphaene petersiana* palm fruit and known as vegetable ivory, or locally as a Makalani nut. Other examples of NTFPs are used to create an overarching perspective of the importance of NTFPs in Namibia. This is to highlight the lack of information regarding vegetable ivory in Namibia, both as a material and a tool to promote employment through local craft.

Chapter THREE is linked to the issues highlighted in Chapter TWO and looks at them in greater detail by addressing the problem statement: What can be done to enrich the current crafting situation with respect to the Makalani nut? This chapter explores the methodology used to address the problem statement, as well as several research questions nestled within. The current extent to which the Makalani nut is used, documentation of other crafting techniques which have been successfully employed with the tagua nut, and possible avenues of experimentation are all presented in this chapter. A list of techniques is generated, which will then inform the following chapter.

In an attempt to answer the question of what crafting techniques and practices have been successful with the tagua nut found in Ecuador, South America, Chapter FOUR explains in detail the techniques listed in Chapter THREE and explains each one in detail. Experiments and the findings of the experimental sessions involving the master-crafter, Mr Erwin.R.≠Eichab, and the researcher, are documented. Through visual and written documentation, the findings are presented in tabular form. A comparison of crafting technique results between the tagua and Makalani nuts

can also be found in this chapter. The question of how experimentation with the Makalani nut can add value to the craft products made from it is also unpacked briefly in Chapter FOUR.

Chapter FIVE covers the discussion and analysis of the experimental session findings presented in Chapter FOUR. In this chapter, the challenges and successes of the experimental sessions are explored in order to understand better the results of the various experiments, as well as the discourse that emanated from physically engaging with the Makalani nut. The limitations of the study will be reviewed in order to evaluate whether or not they could be overcome in different contexts that allow for the findings of this research to be further explored.

By analysing the current state of the crafting industry, involving this nut in Namibia, alongside the findings of this research, Chapter SIX reflects on the findings of this study. This chapter notes the wider horizon of options that the introduction of Makalani-crafting has reached, but also touches on the personal growth that has taken place within the researcher and the master-crafter. This chapter encompasses several recommendations, as well as highlighting possible avenues of further research that could be explored at a later stage.

1.12 Summary

Looking at NTFPs as a natural, renewable resource through the lens of craft in Namibia, and all the techniques that go with it, this study drew inspiration from successful techniques used on the tagua nut to inform the quasi-experimentation that took place when testing various manufacturing techniques on the Makalani nut. Realising that the Makalani nut was used only for carving in the past, the research addressed the possibilities of using different techniques to enhance the range of products crafted from the nut. Through a range of quasi-experiments, and documenting the process and findings, a list of recommendations was compiled in order to contribute towards the overall body of knowledge of craft in Namibia, and to crafting techniques used globally on vegetable ivory as a whole. Within the discussion and conclusion section found in Chapter SIX, the challenges facing Mr Erwin.R.≠Eichab are addressed, with several recommendations made to serve as possible future areas of research. These recommendations draw together existing resources, but present them in a manner that supports the growth of the crafter in a holistic manner, and places the development and production of sustainable Makalani nut products at the heart of the process. In so doing, the study highlights both the physical resource presented by the Makalani nut, as well as the importance of the local crafter who practises sustainable harvesting of this natural resource, capturing the essence of Namibia through Namibian hands and presenting it to the world in an authentic manner.

CHAPTER TWO
LITERATURE REVIEW

2.1.1 Introduction and Background to the research

Tourism and forestry are two of Namibia's largest sources of employment and income. A prominent sub-culture practice of tourism is to buy locally made products – be it food or artefact, therefore identifying crafts as an important actor in tourism (NDP4, 2012:92-96). Within the top three goals listed in the Fourth National Development Plan of Namibia (NDP4), the creation of employment opportunities was identified, along with sustainable economic growth and enhanced income equality, for the year 2030. The document encourages citizens to choose a perspective of identifying possible opportunities as opposed to that of identifying obstacles in the task of tackling issues such as high unemployment. The president of Namibia, H.E. Hafikepunye Pohamba, states that all Namibians should be part of the movement towards Industrialisation and invest in research as well as development, to create a country that supports all Namibians in realising their full potential (NDP4, 2012:Vm ii-viii).

In the financial year of 2012/2013, 33.4 million Namibian dollars (N$) was allocated to equipment aid under the Business and entrepreneurial development and promotion programme. The largest sector was that of Manufacturing (EAS, 2013). With support offered to SMEs to meet necessary equipment and other technological needs, the Ministry of Trade and Industry (MTI) aims to facilitate the creation of employment and successful running of SMES in Namibia (Ministry of Trade and Industry website, 2013). The successfully selected businesses that are selected to benefit from the equipment aid funding are referred to as 'champions'. The document states that, "*The ministry aims to support at least one champion per each region who are either mainly focusing on manufacturing and adding value to natural resources*" (Ministry of Trade and Industry, 2013). This funding serves to empower manufacturers who have a business concept and skills, but lack the funds to buy the necessary machinery.

Despite the fact that policies are in place to support potential *champions*, there are still gaps in the (value chain) process that need to be addressed to better facilitate empowering individuals. These gaps can and will only be addressed once more information linked to the harvesting, environmental and socio-economic impact factors surrounding NTFPs have been consulted.

Figure 2.1 below illustrates an overview of what is covered in this chapter. With the four major components in this chapter consisting of non-timber forest products, palms, vegetable ivory and how these three components fit into the area of focus, Namibia.

2.1.2 Rural-Urban migration

The National Development Plan (NDP) addresses unemployment in Namibia, stating that the high unemployment rates have prompted the Namibian government to come up with policies that address this issue (NDP, 2012: vii; 121; 125).

With rural-to-urban migration continuing despite increasing rates of deterioration of living conditions taking place in urban settings, it is suggested that rural perspective is that economic opportunities are more promising in urban areas. This is perceived as being a better option compared to staying in economically-pressured rural environments (Frayne, 2005:51). A consequence of this migration is that rural crafters then begin to sell crafts in urban areas in order to generate income. An example of this is the selling of traditional *ekipa* to jewellers in urban areas where there is a buying market (Reeve, Pope, & Stewart, 2007:1-3). The high demand from collectors and tourists for authentic *ekipa*, creates a market in which to trade with these traditional artefacts (Conservation and the Environment in Namibia, 2002). Since the implementation of strict legislation surrounding the trading of animal ivory, Namibia obtained special permission to export *ekipa* with the condition that trade is regulated by the Ministry of Environment and Tourism of Namibia (Reeve et al, 2007:3). The trading of *ekipa* is discussed in greater detail in subsection 2.8 in this chapter

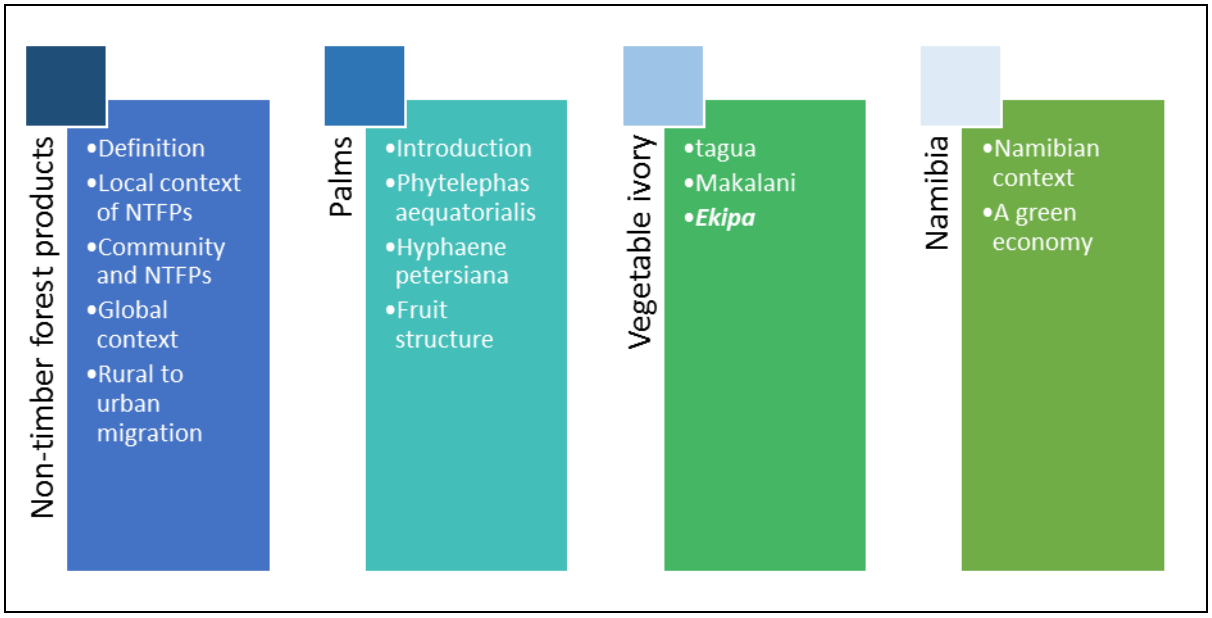


Figure 2.1: Chapter TWO overview (2014)
(Source: Author's construct)

2.2 State of the Art on Non-Timber Forest Products

The Forestry Agriculture Organisation (FAO) has requested that governments collect and report data related to non-timber forest products. This data collection has resulted in a vast amount of data being collected, and as a result striking up a debate about what defines a non-timber forest product. There are several factors that complicate the matter of data collection surrounding NTFPs.

These factors include the:

- vast array of species and types of NTFPs across the world
- variation in the volumes that are extracted from forests, used and traded
- difficulty of enumeration due to NTFPs that are harvested by rural communities who are far away from formal recording or census agencies
- assessment of sustainability of extraction due to insufficient data as well as,
- discourse surrounding what is deemed a NTFP and what is not (which affects what and how data is collected) (Shackleton, C., Delang, Shackleton, S., Shanley. (eds), 2011a:4)

Non-timber forest products are also referred to as *minor products* and *non-wood forest products* (Shackleton, C., Shackleton, S., Shanley. (eds), 2011b:259). Although the definition of non-timber products can be argued depending on the field of research under investigation, for the purpose of this study a non-timber product will be called a NTFP. Shackleton *et al* (2011) cites the work of De Beer and McDermott (1989) to define an NTFP as "*all biological materials other than timber, which are extracted from forests for human use*". This is the lens through which any NTFP mentioned in this body of work will be discussed.

2.2.1 Local context of NTFPs

Drawing on knowledge (including skills) passed down from generation to generation; many local people have generated income from selling products made by using their indigenous knowledge (IK) of locally found materials. These products often incorporate traditional crafting skills such as carving and weaving. These skills are used daily to fulfil various tasks, often including creating objects used in day-to-day living (Cheikhyoussef & Embashu, 2013:2-4).

The importance of non-timber forest products (NTFP) has started to play an increasingly prominent role globally, and in the craft sector in Namibia (Shackleton, Delang, Shackleton & Shanley, 2011a:3-21). Materials such as wood, palm leaves, reeds, pods, seeds and nuts are used to manufacture a variety of handmade products. Materials are readily available to rural people who gather them from the areas where they live. These crafts are produced to sell as a form of generating income (Sullivan, Konstant, Cunningham, 1995:357-370). NTFPs have immense potential to contribute towards the economy of the country as a whole. Brazil is such an example, with the exporting of the Brazil nut (Ros-Tonen, 2000:196-201). Even on a smaller scale, short-term benefits such as immediate economic gain by means of trading reflect the income-generation potential of using NTFPs (Setty, Bawa, Ticktin & Gowda, 2008:19). Namibia's socio-economic use of the Makalani seed is fairly recent in the context of vegetable ivory as a crafting material. An excellent example of the potential found in vegetable ivory is seen in the *Phytelephas aqequatorialis* palm nut - or *tagua* nut.

2.2.2 Community and NTFPs

Charlie Shackleton *et al*, 2011, noted that "*Over the last two decades, the importance of non-timber forest products (NTFPs) to rural livelihoods, income generation, local economies and in some instances, forest conservation has become increasingly recognised and appreciated in both the research and policy sectors*." With an increasing number of research papers investigating the complex range of dynamics that the regulation of NTFPs create, what comes to mind is how rural individuals will be affected by upcoming legislation seeing as how most of their extraction of NTFPs has gone unregulated in the past. With NTFPs having the ability to be a sustainable resource for several generations to come, it would be wise that further research should be undertaken in order to raise the awareness and common knowledge pertaining to NTFPs. Focus areas could include enhancing the perceptions and value of NTFPs by promoting and facilitating partnerships between local communities and private sectors (Guariguata *et al*, 2010:237-245). Palms are a great resource to local communities by providing raw materials to craft or trade with. The fact that palms grow in fairly large numbers without having to be planted by deliberate efforts, speaks of their sustainable and regenerative capacity if managed well by those utilising them (Brokamp *et al*, 2011:573). Mosimane & Silva (2012:26) state that, "*Proponents of CBNRM [community-based natural resource management] use theories of collective action to argue that, under the right conditions, local management of natural resources enhances efficiency and sustainability better than more centralized, top-down approaches*." However, community-based natural resource management (CBNRM) still requires some form of incentive for

the communities involved to participate and comply with land-use practices that are in line with those set out in Namibian tourism (Mosimane & Silva, 2012:25). Foundations such as Pro Pueblo, aim to empower local crafters in Ecuador by creating opportunities to generate sustainable income through the selling of products made from natural materials. Pro Pueblo facilitates this process by providing financial support and training as needed by the crafters. In this manner, the crafters are able to purchase necessary equipment needed for the manufacturing of their products (Propueblo.com, 2014). In seeing the benefits of partnering with foundations such as Pro Pueblo, locals can be encouraged to participate in CBNRM by creating an incentive linked to supporting the making of their products in exchange for practising sustainable harvesting.

Although research on increasingly important topics such as NTFPs is done, often the dissemination of findings and new knowledge is not effectively communicated to the communities that it impacts (Shanley & Lópes, 2009:534). In a paper addressing the gap between research findings generated and reaching relevant parties, Shanley and Lópes (2009) speak of the importance of the dissemination methods used to convey findings from research to the relevant parties. Including communities in the process of research, as well as communicating the findings in a manner that is understandable and accessible to them, allows research to be relevant and implemented more effectively (Shanley & Lópes, 2009:535-544).

Studies on available natural resources have and are being done in Namibia. However, it is the distribution and active implementation of the research findings that are often withheld from the communities that could benefit from new knowledge. This contributes to the lack of development in communities that use these natural resources to generate income. By empowering individuals to incorporate new knowledge into existing practices, researchers and their work create a greater impact in their area of study.

In the journal, Biotropica (Shanley & Lópes, 2009:539), it states that there is an increase in benefits for the parties engaged in the research. Figure 2.2 shows that Morin (2003), as cited by Shanley & Lópes, 2009, believed that research anchored in contextualised science was developed by feeding user input into the research. This means that involving crafters in the process of identifying ways to address issues of sustainability would be beneficial for both crafters and researcher alike.

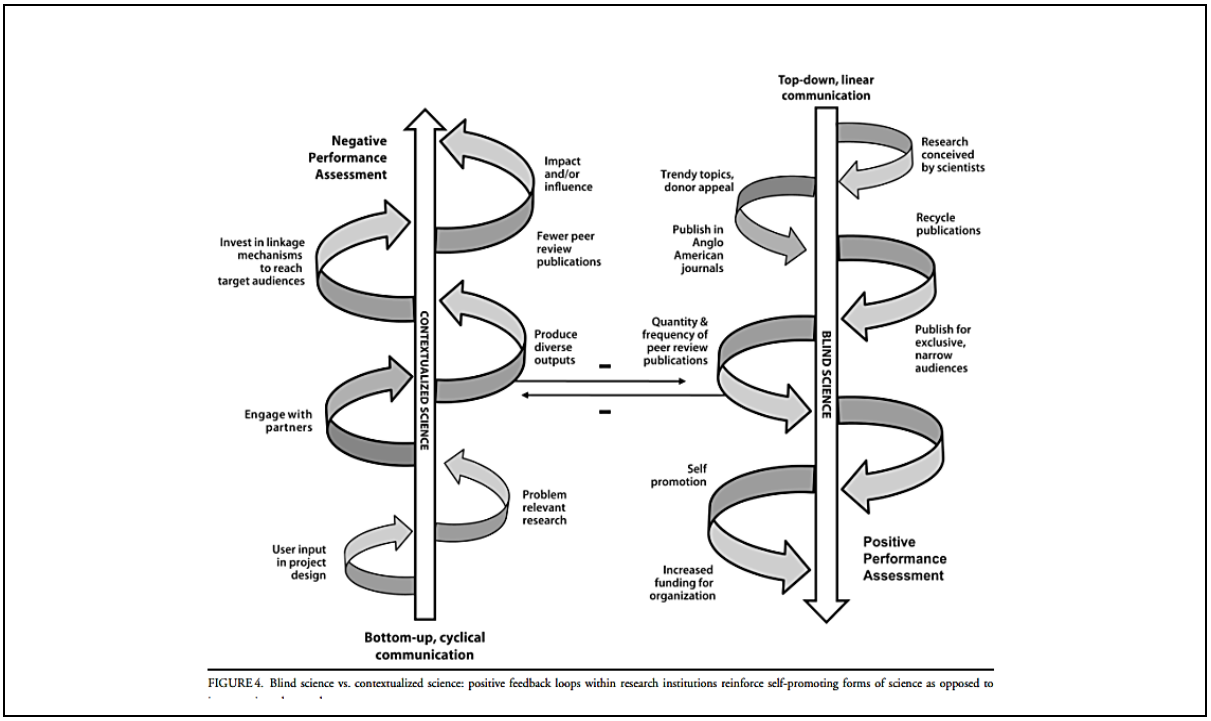


Figure 2.2: Figure 4. Blind science vs. contextualized science: positive feedback loops within research institutions reinforce self-promoting forms of science as opposed to impact-oriented research.

(Source: Morin, 2003 cited in Shanley & Lópes, 2009:539)

By incorporating user input into the research, community problems can be examined to develop relevant solutions for the community in which CBNRM programmes are to be implemented. Findings from the research will speak to creating partnerships between crafters and available resources (such as financial support). It is important that data generated from the research are first relevant to local crafters, and *then* to contribute to the academic field.

Namibia has been acknowledged for its activities and legislation pertaining to involving local communities in the sustainable conservation of wildlife. By communicating the long-term benefits, and very real possibility of large profits to be generated from community involvement in wildlife conservation, a shift in mind-set could be achieved. This resulted in an increased valuing of the environment and also the understanding of the long-term benefit held for the communities in need (Bird & Brown, 2011:3). In their report titled, *Sustainable natural resource management in Namibia: Successful community-based wildlife conservation*, Bird & Brown (2011:3) note that: "*The opportunity to create a national CBNRM programme arose out of three key factors: 1) Application of lessons from surrounding countries' attempts at CBNRM; 2) Namibia's success in its own national efforts to devolve [wildlife] management to commercial landholders; and 3) the leadership of the Namibian government, with support from local non-governmental organisations (NGOs) and international donors*". Although this document speaks about wildlife in a CBNRM programme, considering the above-mentioned factors when addressing non-timber forest products would benefit any policies

developed around this natural resource. With this being said, it is still a problem for government to develop effective legislation for all NTFPs found in Namibia. An example of such difficulty with legislation development is seen in the case of *ekipa*, the traditional ivory buttons worn by the Owambo tribe in Namibia. While Bird & Brown (2011) states that CBNRM does benefit the communities in which the strategies are implemented, Mosimane & Silva (2012:25) argue that there remains a "*level of discontent with CBNRM as a development strategy*". Promoters of CBNRM strategies maintain that if communities benefit financially from the preservation of wildlife and the land they occupy, an incentive would have been created for communities to participate in proposed conservation strategies. Which then addresses issues such as limited resources – in terms of lack of man power- to monitor identified at-risk areas. This also creates employment in areas where there would not have previously been an opportunity to generate income due to limited resources or location. The problem lies in the fact that attempts made at addressing sustainable harvesting and use of natural resources are often developed without consulting the locals who are directly affected by the proposed policies (Rainforest Conservation Fund, 2009).

2.2.3 NTFP Global context

Vegetable ivory from different palm species found globally, has been used to make different items, including toys, jewellery, buttons and other carved pieces (Doren, 1997:184). The most popular variety of vegetable ivory used to craft these items seems to be the tagua seed from the *Phytelephas aqequatorialis* palm. The greatest producers of this specific variety of vegetable ivory (tagua) are Panama, Ecuador, Brazil, Peru and Colombia (Barfod, 1989:181, Doren, 1997:189). Countries that have imported vegetable ivory as a manufacturing material include France, England, Germany, Japan, Italy and the United States (Barfod, A., Bergmann, B. & Pedersen, H, 1990:293, 1989:181; Doren, 1997:184). Foundations such as Pro Pueblo have helped local communities to establish business practices that empower the crafters when selling their vegetable-ivory crafts (Pro Pueblo, 2014). Despite the popularity of the tagua nut as the seemingly preferred variety of vegetable, other types of vegetable ivory can be found in several countries. The Doum palm is one of ten varieties in the *Hyphaene* genus, and is the variety of palm species found in Africa. The *Hyphaene petersiana* or Doum palm is known locally as the Makalani palm, and is found in Namibia (Doren, 1997:185). *Metroxylon* is the Asian variety of vegetable ivory palm species and is made up of five species. Each species within the genus can be found in specific countries. The *Metroxylon sagu* species, for example, is found in Indonesia, New Guinea, Mindanao and Malaysia (Doren, 1997:186). Although vegetable ivory varies slightly in size and colour depending on the palm tree from which it is sourced, it is seen globally as a sustainable material resource (Barfod, A., Bergmann, B. & Pedersen, H, 1990: 293-295).

2.3 Palms

Palms are one of three of the most significant plant species for mankind. With their use mainly linked to utilitarian functions, it is not difficult to see how they have become the core resource to several products made by subsistence-living communities. The scientific name given to palms, which is *Arecaceae* or *Palmae*, indicates which plant family they belong to. Palms are woody-stemmed, perennial plants that make up five sub-families from a total of 183, currently recognised genera. It is estimated that there are approximately 2 450 different palm species across the world, however due to on going debates around what constitutes as a specific species, the exact number of species remain unclear (FAO, 2011:1).

2.3.1 Palm growth habits

Palms display growth habits in 5 different ways and are defined by describing or identifying the stem or trunk. Solitary and clustering growth habits have known to be found in the same species and are therefore not exclusive to one palm species as a rule. Table 2.1 gives a description of each growth habit with an example of a palm species for each habit. The table is based on data from the revised FAO (2011), NTFP: Tropical palms report. Illustrations of the different growth habits can be seen Figure 2.3.

Table 2.1: Palm growth habits (FAO, 2011:1-2) (Adapted from FAO:2011)

Growth habit	Description	Palm specie example
Solitary	Single stemmed with great variability found in this growth habit. Stems can range from 30cm to 60m in full height. Stem widths can also vary significantly, with some species boasting an amazing 2m stem diameters. Cultivated mostly for economic and ornamental purposes. Vulnerable due to their need to be propagated from a single seed; damage to their growing tip can prove fatal.	*Chamaedorea tuerckheimii* or Potato-chip palm (stem reaches up to 30cm in height) ; *Ceroxylon alpinum* or Andean wax palm (stem reaches up to 60m in height)
Clustering	Multi-stemmed and fairly common.	*Phoenix dactylifera* (Date palm)
Aerial branching	Aerial branching is unusual in palms. Only found naturally in the genus *Hyphaene, Dypsis* and the rattan genus, *Korthalsia* and *Laccosperma.* Branching occurs by equal forking (dichotomous branching). Abnormal aerial branching can occur in solitary palms because of sub-lethal damage to the growing point by insects or a physical force such as lightening. Examples of abnormal aerial branching is	*Hyphaene petersiana* (Makalani palm)

	found in the coconut palm (*Cocos nucifera*). No technique has yet been devised to induce abnormal aerial branching for economic purposes.	
Subterranean branching	Occurs by two processes: dichotomous and lateral branching. Both can be vegetatively propagated by separating and transplanting individual branches.	*Nypa fruticans (*Nipa palm): dichotomous branching palm; and the *Salacca zalacca* (Salak Palm): lateral branching palm
Climbing	Over 500 palm species have a climbing growth habit. The majority of climbing palms are clumping palms, sending out new shoots from the root system. The initially erect stems seek out trees for support and climb up into the forest canopy. The stems are often referred to as canes and are solid.	*Calamus* genus

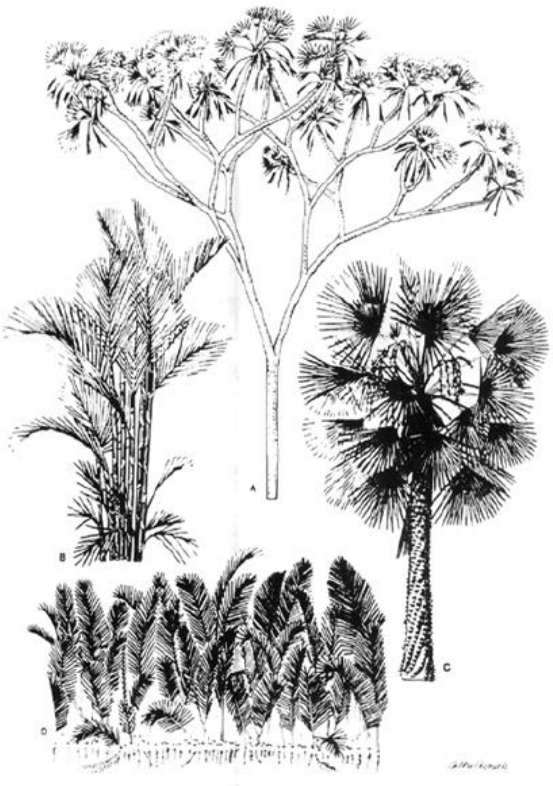
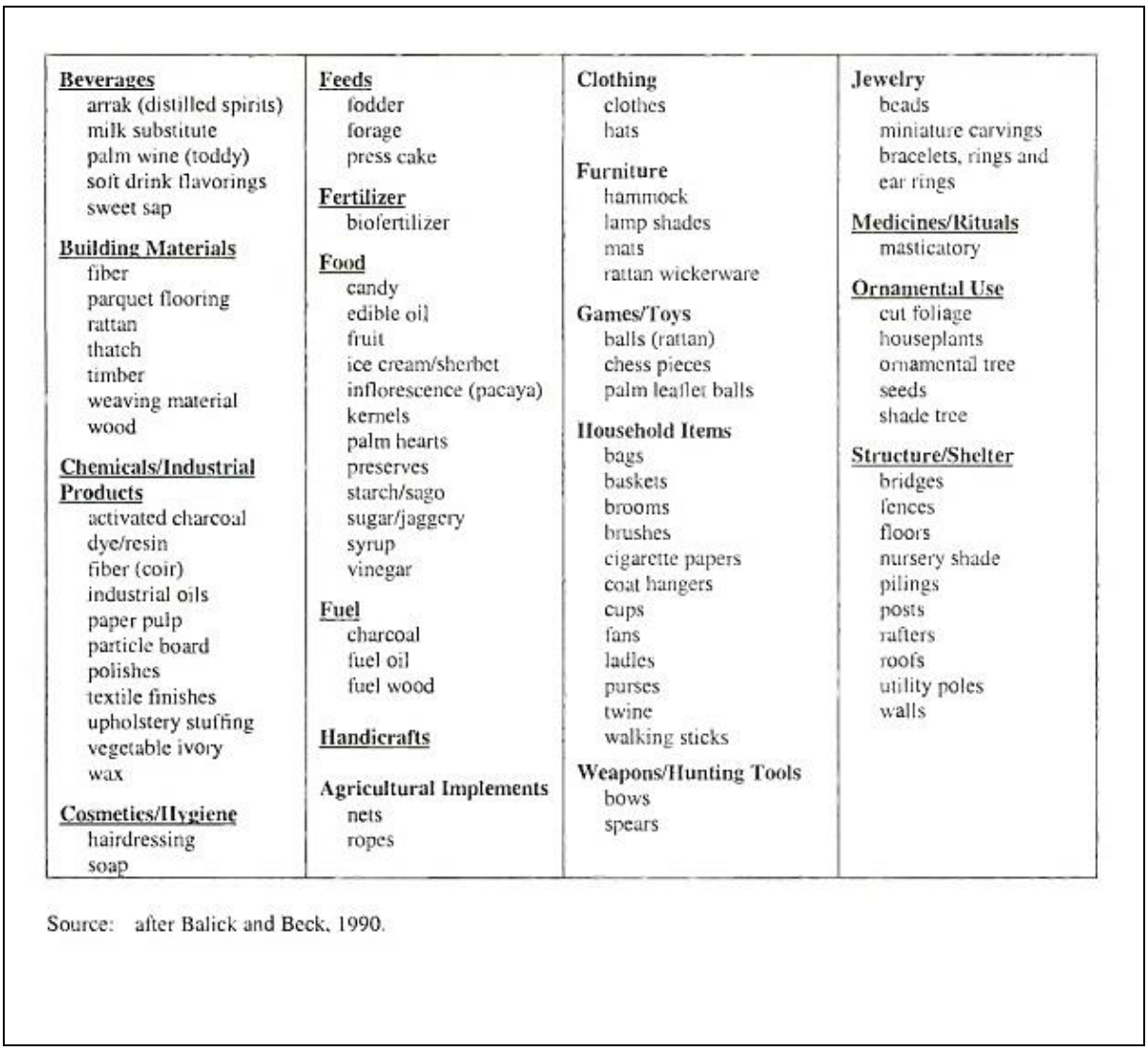


Figure 2.3: ***Palm growth habits***
A. An aerial branching palm, the doum palm (Hyphaene thebaica). B. A clustering palm, the sealing was palm (Cyrtostachys renda). C. A solitary palm, the carnauba wax palm (Copernicia prunifera). D. A subterranean branching palm, the nipa pal (Nypa fruticans)
(Source: FAO, 2011:3)

2.3.2 Palm uses

Palms offer the communities that harvest materials from them, a wide variety of non-timber forest products. Their leaves are used for weaving and basketry, their fruits provide food and nutritious oils, their branches and stems supply wood for construction and seeds provide food and crafting material. The products made from the various palms depend on the species, resulting in some palm species being known specifically for product that is made from it. Examples of palms that are synonymous with their NTFPs are the Tagua palm (*Phytelephas aqequatorialis)*, popular for its seed (tagua nut); and the Oil Palm *(Elaeis guineensis*) known for its palm oil (http://www.wwf.org.au). The figure below is a comprehensive list of products made from palms. This list includes products that can be consumed, those needed for everyday utilitarian purposes as well as crafts (FAO, 2011:31-33).



Beverages arrak (distilled spirits) milk substitute palm wine (toddy) soft drink flavorings sweet sap **Building Materials** fiber parquet flooring rattan thatch timber weaving material wood **Chemicals/Industrial Products** activated charcoal dye/resin fiber (coir) industrial oils paper pulp particle board polishes textile finishes upholstery stuffing vegetable ivory wax **Cosmetics/Hygiene** hairdressing soap	**Feeds** fodder forage press cake **Fertilizer** biofertilizer **Food** candy edible oil fruit ice cream/sherbet inflorescence (pacaya) kernels palm hearts preserves starch/sago sugar/jaggery syrup vinegar **Fuel** charcoal fuel oil fuel wood **Handicrafts** **Agricultural Implements** nets ropes	**Clothing** clothes hats **Furniture** hammock lamp shades mats rattan wickerware **Games/Toys** balls (rattan) chess pieces palm leaflet balls **Household Items** bags baskets brooms brushes cigarette papers coat hangers cups fans ladles purses twine walking sticks **Weapons/Hunting Tools** bows spears	**Jewelry** beads miniature carvings bracelets, rings and ear rings **Medicines/Rituals** masticatory **Ornamental Use** cut foliage houseplants ornamental tree seeds shade tree **Structure/Shelter** bridges fences floors nursery shade pilings posts rafters roofs utility poles walls

Source: after Balick and Beck, 1990.

Figure 2.4: Principal palm products

(Source: FAO, 2011:33)

2.3.3 Palm fruit structure

The fruit of palm trees are classified as drupes. The basic structures of palm fruit are very similar in anatomy and are made up of 5 main sections. These are the *exocarp*[3]*/epicarp*, *mesocarp*, *endocarp* and the seed or *endosperm*. The *pericarp* consists of the exocarp (skin/peel), mesocarp (soft or fibrous flesh) and the endocarp (woody shell covering the endosperm/seed). The endosperm can be liquid or solid (gelatine-like state), and solidifies with time. In the case of vegetable ivory-palm fruit, the liquid endosperm can be consumed by humans and animals or used for crafting once the endosperm has dehydrated and consequently hardened (Barfod, 1989:182; Brokamp *et al.*, 2014:259). Figure 2.5 illustrates the generic anatomy of palm fruit. Figure 2.6 is an illustration of the same anatomy based on the date palm fruit. The comparison is to illustrate the varying dimensions of the exocarp (thickness) and endocarp (shape and size).

[3] The *exocarp* is also referred to as the *epicarp* (Bumanglag, 2014:7)

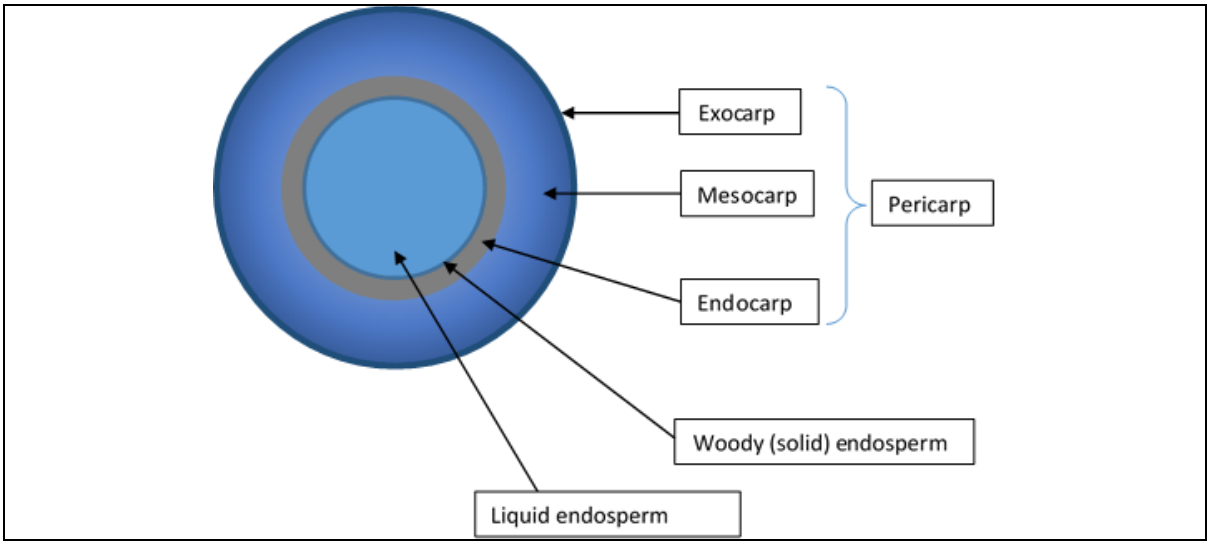


Fig 2.5: Palm fruit (drupe) anatomy
(Authors construct, 2014)

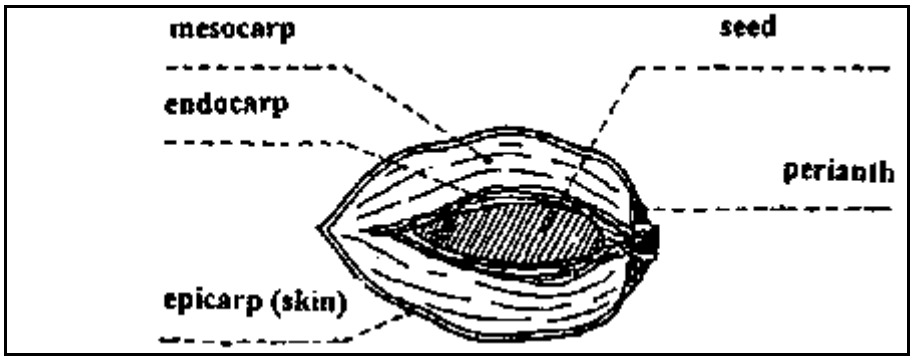


Figure 2.6: ***Fig 8: Morphology and anatomy of date palm fruit and seed*****.**
(Source: Munier, 1973 as cited in FAO,2011)

2.4 Phytelephas aqequatorialis (Tagua) palm

The tagua palm is found in several countries in South America, including Brazil, Colombia, Ecuador, Panama and Peru. The five species are *Phytelephas aqequatorialis, Phytelephas macrocarpa, Palandra aequatorialis, Phytelephas tumacana* and *Phytelephas seemannii* (Barfod, 1989:181). The palm species most well-known for and from which the famous tagua nut is harvested are the *Phytelephas aqequatorialis* and *Phytelephas seemannii.* For the purpose of this study, the research will be limited to the *Phytelephas aqequatorialis* palm.

Figure 2.7: Map of South America, Ecuador (2014)

(Source: Google maps, 2014)

[https://www.google.com/maps/@4.1156735,-72.9301367,5z]

Figure 2.8 shows the tagua palm in its natural habitat, as well as the size of the leaves of the palm.

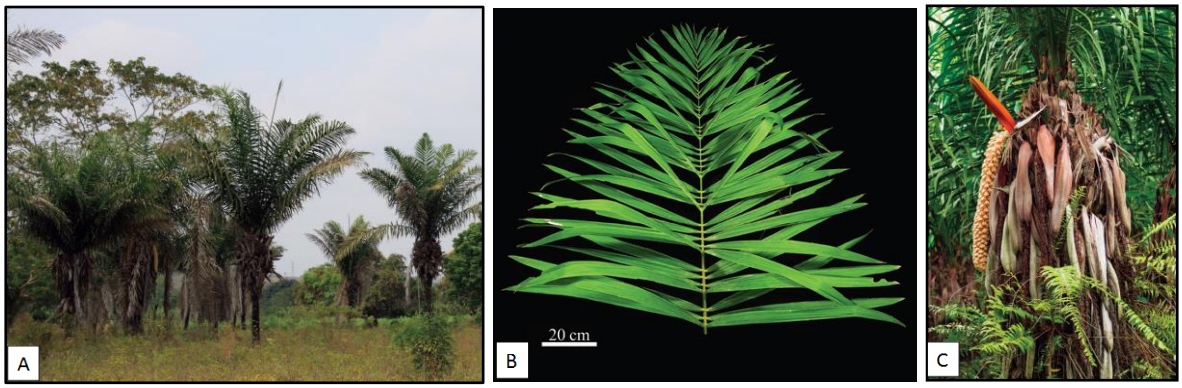


Figure 2.8: ***Figura 13-1. (A) Población de tagua en la localidad de San Plácido, Manabí.*** **[Population of tagua in the town of San Placido , Manabi.]** ***(B) Segmento superior de la hoja pinnada.*** **[Upper segment pinnate leaf]** ***(C) Inflorescencia masculina.*** **[Male inflorescence]**
(Source: Brokamp, Montúfar, Jácome, 2013:188)

Figure 2.8 (from left to right) shows the female infructescence of the tagua palm, at various stages (block D-G) as well as what the fruit looks like when it is sliced in half and the tagua nut is still in a soft state. Block H (in Figure 2.9) shows the trunk of the palm tree.

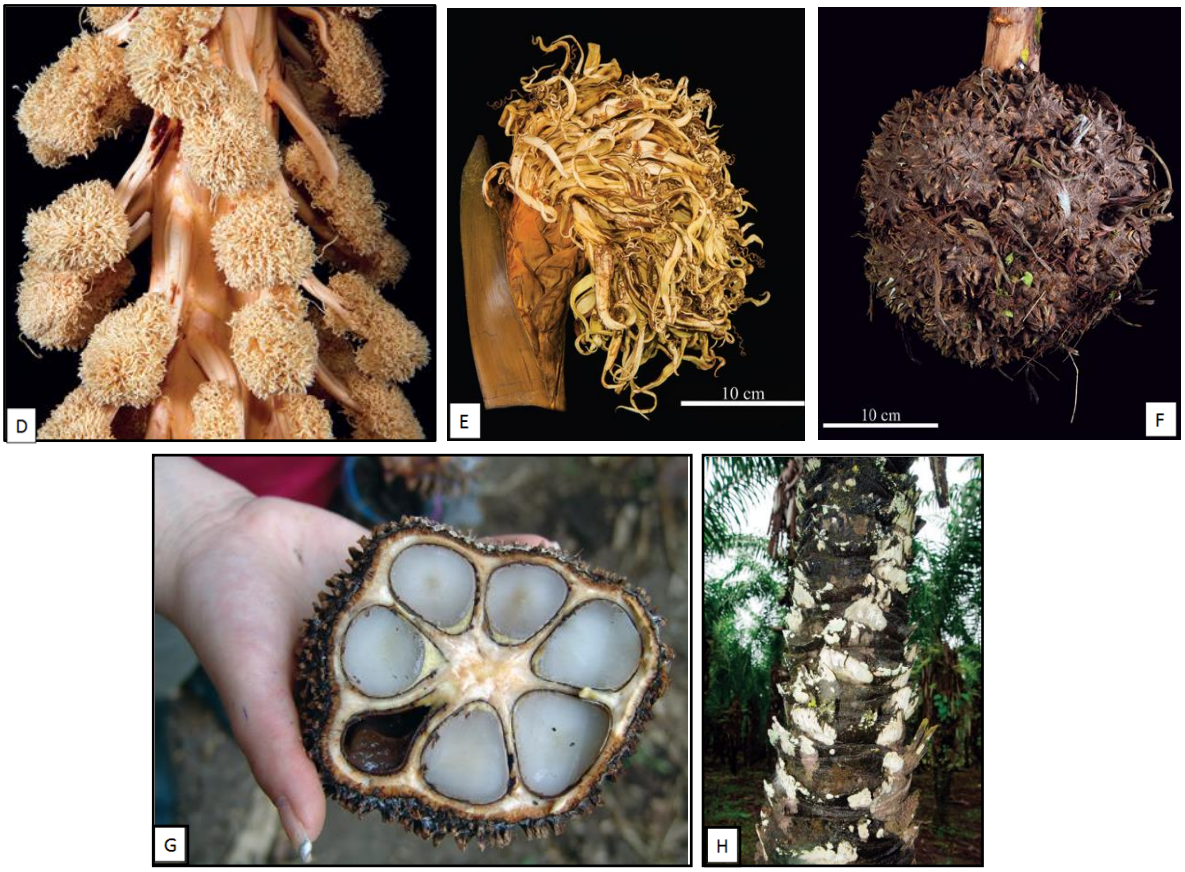


Figure 2.9: ***(D) Detalle de la inflorescencia.*** **[Detail of inflorescence]** ***(E) Inflorescencia femenina.*****[Female inflorescence]** ***(F) Infrutescencia*****. [Infructescence]** ***(G) Cortetransversal del fruto, con semillas con endospermo semimaduro.*****[Transversalof fruit , semi-ripe seeds with endosperm]** ***(H) Cicatrices foliares en el tallo de la tagua.*** **[Leaf scars on the stem of the tagua] Fotos: (A, G) R. Montúfar; (B–F, H) R. Jarrín (Source: Brokamp, Montúfar, Jácome, 2013:188)**

2.5 Hyphaene petersiana (Makalani) palm

The *Hyphaene petersiana* palm has several local names including, *Omulunga*, *Lala palm*, Real fan palm, Doum palm and African Ivory nut palm (Blach-Overgaard et al, 2009: 1-12; Cheikhyoussef & Embashu, 2013:4; Doren, 1997:185; FAO, 2011; 2, 150; Sola, 2004: 245-246). The specific name for the palm found in Namibia is *Hyphaene petersiana* Klotsch (Sullivan, Konstant, Cunningham, 1995:346l Sola, 2004:245). The leaves of juvenile palms are mainly used by Oshiwambo women, for weaving baskets. These baskets are used as household items but can also be sold to generate additional income (Sullivan, Konstant, Cunningham, 1995:346-347).

Figure 2.10: van Wyk, 2014. ***Hyphaene petersiana palms***

The leaves of the *H.petersiana* palm are also used as a toothbrush, by the Oshiwambo tribe in Namibia (Cheikhyoussef & Embashu, 2013:4). The palm is found in the northern part of Namibia (Sola, 2004:247). The baskets woven for household use differ in strength and manufacturing techniques,

when compared to those that are sold. Generally the household baskets are woven with greater strength and have less dyed leaves incorporated into the designs (Sullivan, Konstant, Cunningham, 1995:348). The Hyphaene petersiana palm, also known as the Makalani palm by the locals, is a source of food and building material to the poorer communities (Cheikhyoussef & Embashu, 2013: 1-2; Sullivan *et al*, 1995:346-347). The fruits are dried, the pericarp is fermented to produce traditional wine, palm leaves are used in construction and seeds are crafted into products to be sold to tourists (Sullivan *et al*, 1995:346). The Makalani palm is one of the trees most used by the locals in Namibia but is also greatly used inother countries where it grows. These countries include Angola, Zimbabwe, Botswana (Cheikhyoussef & Embashu, 2013:1; Sola, 2004: 247).

Table 2.2: Hyphaene petersiana palm information sheet

Hyphaene petersiana palm tree information sheet	
Found in (countries)	Angola, Botswana, Burundi, Caprivi Strip, Mozambique, Namibia, Northern Provinces, Rwanda, Tanzania, Zaire, and Zimbabwe (Blach-Overgaard *et al*, 2009:3-4; Palm Pedia, 2014; Sullivan *et* al, 1995)
Growth habitat	Aerial (FAO, 2011:2)
Common names	Doum palm, **Makalani palm**, *Omulunga* (Oshiwambo[4] language), Real fan palm, African Ivory nut palm, Gingerbead palm (Blach-Overgaard *et al*, 2009; Doren, 1997:185, FAO, 2011:150; Sullivan, 1995)
Fruit	Fruits are taller than wide, have a shiny exterior and a sweet smell. Vary from light brown to very dark brown. Darker fruit have better developed seeds (Doren, 1997:185)
Uses	Leaves for weaving and construction, fruit for wine-making (destructive to palm) and eating, nut for carving (Doren, 1997: 185; Sullivan *et* al, 1995)

2.6 Vegetable ivory

The (hardened) seed of the palm tree is what is referred to as vegetable ivory. Although the term *vegetable ivory* has been used to refer to the seed or nut of palm fruits too. Vegetable ivory is enclosed in a brown layer, known as the endocarp and is creamy-white in colour (Barfod, 1989:181-182; Bernal, 1998:65). Global focus has been on seeds harvested from five palm species found in South America, with the nuts from the *Palandra* and *Phytelephas* species proving to be the most popular. Other vegetable ivory-producing palms can be found in Asia (*Metroxylon* species) and Africa (*Hyphaene spp.* species) (Barfod, 1989:182; Doren, 1997:184-186). It is the unique infructescence[5] of the *phytelephantoid* species that make tagua nut the vegetable ivory of choice – producing nuts that are often solid and large in size. These qualities along with a favoured shape make for great export and manufacturing qualities (Barfod, 1989:181, 184-185; Doren, 1997:184-186, 208-209). Figure 2.11 shows a cluster of fruit attached to the Hyphaene petersiana palm (Makalani palm), while Figure 2.12

[4] Oshiwambo is an indigenous language spoken by the Oshiwambo tribe in Namibia.
[5] A term used in Botany meaning aggregate fruit, or fruit formed from several carpels derived from the same flower

shows the harvested seed of the *Phytelephas aqequatorialis (tagua) palm.* These images show that the size of the Makalani fruit is slightly bigger than some tagua nuts. The nut of the Makalani palm is therefore much smaller than the tagua nut, once the external covering of the fruit (*exocarp* and *mesocarp*) is removed.

Figure 2.11: *Real Fan Palm (Hyphaene petersiana)* [Makalani palm fruit]
Taken by: Grimes, M 2011

(Source: Flickr.com, 2014)
[https://www.flickr.com/photos/mikeegee/15796355 06/in/photolist-tTV7ww-akSNXp-iUL7MB-iULqnB-iUMYPg-iADbz6-iAC9BT-fgkNJB-3pA3AW-rk3mRm-6NEKXa-75siex-6ngT1b-9sjdrF-ptWDUe-iNQ28E-iNKYa2-9K7dG9-9K7dtY-6zxxMa-pa49Pi-ec9vuw-mfm4XR-rDpzAt-6ccndx-9BR5VG-geRaTe-geQQQN-geQQrb-f4wWnr-f4MbYG-f4wVFr-bWHmzp-bXSMod]

Figure 2.12: *Tagua Nuts* [Phytelephas aqequatorialis palm nut]
Photo by: 2Roses, 2011

(Source: Flickr.com, 2014)
[https://www.flickr.com/photos/2rosesjewelry/62003 97667/in/photolist-arUEd4-bSQyEa-bwqppK-bwqp4D-bwqoHr-bwqon6-bwqnZv-bwqnC2-bwqnfV-bwqmUv-bwqmzg-bwqmcH-bwqkR2-bcNiYM-b5QqPn-b5QqqT-b5Qq3t-b1T3Qk-b1SqkR]

Figure 2.13: Tagua
Taken by: Serafini, M, 2009

(Source: Flickr.com, 2014)
[https://www.flickr.com/photos/acquariana/ 4289849063/in/photolist-7xkMhy-7x5AET-7x5AHP-7x5AGx-7xgYK4-7xkMfG-VrTYB-WdC8g]

Figure 2.13 shows a tagua infructescence with the separated segments of the fruits. There are up to nine tagua nuts in one fruit, where each nut usually has two flat sides and one curved one (Doren, 1997:207). The internal colour of the tagua nut (*endosperm*) varies from white to a light brown. After the harvesters collect the tagua nuts, they are left to dry before being crafted by local artisans.

Figure 2.14: *Metroxylon sp. Seed*
[Metroxylon amicarum palm fruit]
Photo by: Knecht, J.U, 2007

(Source: Flickr.com, 2014)
[https://www.flickr.com/photos/morabeza79/343808579/in/photolist-wo7j8-wo7ja-wo7jc]

Figure 2.15: IMG_1178_2embryo [Metroxylon amicarum palm nut]
Photo by: Edwards, MH, 2007

(Source: Palmtalk.org, 2007)
[http://www.palmtalk.org/forum/uploads/post-657-1195270100.jpg]

2.6.1 Tagua: Ecuador's vegetable ivory

Tagua is the Spanish name given to the seed or nut of the palm, however can refer to the palm itself (Barfod, 1989:181). The variety of vegetable ivory found in Ecuador, the *tagua* nut, has gained great popularity across the globe (Runk, 1998:168-182). This is due to it being marketed as a sustainable alternative to the highly sought-after elephant ivory (Acosta-Solis, 1948:46) and the current methods of extraction have seemingly been that of not disturbing the surrounding environment. The tagua nut is mostly exported from Ecuador and has been documented to export up to 90% of the world's tagua. Corpei, Ecuador's export and promotion agency for tagua, note that tagua is one of Ecuador's top agricultural exports (Verdezoto, 2006:12). A total of 25 countries around the world import this vegetable ivory, of which the top four buyers are Hong Kong, Italy, Germany and Korea. National tagua exports generated U$30 million in 2005, compared to U$18 million in 2003 (Verdezoto, 2006:12). Tagua nut has been sold since 1859, when it gained popularity for its use for making buttons and other crafts. However there was a decline in exports with the industrial movement as preference was given to synthetic materials. It was only with the growing concern for addressing the poaching of animals such as elephants and rhinos, that tagua once again regained its popularity as an alternative to ivory (Verdezoto, 2006:12).

Figure 2.16: ***(A) Tagua fresca con residuo del mesocarpio.*** **(Tagua with fresh mesocarp residue)**
Photo by: Montúfar, R (2013)
(Source: Brokamp, Jácome, Montúfar, 2013:194)

Tagua is collected by hand from its natural habitat. The palms are not cultivated by the communities that harvest NTFPs from the palm. The fruit of the palm grows heavy and when ripe, falls to the ground. Frest animals then pick off the exterior (*exocarp*) to eat the orange, soft fibrous fruit (*mesocarp*). This leaves the nut cleaned and unharmed. Locals then collect the already 'cleaned' nuts. The cleaning of the tagua fruit (*mesocarp*) by animals, saves harvesters a fair amount of work as removing the exterior of the fruit can be difficult, labour intensive and time consuming (Barfod, 1989:183). The tagua palm was intensively harvested during the late 1920's and early 19030s despite heavy harvesting the presence of tall, older tagua palm trees, proved to protect the species from extinction as their fruits were too high up to access. Therefore some nuts were always present, although at varying times. However since the introduction of Bakelite and other plastics, the demand for tagua waned after World War Two (Barfod, 1989:187-188).

Figure 2.17: ***(B) Tagua con cáscara (endocarpio)***
[Tagua shell (endocarp)]
Photo by: Montúfar, R, 2013
(Source: Brokamp, Jácome, Montúfar, 2013:194)

Figure 2.18: (C) ***Tagua pelada o semilla con endospermo sólido***
[Peeled or solid endosperm Tagua seed]
Photo by: Montúfar, R, 2013
(Source: Brokamp, Jácome, Montúfar, 2013:194)

Tagua nuts are of the largest vegetable ivory seeds harvested from palms. It is their large size, faceted sides and flat shape that make them a popular choice for crafting. Size is an important factor when crafting as the material often dictates what is made from the nut. Furthermore the tagua nut is often solid, with no or a minimal hollow cavity on the inside of the nut (endosperm). This allows for more flexibility to carve items with prominent relief detail (Barfod, 1989; Barfod, 1991: 293). The creamy-white colour of the nut closely resembles that of ivory and polishes to a lustrous surface.

Harvesting has gone unmonitored in most NTFP-gathering communities. Harvested products need not necessarily be associated with trade and can be used only for domestic purposes. However when harvested products are traded, they can make their way into several trade environments, both large (international markets) and small (local-trade markets) (Bernal et al, 2011:610-611). Products made from palm leaves, nuts, seeds, etc. are popular in local markets. Harvesting, proving to be complicated in matters of accurate monitoring, has been identified as an issue to be addressed within NTFPs. In the study of palm products in South America, Bernal *et al (2011:607) highlight the need for* "*monitoring of the populations under intensive harvesting is required*".

Figure 2.19: ***Tagua nut.*** **[Polished tagua nut]**
The seed of a tropical palm tree from South America. Very hard with a thin dark skin and subtle grain, a fine low-priced ivory substitute. These run from 1 1/4" -2" and are great for scrimshaw (spray with clear lacquer first) or carving (stay away from the cavity in the center)

(Source: Crystals Rocks and Gems, 2014)
[http://www.crystalsrocksandgems.com/Healing_Crystals/TaguaNut.html

Table 2.3: ***Identified edible portions of P. aqequatorialis [tagua]***

(Source: Koziol & Pedersen, 1993:401-402)

TABLE 1. IDENTIFIED EDIBLE PORTIONS OF *P. AEQUATORIALIS*.

Plant part	Use	Reference
Palm heart	Human consumption	Acosta-Solís (1948); Barfod (1991a)
Male inflorescence	Foraged by cattle	Field observation
Mesocarp	Bait for fish traps	Field observation
	Bait for rodent traps and to attract rodents as game (hunter in blind)	Field observation
	Human consumption (as snack)	Barfod (1991a); Barrett (1925)
	Extraction of oil (rarely done now)	Field observation
	Fodder for pigs and chickens	Field observation
Immature endosperm	Human consumption	Acosta-Solís (1948); Barfod (1991a); Barrett (1925)
Hardened endosperm	Residue from carving	Barfod, Bergmann, and Borgtoft Pedersen (1990); Borgtoft Pedersen and Balslev (1990); Winton and Winton (1932)
	Cattle fodder (sometimes mixed with cotton press cake)	
	Coffee substitute	Winton and Winton (1932)
Haustorium of germinating seed	Human consumption (as snack)	Field observation

2.6.2 Makalani nut: Namibia's vegetable ivory

Vegetable ivory is a NTFP that has enabled many local communities to generate an income from its commercialisation. Several varieties of vegetable ivory are found across the globe stemming from various palms. The *Hyphaene petersiana* palm nut, or as it is locally known - the Makalani nut, is found in Zimbabwe, Angola and Namibia. In Namibia the fruit of this palm is used for making traditional wine and nut for carving craft products (Cheikhyoussef & Embashu, 2013:4). In their research conducted on indigenous fruits in the northern regions of Namibia, Cheikhyoussef and Embashu (2013:1) note that 61.4% of locals that were included in their study believed that no conservation efforts were made towards indigenous fruit trees. The Makalani palm was among the top four trees mentioned. This could highlight an issue of sustainability, especially seeing as the palm is both used as a source of food and generating income (Cheikhyoussef & Embashu, 2013:4-6). The north-central part of the country has a dense population of palms due to three main factors, namely seed distribution as a result of flood waters, conservation of palms by locals and the disposal of seeds after having eaten fruit (Fujioka, 2005:89-105). The north-central area however has suffered deforestation due to the area being densely populated, which can be attributed to the more favourable agricultural conditions, as water is found to be more readily available in comparison to the rest of the land (Erkkilä & Siiskonen, 1992:244).

The Makalani palm tree is one of Namibia's many indigenous trees that the local people use for both household and economic use. The palm is used to make traditional alcohol, provide shelter from its palm leaves and nutrition from its fruits (Sullivan *et al*, 1995:357-370). The Indigenous Knowledge (IK) possessed by the locals is a rich resource to be drawn from when conducting investigative research to increase and deepen the understanding of the NTFPs of Namibia. With medicinal IK having been identified as a growing focal point of research in Namibia - where most of the medicinal plant species are found in the same area that the Makalani palm thrives in - the potential economic development and important issues of sustainability are increasingly being highlighted (Cheikhyoussef *et al*, 2011:1-11).

The need to address NTFPs within the context of silviculture and sustainability, brings with it an opportunity to not only identify possible solutions to the problem of unsustainable practices but also develop proposed solutions by incorporating previously neglected resources such as IK (Gadhil *et al*, 1993:151-156).

2.6.3 Vegetable ivory drying and extractions (tagua and Makalani)

Vegetable ivory is formed when the soft endosperm of the fruit hardens over time. The endosperm loses water through dehydration and turns from a liquid into a gelatinous – like state (Barfod, 1989:182). The seeds can be eaten in this state, and in most cases have a watery texture and bland taste (van Wyk & ≠ Eichab, 2014b). The harvesting of tagua seeds from their pericarp is made easier by the forest animals that eat away at the fibrous layer covering the nuts. Local harvesters are able to extract the fruit with minimal effort and prepare the seeds by drying them in the sun until completely hard. The nuts need to be dried for approximately three months before they can be successfully extracted (Barfod, 1990: 296). One tagua fruit is able to offer up to nine nuts, whereas the Makalani nut can only offer one nut per fruit (Doren, 1997: 207). A darker colour outer shell in Makalani nuts, are found to produce fully ripened seeds, which results in a larger seed size. Makalani fruits are harvested and stored for the drought season and therefore further lengthen the period of time wherein the seed is able to dry, after having been gathered. Tagua nuts that have been dried in the sun have a lighter colour than those that have been harvested from the forest floor (Barfod, 1990: 296). Makalani nuts vary in shape and are wider than they are tall (van Wyk & ≠ Eichab, 2014a). Larger tagua nuts fetch better prices than smaller one due to the larger nuts allowing for a wider scope of products to be created. This preference is not seen in the case of the Makalani nut. A price is generally set as the retail price, however the complexity of the object created from the Makalani nut can push up the retail price (van Wyk & ≠ Eichab, 2014b). Figures 2.20 to Figure 2.25 shows the various stages of the hardening of the soft endosperm. In Figure 2.20 and 2.21, one sees the pericarp is covered with a fibrous layer. This is the part of the fruit that the forest animals clean off by consuming it.

Figure 2.20: ***Fruto maduro de Tagua***
Taken by: La Tagueria, 2013
(Source: Flickr.com, 2014)
[https://www.flickr.com/photos/latagueria/9044619831/in/photolist-]

Figure 2.21: ***Colombia Naqui Tagua***
Photo by : La Tagueria, 2008.
(Source: Flickr.com, 2014)
[https://www.flickr.com/photos/latagueria/4950899003/in/photolist-8xPCcE-8AXe4t-8y28q4-a8mQGV-8xxFbE-aakndG-8AXdXX-aky1CG-8xuDMD-8AWj94-8AWjea-8AZqy1-8AWbHZ-8B1jij-8B1jB5-8B1jwq-8xLwrP-8xPy3W-8AXa4x-8xPCg7-8xxFjo-8xuDzV-8AZiAU-8AWbW2-8AZi3s]

Figure 2.22: ***Fruto de Tagua con semilla blandita***
Taken by: La Tagueria. *1.* 2006.
(Source: Flickr.com, 2014)
[https://www.flickr.com/photos/latagueria/4989855307/in/photolist-8AZqy1-8AWj94-8AWjea-8AZqtA]

Figure 2.23: ***Fruto de Tagua con semilla blandita 2***
Taken by: La Tagueria, 2006.
(Source: Flickr.com, 2014)
[https://www.flickr.com/photos/latagueria/4989855603/in/photolist-8AZqy1-8AWj94-8AWjea-8AZqtA/]

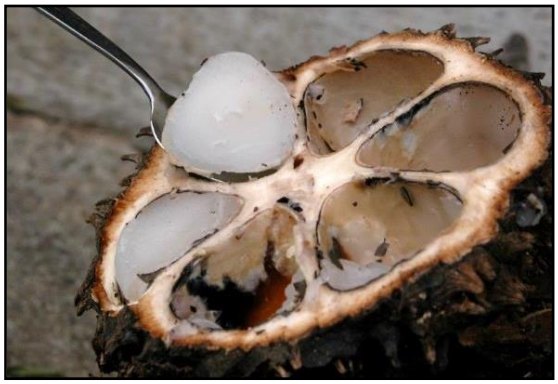


Figure 2.24: ***Fruto de Tagua con semilla blandita*** **3. Taken by: La Tagueria, 2005.**
(Source: Flickr, 2005)
[https://www.flickr.com/photos/latagueria/4990461960/in/photolist-8AZqy1-8AWj94-8AWjea-8AZqtA/]

Figure 2.25: ***Fruto de Tagua con semilla blandita 5.***
Taken by: La Tagueria, 2006.
(Source: Flickr, 2006)
[https://www.flickr.com/photos/latagueria/4990462216/in/photolist-8AZqy1-8AWj94-8AWjea-8AZqtA/]

The pressing of the seeds against one another, inside the fruit, is part of what creates the flat sides seen in the tagua nut. The Makalani nut does not have the same structural set up, however the base of Makalani nuts are often flat, while the sides are rounded and the top has a slight point. The documented process of the hardening of Makalani vegetable ivory is yet to be seen in literature. The tagua enjoys a fair amount of popularity and so is very well researched as an NTFP. The majority of Makalani fruit are light brown, however there is a wide scope of brown hues that can be seen on fruit at different stages of the ripening process. This is illustrated in Figure 2.26 and Figure 2.27.

Figure 2.26: *Makalani palm nut.*
Photo by: Christy Linn, 2014.
(Source: Flickr.com, 2014)
[http://www.flickr.com/photos/100144935@N04/14435578719]

Figure 2.27: *Makalani Pyramide*
Photo by: Richard Namibia, 2006.
(Source: Flickr.com, 2014)
[https://www.flickr.com/photos/36741737@N00/310459549/in/set-72157594399274380]

2.7 *Ekipa* – ivory button

Traditional artefacts carry with them a country's history and culture (Conservation and the Environment in Namibia, 2002). This is found to be true with the *omakipa* – a fairly large button carved from ivory and decorated with various patterns. The Oshiwambo tribe that mainly live in the north of Namibia, used these ivory buttons as a display of wealth and status. Husbands would give their wives several of these traditional buttons to wear at special ceremonies such as weddings and funerals (Conservation and the Environment in Namibia. 2002; McIntyre, 2011:26). Collectors and tourists alike are eager to buy - *ekipa* as collectors' items or as jewellery pieces (mounted into precious metal). As a result, many traders flock to urban areas to sell these traditional artworks in hope of earning an income. *Ekipa* have now become scarce, as buyers – mostly tourists - normally leave the country, taking with them cultural artefacts that are significant to Namibian cultural heritage (Conservation and Environment, 2002). Strict legislation surrounding the trading of animal ivory has caused many crafters to become weary of legally trading in ivory, as registered documentation first needs to be acquired to do so (Reeve et al., 2007:1-2). CITES has banned the commercial trade of animal ivory but has granted permission for four selected countries to be able to trade in ivory under

special regulations. Namibia is one the countries where one can legally buy animal ivory items (*ekipa*), provided that they are marked *and* certified. Poor implementation of the proposal put forward at an annual conference, motivating for permission to trade in *ekipa*, has resulted in an increase in illegal and international commercial trade of the traditional artefact (Reeve *et al*, 2007:4). With a growing demand for *ekipa* within the Namibian jewellery sector as well as from tourists, and collectors, it is important to address the problem in a manner that provides a sustainable solution. Vegetable ivory has similar properties to animal ivory (Doren, 1997:189). The appeal of the large size of antique *ekipa* requires further research, so as to develop appropriate strategies that harness the potential of the Makalani nut as a substitute for animal ivory. The sustainable alternative will need to capture the cultural identity of the Oshiwambo people in a similar manner that the original crafted buttons do. Perhaps if the authenticity of the carving techniques can be transferred to vegetable ivory, then this sustainable alternative could act as a buffer against illegal commercial trade of these scarce traditional pieces.

Figure 2.28*: Four Cuanhama Pendants* [*Ekipa*], 2012. (Source: Bonhams, 2012) [http://www.bonhams.com/auctions/20065/lot/108/]

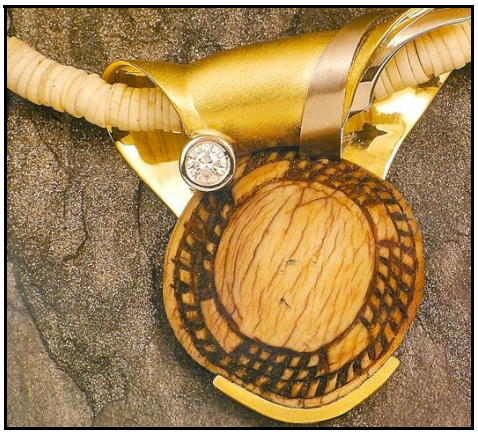


Figure 2.29: *The Ekipa*, 2014. (Source: Hard Stone Processing, 2014) [http://www.namibia-seber-diamonds.com/home/products-services/hsp-products-linked/namibian-sun]

Figure 2.28 shows four *ekipa* that have been auctioned off on international websites. Figure 2.29 shows a mounted *omakipa*, to be sold as a contemporary African piece of jewellery. Producing artefacts is important to convey a message. Investing in a national project that promotes the use of Makalani as a crafting material could convey a strong message about sustainability and raise awareness of the importance of implementing sustainable practices with available natural resources. *Joost Vogtländer, wrote "Artefacts are of crucial importance on the road towards a sustainable society. They not only show that a better world is possible, they often show that consumer preferences, behaviour, and lifestyle can change. Artefacts convey the issue of sustainability in a better way than stories and theories: they send a clear message." (Vogtländer, 2011:8). Ekipa* tell a story of Namibian

culture, its people and their creativity, and by actively planning projects that focus on preserving this traditional craftwork, one is able to buffer against the loss of this national heritage.

2.8 Namibian Context

The increasing harvesting and sourcing of NTFPs within Namibia mean that many more people are aware of the economic potential these products carry. However, as is often the case with other NTFPs, the sourcing is in direct proportion to the market demand. Which could lead to several problems with regards to the impact on the environment. Where tourism is a great contributor towards the country's annual GDP (NDP4, 2012:92-96), crafts have found a niche market.

Frequently, even though cooperatives are established to empower crafts people, their product is often valued more highly than they are. It is here that one sees the need for crafters to be validated by acknowledging not only what they do but also who they are as individuals. When there is a sense of belonging, the work environment becomes a place of improved performance (Adelman, 1993:7-24; Macefield, 2007:145-154). This could facilitate IK being formally recorded and added to the body of knowledge surrounding NTFP in Namibia.

Along with belonging to a larger whole, is the individual's need to create a variety of beautiful objects that will be used and the rest that comes with knowing this can be achieved in a chosen period of time within a pleasant work environment. Crafting a beautiful object is no longer work, as the line that was intended to separate labour from pleasure, blurs (Morris, 2008:23-26).

2.8.1 Namibia - a green economy

The term 'green economy' is defined by Zeidler *et al* (2012:4) as an economy "*that results in improved human well-being, poverty reduction and social equity, while significantly reducing environmental risks and ecological scarcities*".

The United Nations Environment Programme (UNEP) is the driving force behind the initiative of Capacity Building for Biotrade Project (CBBT), wherein three countries, namely Namibia, Nepal and Peru partake. The project is supported by the German Agency for Technical Cooperation (GTZ) and "…*seeks to build national capacities in order to promote the sustainable use and trade of biodiversity-based products, otherwise known as BioTrade*." (UNEP, 2012:1). It is evident that there is more insight needed in order to guide legislation surrounding NTFPs as not all NTFPs have been considered when drafting possible harvesting and processing policies. This is especially true for NTFPs that do not have a direct impact on the economic contribution of tourism. Trees such as the Marula tree and the products generated from it are covered by legislation because of the established contribution it makes towards communities involved and the economy (Millennium Challenge Account Namibia, 2012:5). It is important to look at NTFP products where production has been streamlined and the value

of the product has been added to due to various manufacturing processes. Identifying various stakeholders at each stage is an important step to taken when developing value chains.

While value added chains are necessary for all NTFPs, it is a complex process to generate a generic model that can apply to all natural resources. Each NTFP has different harvesting challenges and an in-depth study of each one is required to better understand the many factors that impact the profitable collection and processing of each raw material (Shackleton, *et al., 2011:3-4).* The challenge to bring harvesters and other smaller resource stewards in the value chain, to a level where they are able to receive a greater share in the retail value of NTFP products remains a complex yet important issue to resolve. Harvesting and processing NTFPs brings with it many risks, especially that of continuing to deplete natural resources; and not addressing the social and economic inequalities that have been associated with these processes in other contexts. (UNEP, 2011:2).
The Natural Resources Institute states the following about trade:

> *"Trade represents a huge opportunity for tackling poverty and generating wealth, and is gaining increasing attention from donors in the form of value chain interventions and 'making markets work for the poor' (MP4). Yet not all of these interventions specifically focus on poor and disadvantaged smallholders who face a range of challenges (structural, organisational, financial, education and information related, market access, land rights, and climate change etc.). Furthermore, they are often not able to capture benefits from trade; they may be excluded from global value chains, or be unable to influence the terms of trade and establish alternative systems. They may face difficulties in participating in local and regional markets for similar reasons."* (NRI, 2014)

This highlights a key issue linked to the trade of NTFPs. If local harvesters are not able to contribute in a more impactful manner on the value chain process of the NTFPs they harvest, then it is inevitable that valuable knowledge will be lost along with the absence of their voice in the matters that impact them most. Shackleton *et al* (2011: 6; 14), addresses the discourse around what constitutes a non-timber forest product and what it is not. Factors that motivate the promotion of using NTFPs as a sustainable resource, such as alleviating poverty and increasing social and environmental stability, are neglected if the only change that harvesters can bring remains on the grassroots level of NTFP collection. If trade with locally produced NTFPs is not able to benefit local harvesters and/or crafters to a greater extent than providing short term economic relief, then trading with these products will not be sustainable in the long term.

2.9 Summary

This chapter looked at the potential non-timber forest products have to be used as a tool to implement sustainable practices within communities that depend on trading with NTFPs for their livelihood. By involving local communities in sustainable practices such as sustainable harvesting methods, the

potential of NTFPs as a vehicle to empower Namibians, is increased. The tagua nut has been effectively used by foundations to engage crafters in Ecuador by providing financial support to crafters, to buy small-scale machinery and tools needed for manufacturing tagua crafts. Namibian vegetable ivory, the Makalani nut, has not yet enjoyed the same amount of investment that the tagua nut has. With the similarities in aesthetic and manufacturing properties, vegetable ivory could be used as a substitute material for creating traditional items like *ekipa*. In order to generate a greater public interest and awareness of the potential harnessed in this natural resource, the Namibian government can align community projects with successful programs such as Pro Pueblo in Ecuador. Explorative research can be conducted with the Makalani nut and the communities that use the nut as a crafting material. Indigenous knowledge can be formally documented in order to inform best practices for the potential research areas. This research takes on an explorative stance in order to gain a better understanding of the Makalani nut as a crafting material. Chapter 3 looks at the structure of the process; in order to gain greater clarity on the approach the researcher took.

CHAPTER THREE
METHODOLOGY

3.1. Introduction

This qualitative research is an ethnographic study with the single case study of a master-crafter within Namibia. The study focuses on and is limited to the crafting material: vegetable ivory in Namibia (referred to as Makalani nut for the purposes of this study). Figure 3.1 below highlights the research questions on the left and the aims of the research on the right.

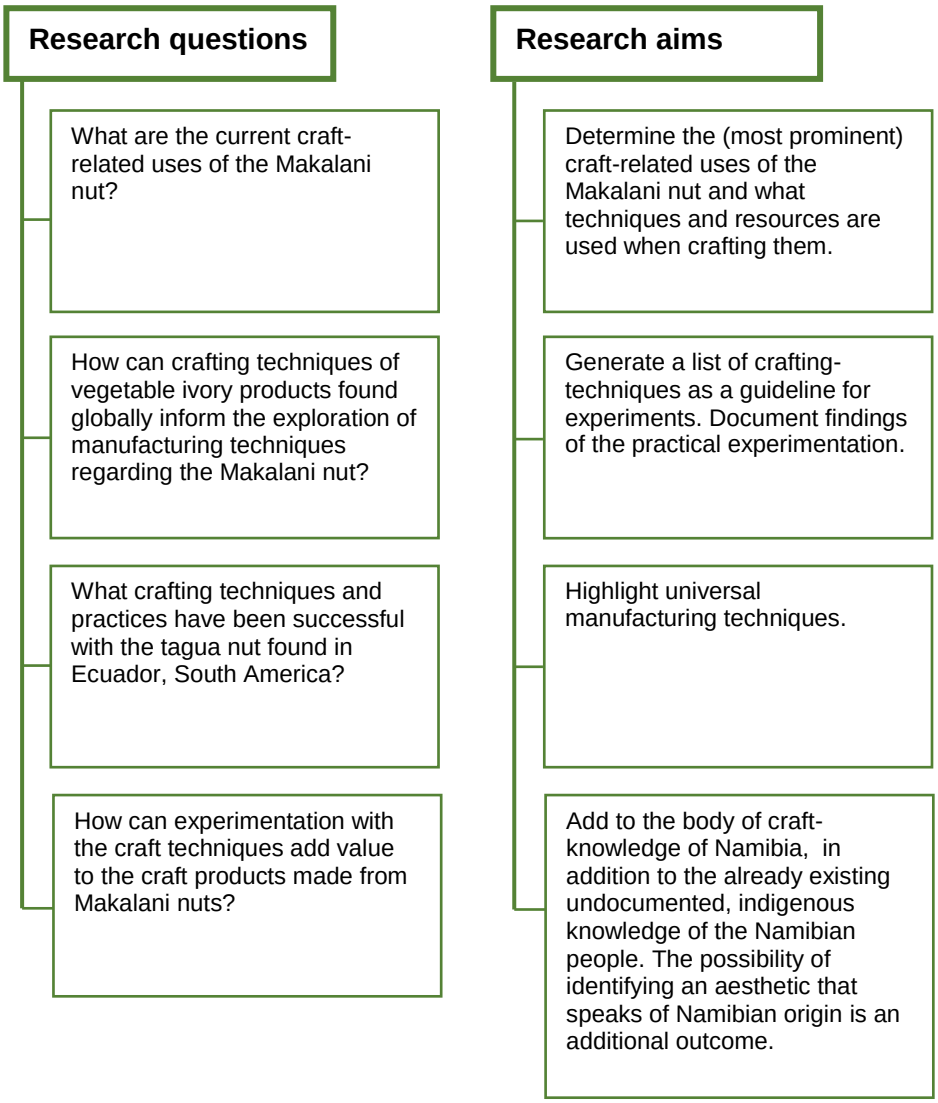


Figure 3.1: Overview of research questions and aims, 2014. (Author's construct)

The single-case study is based on the selected local master-crafter due to his skill and influence within the community of crafters (Chapter one). Mr Erwin.R.≠Eichab is a highly-skilled carver of the Makalani nut as well as a teacher of local craftspeople. This marks him as a rich source of information regarding the uses of the Makalani nut within the framework of craft in Namibia, and so the sampling of one master-crafter was chosen for the single-case study. The research is an explorative case study

that looks at (1) what manufacturing techniques are successfully used on the tagua nut (found in Ecuador), (2) whether and how these techniques can be used on vegetable ivory found in Namibia *and* (3) how the knowledge generated from this study can contribute towards already existing indigenous crafting knowledge (Mariano, 2000:311; Yin, 2009:9-10). This would include the possibility of identifying universal crafting techniques for vegetable ivory and a possible Namibian vegetable ivory aesthetic (Makalani nut) (Zimmerman:2007:493). The single-case study method was selected for this research as it best facilitated the answering of the "*how*" (can other techniques inform) and "*what*" (techniques can inform) questions addressed in the research problem. Vegetable ivory is a sustainable crafting material that falls within the contemporary issue of non-timber forest products and their potential as a renewable resource. NTFPs are perceived as having the potential to address social issues such as unemployment, as well as environmental issues such as finding an alternative for animal ivory (Acosta-Solis, 1948:46; Barfod, 1989:181-190; Barfod, 1990:300; Verdezoto, 2006:12; Yin, 2009:11). The length of the case study spanned across nine months, which included the experimental sessions conducted by the researcher and the master-crafter. The master-crafter and the researcher are both Namibians by birth, which facilitated the building of a foundation of trust and allowed for a less guarded narrative. The interviews were conducted in Afrikaans, one of the official languages of Namibia. The study took place in two separate environments, namely Cape Town, South Africa, and Windhoek, Namibia. The interviews took place in the master-crafter's natural environment at his place of trade at a well-known heritage site in Windhoek, and follow-up conversations were conducted telephonically, with the researcher calling the master-crafter. This well-known heritage site is in the capital of Namibia, Windhoek. Several of the experimental sessions in Namibia, some involving only one party (Single Experimental Session or SES) were also in Windhoek. The experimental sessions that involved both the researcher and the master crafter are referred to as Team Experimental Sessions (TES). The experimental sessions conducted in Cape Town, South Africa, were SES conducted solely by the researcher and informed by the interviews with the master-crafter and data extrapolated from literature. The SES took place in the jewellery department of a tertiary institution in Cape Town, South Africa. The structure, challenges and successes of the experimental sessions are noted and discussed in detail in Chapter FOUR and FIVE of this study. The qualitative nature of this study required detailed capturing of the experimental sessions which included discussions around the quasi-experiments as well as visual documentation of the experiments themselves. Chapter FOUR looks at the experiments in detail where the results of the experimental sessions were documented from various sources such as written notes (and sketches), voice notes, videos and photographs (Denscombe, 2010:3; 101-103).

3.2. Design philosophy: ontological and epistemological stance

This study is grounded in the ontological stance of constructivism and the researcher states her commitment to an epistemological assumption of subjectivism. The researcher believes that knowledge is generated by the interaction between the master-crafter and the investigator (researcher). It is this design philosophy that guides and informs this research (Guba & Lincoln, 1994:105; 111). The research paradigm is a qualitative one and is an ethnographic approach towards unpacking the

manufacturing techniques associated with vegetable ivory. The structure of the experimental sessions result in the necessity of having to engage the crafter, and this creates an environment in which multiple realities are present (Denscombe, 2010:120-123).

3.3. Purpose and aims of the research

3.3.1. Intention (purpose) of the research: what is the research about and why is it important?

The intention of the research is to identify crafting techniques that will enhance the *current* crafting techniques used on the Makalani nut. Generating this knowledge is mainly aimed at the local Namibian crafters, to facilitate the possibility of immediate implementation within their working context. The aim behind broadening the scope of crafting techniques is to explore sustainable methods that have been successfully used on other vegetable ivory species and that could benefit Namibian craft made from the vegetable ivory found locally. The generated list of techniques were tested on the Makalani nut to confirm two speculations: namely, that carving is not the only crafting technique that can be successfully used on Makalani nuts, and that a wider range of techniques will broaden the variety of products made from the Makalani nut.

3.3.2. What the research aimed to achieve

The research looked to explore the incidence of vegetable ivory as a sustainable crafting material in Namibia, and to identify possible sustainable crafting techniques that can be practised by local crafters. This meant that all selected techniques and available resources would need to fall within the framework of sustainability. Thus the study needed to be of an explorative kind, to gather facts about the phenomenon of vegetable ivory within the context of Namibia, and then describe the findings, in order to understand the current state of this under-used natural resource as a crafting material (Denscombe, 2010:11-12).

3.4. Methodology

Methodology not only informs and guides research, but also highlights the strengths of choosing a selected method for studying a specific phenomenon in a specific context (Guba, 2010: 105; 107-108). Robert K. Yin (2009:18) defines a case study as "*... an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident".* This research is an inquiry that investigates the case of a master-crafter of vegetable ivory (the Makalani nut) in Namibia, to understand better the link between this sustainable resource and the phenomenon of its limited use as a crafting material. By using a single case-study as the research methodology, the researcher aims to gain a more profound understanding of the complex conditions that are linked to the master-crafter and his material. The set methods of data collection within a case study include interviews, direct observation (of participant in his natural environment) and documentation. Figure 3.2 below lists the three important decisions that shape the case study.

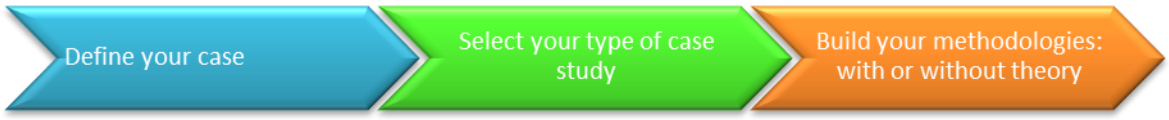


Figure 3.2: Designing your case study: 3 steps to consider (Yin, 2009)

Defining your case study upfront ensures that the data collected, the means used to collect the data and the findings analysed all align with the issues highlighted in the research question(s) and objectives of the research (Yin, 2009:24-27). The logical process presented in the research design outlines a clear progression of moving from what is desired to be known (or explored) to a better understanding of that phenomenon. There are five components in a case study that are crucial in the research design, namely:

- The research question
- Propositions (research questions and aims),
- Unit(s) of analysis
- The logic linking the data to the propositions (research questions and aims)
- Criteria for interpreting the findings (Yin, 2009:27)

Case studies can either be single or multiple, with a holistic approach or an embedded approach. This means that a (single or multiple) case study can have a holistic unit of analysis or multiple embedded units of analyses. Figure 3.3 (Yin 2012:8) below, originally adapted from Yin, 2009, illustrates this visually.

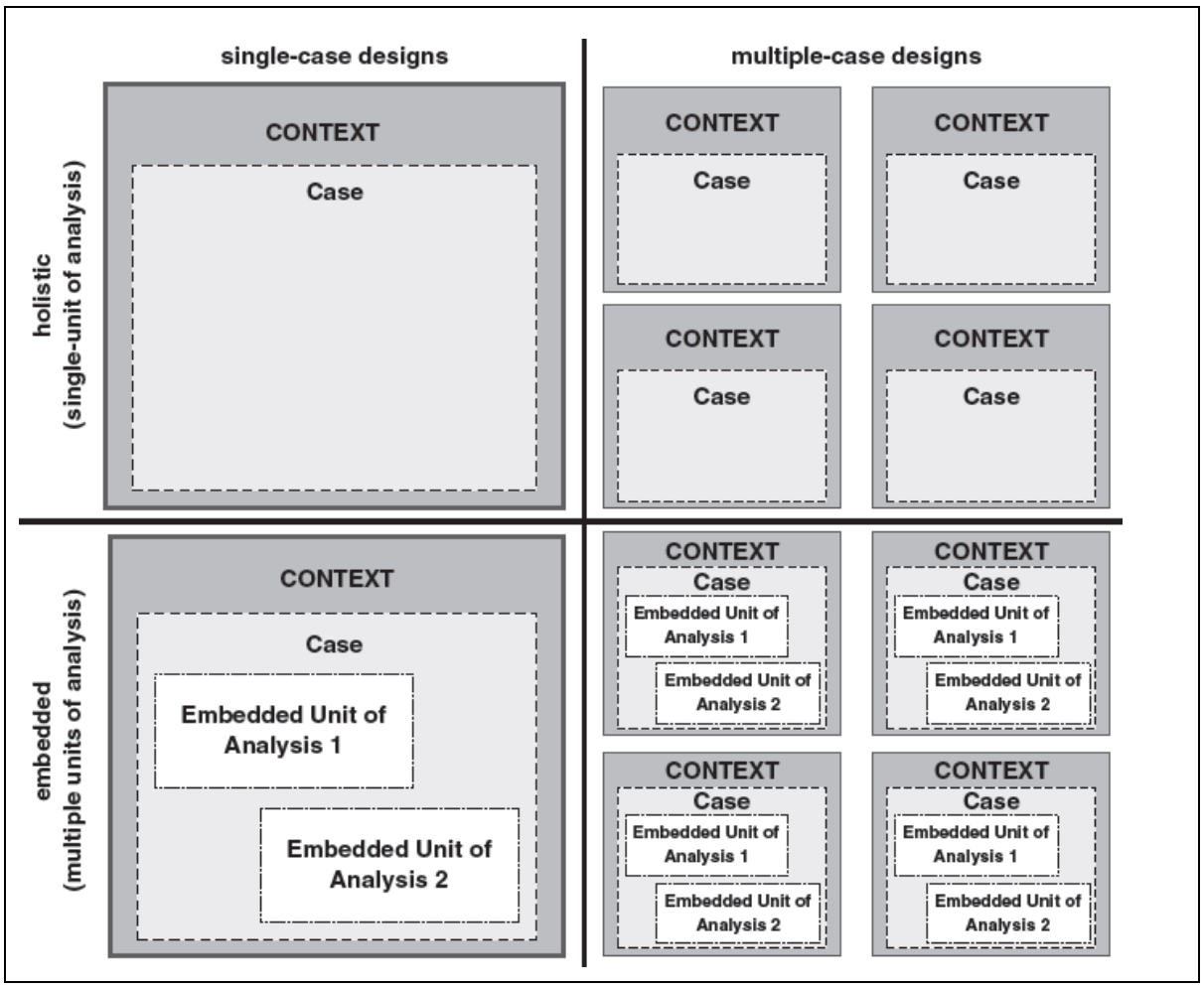


Figure 3.3: Case study approaches: single, multiple, holistic and embedded (Yin, 2012:8)

3.5. Data collection methods

The first stage of the data collection called for an ethnographic approach, which required observing and documenting the current state of crafting for Mr Erwin.R.≠Eichab in his natural environment – at his place of trade. Documenting was done by means of interviews, filming and written notes (Blomberg, 1993:123-155). The method and situated place of data collection are important because Mr Erwin.R.≠Eichab needed to remain at his place of work in order to generate an income.

This requirement suited the study by facilitating the observation of everyday practices (in their usual context) related to the creation of and trading with Makalani nut products. This was to minimise the possibility of distorted results, as Denscombe (2010: 149) states, "*Research that is intrusive and disrupts normality is likely to produce distorted results*." Data collection methods also include episodic interviews which take on a narrative form. This style of interview was chosen in order to generate a free-flow discussion around issues that are important to the crafter and which have an impact on the articles he produces. By keeping the structure of the interview grounded in narrative and posing probing questions around daily practices and challenges, key issues were identified by the direct impact they had on the crafter and the crafting of Makalani nut products. These included challenges faced when manufacturing, such as carving and trading outside in the open with no shelter

from the elements (direct exposure to heat, cold and rain[6]). Safety is also an issue, as often trading in cash leaves the crafters vulnerable to being attacked and robbed of their daily earnings (≠Eichab, 2014b). Episodic interviews enabled the researcher to gain the trust of the master-crafter by developing a platonic relationship that permitted general conversation (not necessarily pertaining to the study), but that also helped to build a foundation for more specific (and sensitive) questions to be asked at a later stage. An example of a sensitive question would be one related to the specifics of income generation (Denscombe, 2010:156). The interviews were structured around open-ended questions that explored the crafter's crafting background and suited the explorative nature of the study in terms of trying to understand the crafting process of the Makalani nut from a holistic perspective.

3.6. Data analysis

Triangulation was used as the chosen method of data analysis. This method best suited the research process as explained in Uwe Flick's published work, *Introducing Research Methodology: A Beginner's Guide to Doing a Research Project*. He writes that "*Triangulation of data combines data drawn from different sources and at different times, in different places or from different people*" (Flick, 2011:186). Triangulation is a means of ensuring the validity of findings within the research as each source, whether it is data generated from episodic interviews, practical experiments or compiled from literature, is treated equally and compared to other sources. An inductive method of coding was used, grouping findings into various experimental sessions linked to manufacturing processes. The unit of analysis used was Mr Erwin.R≠Eichab. Chapter FIVE looks at the analysis of the findings and introduces reflections on the entire process of the research design and its unfolding.

3.7. Assumptions

The researcher assumes that the Makalani nut is currently underused as a natural crafting material in Namibia. This assumption is based on the fact that vegetable ivory found in Ecuador has been successfully used in several ways to produce a variety of products. Through documentation of the Makalani nut crafted products sold in Namibia, it was observed that the current use of the nut is limited to carved products. The extent of use of the tagua nut in Ecuador serves as an example of the potential which vegetable ivory has as a crafting material (Barfod, 1989:181).Vegetable ivory is classified a non-timber forest product and is, therefore, a sustainable resource if managed in a sustainable manner. The non-destructive extraction-method of vegetable ivory, along with its similarity in colour and ability to be carved, present it as a possible alternative to real ivory (Barfod, 1989:189; Verdezoto, 2006:12).

3.8. Limitations of the study

3.8.1. Limitations of context

The time frame of the practical experimentation was limited to two months in total, but was split up into shorter intervals, due to the fact that the study was taking place in two countries.

[6] Namibia's climate is generally hot with temperatures in the interior often exceeding 40 degrees Celsius and the rainy season falling between the months of November and April (Namibia Tourism Board, 2013).

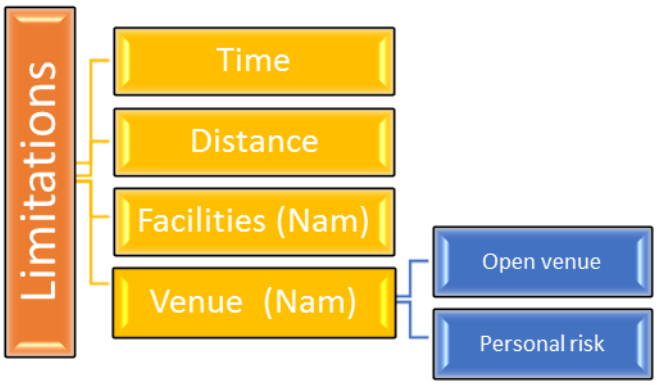


Figure 3.4: Overview of limitations of study, 2014. (Author's construct)

The researcher is currently based in Cape Town, South Africa and the master crafter is currently based in Windhoek, Namibia. The factor of distance meant structuring the experimental sessions in a manner that facilitated individual contribution sessions with the Makalani nut as well as group contribution sessions. Certain crafting techniques required machinery that is currently only available in established workshops of training institutions. Due to teaching schedules, the workshops were available only for a limited time in which to experiment. Great care was taken to document the practical experimentation (experimental sessions) with the Makalani nut (by means of written notes, photographs and video recordings). However, some experimental sessions took place in Windhoek with only the master-crafter present. This created a challenge in terms of observing and documenting the process of the practical experiments in real time. The researcher instructed the crafter to take note of the key points when conducting the practical experiments, so that he could discuss them when she was present. The data collected from each experiment (session) were discussed when the researcher was present in Windhoek, Namibia. In this way the experiments had a structure to guide the process but also allowed for unplanned findings to be documented. Findings emanating from the single sessions, conducted both in Windhoek and Cape Town, were recorded in written notes and discussed in person and telephonically. The researcher documented the process *and* findings from the Single Experimental Sessions conducted in Cape Town, South Africa (Chapter FOUR) on her own. The Team Experimental Sessions' process and findings were also documented by the researcher, as she felt that she was more able to accurately document the processes and findings of the experiments than Erwin would have been able. These processes are discussed in greater detail in Chapter FOUR. The process and end products are documented at various stages in order to generate a chronological order of process development (Blomberg, 1993:123-155).

No actual experimentation with the tagua nut was done by the researcher or the master-crafter. All information relating to the manufacturing techniques of tagua was sourced from journals, books, websites and videos (YouTube). The time and financial constraints did not allow the researcher to travel to Ecuador. The data needed to generate a list of manufacturing techniques could be easily found in literature (journal articles), on websites (online) and from videos documenting various tagua

crafting techniques (YouTube). The researcher created a playlist for ease of future access and to create a virtual cabinet in which to group the selected videos. The videos and journal articles were selected based on their relevance to identifying successful crafting techniques that could be duplicated in experimental sessions. In a set number of workshops (eight), collaborative manufacturing using Makalani nuts took place between Mr Erwin.R.≠Eichab and the researcher. Manufacturing techniques used on the tagua nut were tested on Makalani nuts in various experiments that included shaping, colouring (dyeing), finishes (sanding), relief carving, shaping on a lathe and polishing. Manufacturing also included several jewellery making techniques (burring, cutting, filing). Processes and techniques were refined according to the results of each previous set experiment.

3.8.2. Personal risk to the researcher

Within qualitative research, the researcher becomes a resource in the study. The researcher, as a research tool, is easily overlooked, and so often there is an increase in personal risk. Safety is an important issue to consider when conducting social research. The researcher mostly worked alone when collecting data in Cape Town, South Africa. However in Windhoek, Namibia, collecting data required the researcher to meet Mr Erwin.R.≠Eichab at a national heritage site where he trades his products. The risk of harm was very high in the beginning stages of the study, as no relationship had been forged with any of the crafters at the heritage site. By ensuring that initial contact with crafters was established during the day, in the hours when the heritage site experienced the most (tourist) traffic, the risk to the researcher was reduced (Denscombe, 2010:55). The researcher travelled between Cape Town, South Africa and Windhoek, Namibia, by car to conduct experimental sessions in Namibia with Mr Erwin.R.≠Eichab. The cost and time involved in travelling limited the actual time frame for experimentation to two months (within the nine months of data collection of the study) (Denscombe, 2010:50-51;55).

3.9. Summary

This chapter includes the structure of the research design, which reveals the researcher's ontological and epistemological stance, namely that of constructivist-interpretivism, upon embarking on this research. The study is explorative and qualitative in approach. The conceptual framework for the research is participatory action research (PAR) with the methodology anchored in a single case study (of a master-crafter) (Yin, 2009:17-18). Data collecting methods include direct observation, episodic interviews grounded in the narrative and recording of data (written notes and video, as well as audio recordings) generated in the experimental sessions. There are embedded multiple units of analysis by which the single case study will be analysed. Triangulation of data will also be used as a method of ensuring validity of the findings of this study. Chapter FOUR will describe the detailed findings of the experimental sessions mentioned in this chapter. The single contribution sessions (conducted in Windhoek, Namibia, and Cape Town, South Africa) and group contribution sessions (conducted in Windhoek, Namibia) will be included in Chapter FOUR. All selected techniques were screened through the lens of sustainability (i.e. would the crafters be able to sustainably reproduce the

techniques in their natural environment and in their own capacity). This is done with the intention of creating a relevant outcome of data that can be linked back to the problem statement in order to satisfy the questions held within it. The successes and challenges of the experimental process are discussed in the analysis of the findings (Chapter FIVE). The limitations of the study are also factored into the reflection on the experimental process. Mr Erwin.R.≠Eichab and the researcher have both gained new knowledge through participating in the experimental sessions and the discussions generated by the process of the experimental sessions (quasi-experiments). By structuring the research according to the guidelines of case study methodology, the researcher was able to gain a rich, and in-depth understanding of the Makalani nut and its role in various contexts. The possibility of using the research findings as a starting point to build a business case for Mr E.R.≠Eichab is briefly discussed in Chapter SIX. The knowledge generated in the research can be used to inform the products he makes and will allow him to broaden the variety of crafted Makalani products which he sells. This can serve as an added advantage when selling his crafts to institutions that subscribe to supporting local crafts in that the crafter would be the main decision-maker of how his/her craft is sold. This includes developing an appropriate selling price for handmade Makalani nut products.

CHAPTER FOUR
FINDINGS

4.1 Introduction

This chapter documents the experimental sessions that took place in Windhoek, Namibia, and Cape Town, South Africa. The sessions include a blend of practical experimentation as well as unstructured interviews based on the manufacturing techniques that were tested and the results achieved. Chapter FOUR opens with a table summarising the research aims and the practice followed in each of the six experimental sessions.

4.2 Research aims

The aims of the research were approached methodically. The first step was to identify and document the manufacturing techniques currently used by Namibian crafters to produce Makalani nut market goods. Consulting existing literature and video documentation to identify crafting techniques used on other varieties of vegetable ivory, helped to achieve the second research aim: Establishing a list of crafting techniques to guide the practical experimentation with the Makalani nut. These techniques included dyeing, shaping (burring, slicing, filing) and experimentation with various finishes. The practical sessions were set up as quasi-experiments. The findings helped highlight similarities and differences between the Makalani nut and the tagua nut, when viewed through the lens of crafting techniques. Once the similarities in results were identified it was possible to address the last two aims of the research: namely, to identify universal crafting techniques for vegetable ivory and to develop an aesthetic that identifies the Makalani nut with Namibia. All the findings of the experimental sessions would then feed into the final overarching aim, which is to contribute towards the already existing body of crafting-knowledge in Namibia. Figure 4.1 illustrates the research process followed and how each step fed into the main stream of contribution towards existing crafting knowledge in Namibia.

Figure 4.1: Summary of research aims (Author's construct)

4.3.1 Experimental Sessions

Each session follows a basic structure which includes method(s) used and results. Reflections and recommendations will be offered in Chapter FIVE. In this chapter, the researcher aims to give a concise and informative description of each experimental session. The description of each session will include some images to give the reader a clearer idea of what was documented, as well as an abbreviated table, documenting the detail of the quasi-experiments. The full experiment log (tables) and images can be found in the appendices section (see Appendices).

The researcher chose to use continuity of colour between the various findings achieved in the experimental sessions to create context and relevance, and to anchor the findings in the aims of the study. Table 4.1 has a red band along the left side, indicating that all sessions contribute towards existing crafting knowledge in Namibia. The smaller bands of colour are designed so that each research aim in Table 4.1 speaks to the research aims in Figure 4.1 above. There are experimental sessions that contribute to more than one aim, and so two or more bands of colour can be allocated to one session in Table 4.1.

The experimental sessions were made up of two legs, namely Single Experimental Sessions (SES) and Team Experimental Sessions (TES). The single experimental sessions involved either the researcher **or** the master crafter engaging in a manufacturing technique. The experimental sessions that were conducted as a team involved both the researcher (M.van Wyk) **and** the master crafter (E.R.≠Eichab). The sessions were structured to address the key aims of the research. These research aims will be referred to throughout this body of work so as to align continually the findings, discussions and conclusions. These research aims are as follows:

Table 4.1: Relevance of research aims to experimental sessions (Author's construct)

Experimental sessions	Research aim	Research activities
Experimental Session 1	**Determine the (most prominent) craft-related uses of the Makalani nut and what techniques and resources are used when crafting them.**	**Carving plain nuts – observation and learning of Makalani carving technique. Unstructured interview with crafter (van Wyk, M. & ≠Eichab, E.R. 2014a)**
Experimental Session 2	**Generate a list of crafting-techniques.**	**Dyeing nuts with food colouring and natural (vegetable) pigments. Dyeing nuts with leather dyes (violet, green, yellow)**
Experimental Session 3	**Document findings of the practical experimentation.**	**Shaping and polishing of nut in Jewellery workshop (CPUT)**
Experimental Session 4	**Highlight universal manufacturing techniques.**	**Turning nuts on lathe (vocational training centre)**
Experimental Session 5		**Carving (turned) Makalani nuts dyed with leather-dyes.**
Experimental Session 6	**Explore possibility of identifying a Namibian aesthetic in Makalani nuts.**	**Dyeing and carving Makalani nuts dyed with *Otjize*. Reflect on all techniques and discuss the process of each. This would include evaluating the feasibility of using the technique in everyday crafting (van Wyk & ≠Eichab, 2014b).**
Experimental Session 1 -6	**Add to the body of craft-knowledge of Namibia in addition to the already existing undocumented, indigenous knowledge of the Namibian**	

4.3.2 Value Chains

Michael Porter defines a value chain as, "*a collection of activities that are performed to design, produce, market and deliver [a firm's] product*" (Porter, 2001:50). Value chains will vary depending on the article produced, the location of distribution and the buyers. There are two main activity streams within a value chain, namely Primary activities and Support activities (Porter, 2001: 51, 53). Considering that value is "*the amount buyers are willing to pay for what a firm provides them*"

(Porter, 2001:51), there is therefore a difference between the value of a product and the cost of a product. The aim of any business would be to generate enough profit from the value which the client is persuaded to see in the product, in order to cover the cost of creating that value (Porter, 2001:52). Primary activities are linked to the actual process of creating the product, where support activities would entail all the activities that support the primary activities. The manner in which a value activity is performed will contribute towards the value of a product. Sustainable practices are an example of how a chosen method of production can add value to the product being made no matter the cost of the raw material. Monique Péan jewellery is an example of the consideration given to sourced materials. Miss Péan uses only recycled gold and platinum along with conflict free stones to craft her jewels (www.moniquepean.com, 2014). Figure 4.2 summarises the activities that make up primary activities.

Figure 4.2: Primary contributing activities in a value chain (Porter, 2011:53-54)

4.3.3 Vegetable ivory value chains

Although records of Makalani products and their value chain are limited in existing literature, literature published on the harvesting and processing of the tagua nut offers a clearer picture of what a possible vegetable ivory value chain would look like. Taking into account where and how the palm nut is sourced, as well as the steps needed to take it from its beginning stage (being inside the endocarp) to the final craft product, it is possible to develop a value chain model that considers the needs of the people *and* the processes involved in crafting this non-timber forest product. By assessing the key areas in value chains that have been developed for other NTFPs, one is able to formulate a value chain that could be adapted for the Makalani seed. Figure 4.3 below is adapted from Kronborg et al.

(2008:108). It shows what a possible value chain for Makalani seeds could look like and is a simplified and adapted version of Porter's generic value chain (Porter, 2001:52). Harvesters and crafters are often the same link in the value chain, as individuals who harvest the fruits will make wine from the mesocarp and then carve the nut. However, as the Makalani nut gains popularity as an income generating resource, women have begun selling bags of nuts to crafters based in Windhoek, the capital city of Namibia.

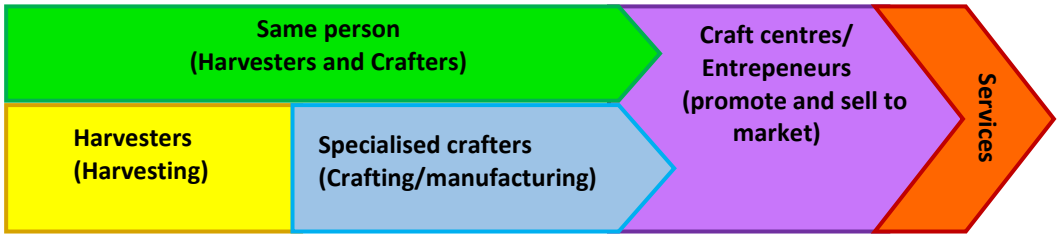


Figure 4.3: Proposed value chain of Makalani nut adapted from Kronborg et al., 2008:108

Migration from rural areas to cities means that crafters are based in urban areas and would need to travel to harvest the Makalani palm fruits and/or nuts. The Oshiwambo women traders selling beads and traditional dresses (*Ondelela*), trade in Windhoek and sell the dried Makalani palm fruit and/or nuts to crafters as an additional source of income. The fruit are gathered in the fields surrounding their home villages and those of their neighbouring communities and those of other community members (van Wyk & ≠Eichab, 2014a).

The tagua nut and Makalani nut have several qualities in common, including internal ivory-coloured flesh and hardness which make for an ideal carving material. The differences include the size of the nuts and the quantity of seeds in each fruit. The tagua nut does not always have a hollow cavity at its centre, and solid nuts are what contribute to the demand for it as a carving material. The Makalani nut always has a hollow cavity; it is only the size and shape of the cavity that vary. Both nuts start off as a soft, edible flesh and harden with time and due to dehydration of the flesh. The solidification of the flesh means an increased density and weight. The increased weight of the nut is a factor to be taken into consideration when transporting the nuts en masse, especially so in the case of the tagua nut. Despite the smaller differences in the variety of vegetable ivory, the factor that remains constant in all species is their ability to be carved.

The tagua nut is much larger than the Makalani nut, and several seeds are found in one tagua fruit as opposed to the Makalani fruit that only has one seed per fruit. Table 4.2 below gives a general summary of the differences between the two varieties of vegetable ivory.

Table 4.2: Brief overview of tagua and Makalani nut (Author's construct)

VEGETABLE IVORY:	TAGUA	MAKALANI
BROWN EXTERIOR	√	√
FOUND LOCALLY	√	√
MOTIFS/ AESTHETIC	LOCAL	LOCAL
PRODUCTS (CURRENT)	JEWELLERY. BUTTONS. CARVED STATUES. CHESS PIECES	KEY RINGS. SERVIETTE RINGS
SIZE: (WIDTH x HEIGHT)	30-60mm X 57mm	30-40mm X 25mm
SOFTENS WHEN MOISTENED	√	√
SUSTAINABLE HARVESTING	√	√
TECHNIQUES	CARVED. DYED. TURNED. POLISHED. INLAYS. MIXED MATERIALS	CARVED. MIXED MATERIALS
VERY HARD	√	√
WHITE/IVORY COLOURED FLESH	√	√
SEEDS PER FRUIT	6	1

The tagua and Makalani nuts have similar physical properties such as colour and porosity (i.e. ability to absorb water). However, upon closer inspection one sees that each nut has specific qualities that are skilfully exploited by the crafters who use them to create products. We see in Table 4.2 that the tagua nut has an average size of 30mm – 60mm x 57mm, while the average Makalani nut is 30mm – 40mm x 25mm. The larger size allows for larger objects to be created from one nut but would mean using other techniques to change the size in order to make a product, such as a key ring, for example. In Table 4.3 below, we see that the average Makalani nut is round and hollow, and smaller in size (see Table 4.2), making it more suited to being crafted into a key ring with minimal adjustments to the actual nut (i.e. shape). This means minimal tools are required to produce a key ring. If one had to produce a key ring from an average-sized tagua nut, the size and solid interior (see Table 4.3) would make for a very large and heavy key ring, even when using a smaller sized nut. A crafter would need tools to change the shape of the nut into something smaller and more suited to the realistic size and/or weight of a key ring.

Table 4.3: Brief overview of tagua and Makalani nut (Author's construct)

	Tagua	Makalani
Hardness	Vegetable ivory (*Phytelephas aqequatorialis* variety) is remarkably dense, with a rating of roughly 2.5 on the scale of mineral hardness. [Compare this rating with 3.5 for a copper penny and 10 for a diamond] Ivory-nuts can be polished in a stone tumbler, as you would polish agates and quartz, or by using tin oxide and a buffing wheel (Armstrong, 2010).	Vegetable ivory (*Hyphaene petersiana* variety) is hard to the touch but is easily shaped by mechanical techniques such as filing, piercing (cutting/slicing with a saw-blade), burring and sanding (2014, SES 3). The nut softens slightly when immersed in water, showing that it is porous.
Size and Shape	Large size and flattened sides add to ease of manufacturing. Sides are slightly faceted due to pressure of seeds growing in the same pod, side by side Two sought after qualities for manufacturing: large seed size and solid nut/endosperm (Barfod, 1989:184)	Flattened base, rounded shape. Nuts are generally spherical in shape but range from round to oval shapes. Smaller nuts, spherical-shape, hollow cavity on inside of nut. Small seed size limits the possibility of crafting (Barfod, 1989:184)
Production	Production does not take place on plantations (Barfod, 1989:184)	Makalani nuts are crafted both in the rural areas where the palms grow as well as in urban areas.
Harvesting	Palms are easily accessible in their natural environments. Nuts are harvested from their natural habitat. (Barfod,1989:184)	Fruit are harvested by locals from wherever the Hyphaene petersiana palm grows. Palms grow in rural areas, and locals collect fruit that fall to the ground. (van Wyk & ≠Eichab, 2014b)
Transporting	Due to the size of the fruits of the tagua palm, transporting the nuts back from where they were harvested often presents a problem. The density of the nut means they are fairly heavy in large numbers.	Most Makalani fruits are transported as dried fruits. This makes them lighter to carry compared to when they are green and have higher water content. (van Wyk & ≠Eichab, 2014b)
External appearance	Two colour varieties: - Tagua rubia [red nut] - harvested when the fruit is immature and by burying it in ground. - Tagua negra nut [black nut] – (Barfod et al, 1990)	Fruits are green and are dried to store. When green, the nut is white and soft and contains a watery, semi-transparent fluid. The watery substance can be consumed (van Wyk & ≠Eichab, 2014:September)

4.4 Experimental sessions: sessions 1-6

4.4.1 Session 1: observation and interview (original carving technique)

Session 1:	**Unstructured interview with Erwin.R.≠Eichab.**
Aim:	Establish current use of and crafting techniques used on Makalani nut
Method:	Episodic interview while filming carving process – observation and learning about removing the nut from the outer husk to skilfully carving the superficial brown layer to reveal the ivory-coloured flesh
Location:	Erwin.R.≠Eichab's place of trade (Windhoek, Namibia)
Participants:	Master crafter (E.R.≠Eichab) and researcher (M.van Wyk)
Background information:	First interview with crafter after having introduced the research idea to E.R.≠Eichab. Ethics protocol was followed by acquiring participant's consent.

Nuts are harvested from the Makalani fruit in the traditional crafter's way: The dried Makalani fruit is eaten and reveals the seed which is covered by a hard outer husk. The collected (Makalani) fruit are cracked open, using a hammer and hacksaw to extract the nut from the hard covering. One has to use a (hack) saw and hammer if one intends to break the hard outer shell (van Wyk & ≠Eichab, 2014). The nut is covered in a superficial dark brown layer known as the seed coat. Several nuts are then knotted inside a plastic bag which contains some water. The nuts are (usually) left overnight to soak, leaving the brown seed coat in a softened state. The softened seed coat is then scraped off using a pair of scissors. The removal of this layer reveals an ivory coloured nut covered by a thin brown skin. Once this skin has dried, the crafters sketch on it with a black ballpoint pen. The sketches (designs) are determined by two factors: the shape and size of the nut, as well as the market preference. This means that many of the Makalani nuts found in Namibia have pictures of wildlife carved on them, due to the preference of the tourists.

Figure 4.1*: Makalani fruit and carved seed (van Wyk, 2014)*

Once the nut is dry, the skin has a matte finish with an uneven surface. The crafters sketch around the nut, using the entire surface as a blank canvas. The black ink from the ballpoint pen adheres to the

brown skin because of the porosity of the nut. A scalpel blade is mounted onto a small stick by cutting a groove at the top of the stick and wrapping a plastic bag around the back of the blade and then securing it in a slit at the end of the stick. The plastic bag keeps the blade in place by allowing some movement and flexibility. The wrapped plastic bag also creates an area for a solid grip, as well as the freedom to adjust or replace the scalpel blade if necessary. Sticks are preferred due to their low cost (can be sourced from surrounding environment at any time), availability (i.e. freely available, therefore, easily replaced), and can be adjusted in length to accommodate any hand size. Two to three 'blank bands' of brown skin are left uncarved on the nut. These blank bands allow the nut to be customised for a buyer. This personalisation increases the value of the product. This is one of the primary activities as stated under "*Services*" in Figure 4.3. A blank band can be carved into a name, dates or simply removed if no personalisation is desired. The most popular design for the nuts sold in Namibia is that of wildlife and some indigenous flora. The *Hyphaene petersiana* palm (Makalani palm) is often found on carved nuts. The selection of animals can be tweaked to accommodate preference: if a customer would like a nut with only giraffes, as opposed to a combination of various animals, this is possible depending on the drawing skills the crafter. This service of customisation again adds to the overall value of the product which in turn allows for an increase in the trading price of the nut.

4.4.2 Session 2: dyeing (food colouring, vegetable dyes and natural leather dye)

Singular Experimental Session (SES) 2 included experiments conducted by the researcher in two separate locations, namely in Windhoek, Namibia, and Cape Town, South Africa. In this session the reaction of the Makalani nut to various forms of natural dyes was examined. The researcher intentionally excluded dyeing the Makalani nuts with *Otjize* dye as she felt it important to conduct this experiment with the master crafter. Due to clashing schedules, a session in which *Otjize* dye was used could be done only in September 2014. This is documented in TES 6.

Session 2:	**Dyeing nuts with food colouring and natural pigments from vegetables [beetroot, broccoli, *Ekaka*[7]]** **Dyeing nuts with natural leather dyes.**
Aim:	Generate list of crafting techniques and test colouring with readily available dye materials to be applied to Makalani nut.
Method:	Manufacturing techniques were identified in existing literature. Dyeing nut flesh (with easily accessible dyes) was identified as a possible manufacturing technique. Natural dyes for leather: Following advice gathered in an interview with a dye specialist from a well-established leather factory (where leather is dyed using natural dyes) in Namibia, a process was chosen in which powder dye was dissolved to lukewarm water.
Location:	Researcher's home (Windhoek, Namibia) and Jewellery workshop (Cape Town, South Africa)
Participants:	Researcher (M.van Wyk)
Background information:	Dyeing has been particularly successful when changing the natural aesthetic of the tagua nut. No records of dyeing Makalani nuts have been formally documented. Natural leather dyes have been successfully used to dye leather products of a high quality. Dyes are known for their vibrancy in colour and ability to adhere to the blank (material/ object).

[7] *Ekaka* is the Oshiwambo name for [traditional] spinach

Table 4.4: SES 2_summary of Appendix A: Dyed nut (food colouring, vegetables & natural leather dyes)

SINGULAR EXPERIMENTAL SESSION 2	16 JULY 2014 09:30 – 11:30 (food colouring) 28 AUGUST 2014 10:15 – 11:40 (vegetable) 11 SEPTEMBER 2015 20:00 – 21:00 (organic natural leather dyes)
TECHNIQUE(S)	FINDINGS/ NOTES/ OBSERVATIONS/ THOUGHTS
Sanding nut to remove outer brown skin	• Brown skin of nut is removed by means of sanding in order to expose the ivory-coloured flesh. This is intended to facilitate absorption of colour.
Boil nut in warm prepared solution of tap water, salt and food colouring (red, yellow, blue)	• A solution of 500ml cold water, a teaspoon of salt and three teaspoons of food colouring was prepared. • Prepared nut was placed in the solution and was warmed on stove. • This was done for three different nuts, to test three different colours: blue, red and yellow.
Boil nut in 500ml water only	• Nut was placed in 500ml water and a teaspoon of salt was added. Liquid was brought to the boil. • Water turned brown from the pigment in the nut's brown skin. Nut did not absorb brown water.
Boil halved Makalani nut with fresh vegetables in salt water: beetroot	• 109.58g of fresh beetroot bulb sliced and placed in 500ml salty water. • Liquid is brought to the boil. High heat setting (6). • ½ nut – carved with elephant motifs – dry weight:10.26g • After 15 minutes of boiling, water colour is a deep red. • ½ nut inserted into red solution and boiled for 5 minutes. Superficial colouring takes places. • Exposed ivory flesh turns slightly red. Inside of nut seems more receptive to absorbing the colour. • Deeper red colour visible on exposed ivory areas. • Colour appears darker/ more intense when wet. Exposed ivory coloured flesh looks pink once the liquid air-dries on it.
Boil fresh vegetables to create pigment infused water: broccoli	• 158.83g of fresh broccoli cut up and placed in 500ml of cold, salty water. • Liquid brought to boil to encourage release of pigment from broccoli. Closed lid of dish to retain water (level). Very light green, not enough pigment in water • No reason to place nut in solution. No effect regarding colour. Only softens outer layer of nut.
Boil half-sanded Makalani nut with fresh vegetables in salt water: *Ekaka*	• Half of nut is sanded with a rough grit sandpaper (400) to remove brown skin. Half of nut is exposed: ivory-coloured flesh is showing with matte surface. • 100ml of cold water was brought to boil with one dry cake (100g) of *Ekaka*. • Water turns brown/dull green colour after 15-20minutes of boiling. • After 30minutes of immersion in hot solution: water is darker in colour, semi-transparent. Nut is softer but exposed half is still ivory in colour. • Nut is dried off and no pigmentation has taken place.
Dyeing nuts using natural dyes for leather	• Colour powdered dye were dissolved to lukewarm water. • A small amount of dye was sufficient (less than a pinch or ¼ teaspoon) per 250ml water. • Prepared nuts were placed into the solution and monitored for 20minutes, with check points of 5 minute intervals • This was tested and documented with photographs and note taking.

The successful absorption of red food colouring into the ivory–coloured flesh is shown below, in Figure 4.2. The red pigment has been absorbed only into the outer exposed flesh of the nut. The red colour cannot be wiped off the nut but can, however, be removed with minimal mechanical force such as sanding or a light stroke from a smooth file.

Figure 4.2: van Wyk, 2014. *SE Session 2_Dyeing nut with food colouring (red)*
1.) Brown skin of nut has absorbed red pigment from solution (2.) Exposed ivory-coloured flesh on base absorbs red pigment well (3.) Shallow absorption of red colouring– one stroke off the surface of the nut exposed the ivory-coloured skin.

Figure 4.3 shows a Makalani nut that has been dyed bright yellow using food colouring as a pigment. The nut appeared a deeper egg-yellow when wet but when dry, revealed a much brighter shade of yellow. The brown skin left on the nut, also absorbed the yellow colouring but due to the fairly dark tone of the brown, careful study of the brown skin is needed to properly note any change in colour. The colour change of the nut dyed with blue food colouring is clearly visible both on the ivory coloured (exposed flesh) and the remaining brown skin. This can be seen in Figure 4.4. The same process was followed in terms of preparation. Despite the intensity of the colour when dyeing the nuts with food colouring, the absorption of the colour remains superficial with regards to the depth of penetration. The colour absorbs easily into the exposed flesh but despite being left in the colour solution for an hour, the level of absorption appears exactly the same as that of being immersed in the colour solution for 15 minutes. Colouring results are permanent and no colour is given off once the nut has dried.

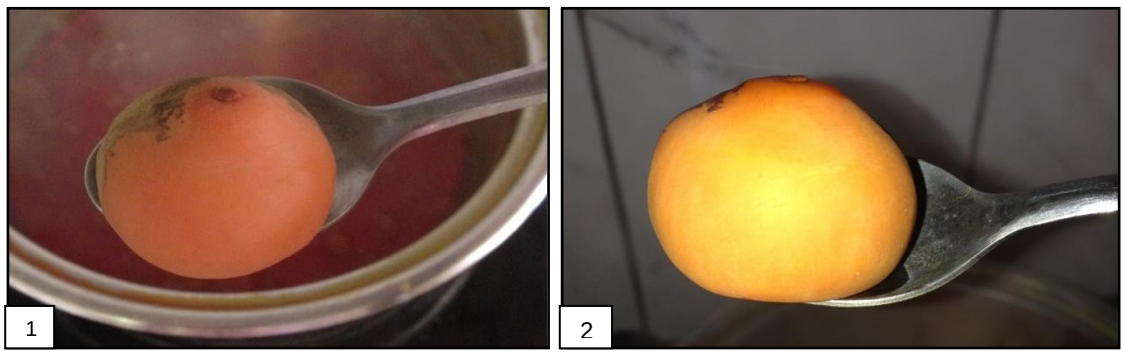


Figure 4.2: van Wyk, 2014. *SES 2_Dyeing nut (yellow food colouring)*

1.) Wet nut: boiled in solution (water, yellow food colouring, salt) (2.) Nut boiled in yellow solution: after drying with a cloth, nut still damp and colour appears brighter.

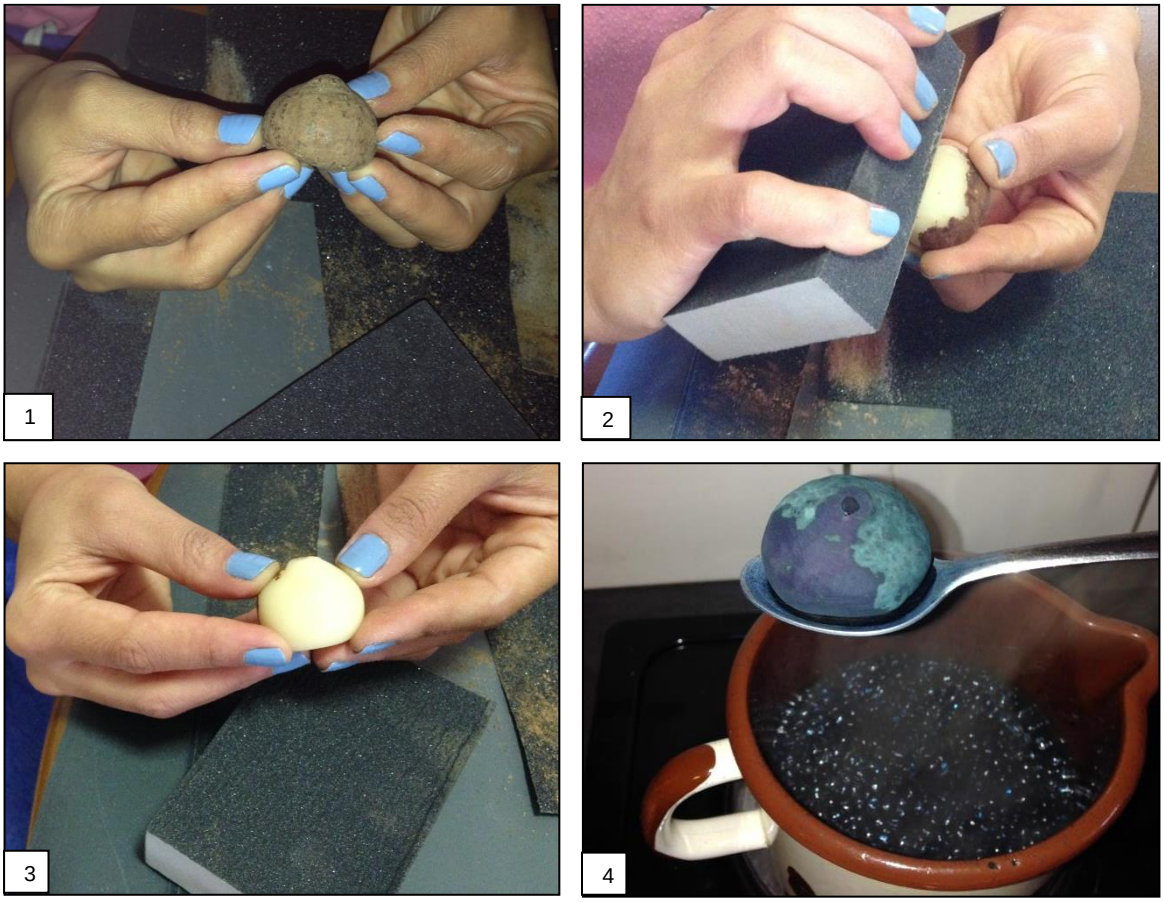


Figure 4.4: van Wyk, 2014. ***SES 2_Dyeing nut with food colouring (blue)***

1.) Whole Makalani nut with brown skin (2.) Using a 360grit sanding block, the brown skin is removed (3.) Makalani nut with ivory-coloured flesh exposed. Partial areas covered in skin (4.) Nut has absorbed blue food colouring in exposed areas. Brown skin has also absorbed colouring.

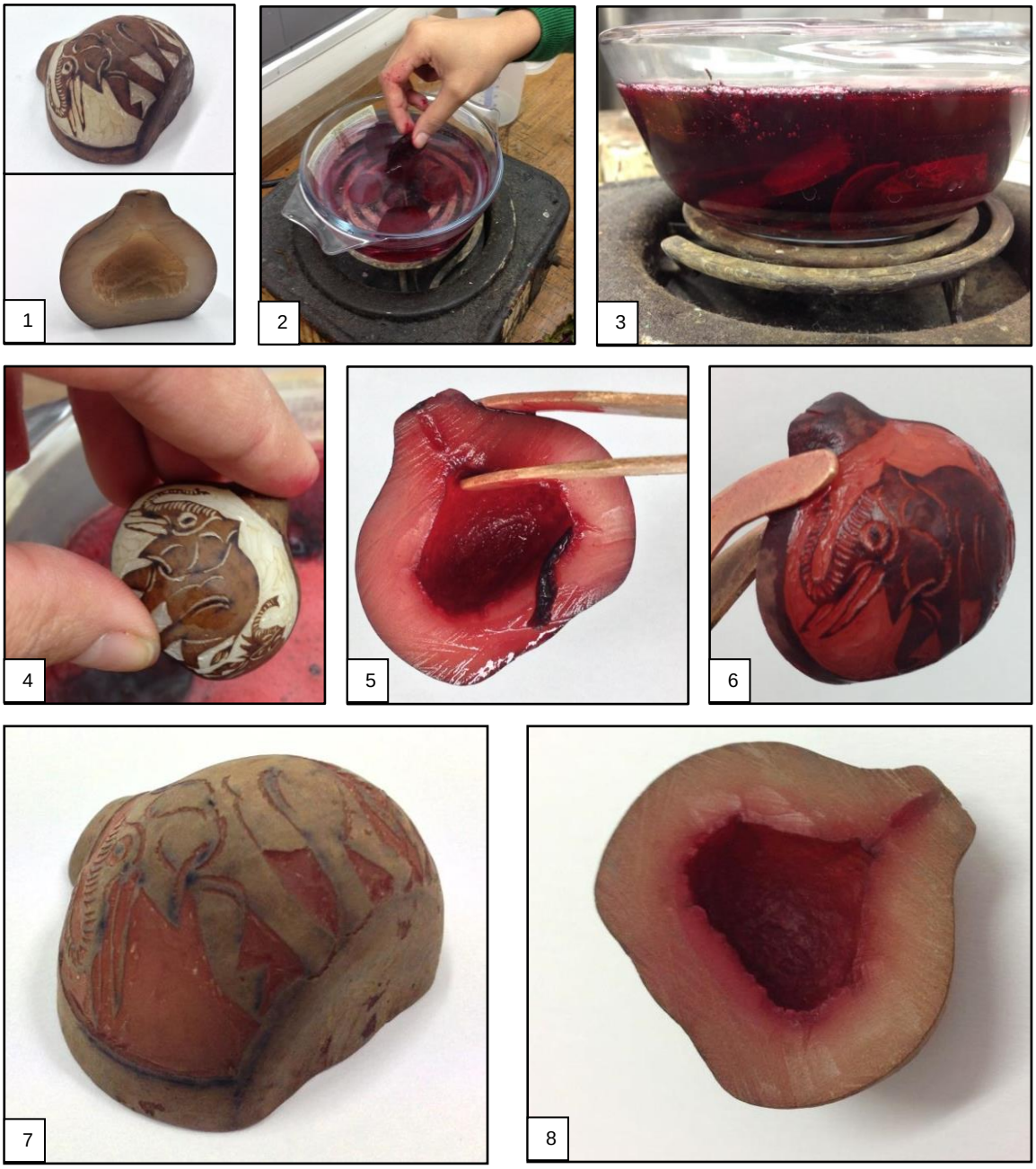


Figure 4.5: van Wyk, 2014. ***SES 2_Dyeing nut with beetroot***

1.) Halved carved Makalani nut (2.) Fresh beetroot slices are placed into salty cold water (3.) Beetroot slices in salt water are brought to the boil: red pigment of beetroot infuses water (4.) Sliced nut is placed into boiling solution of beetroot and water (5.) Inside of nut showing the hollow cavity has absorbed red pigment (6.) Pigment has been absorbed on outer surface of nut. (7.) Outer, curved surface of nut when dry. (8.) Inner surface of halved nut. Higher pigment absorption visible along edge of internal hollow cavity.

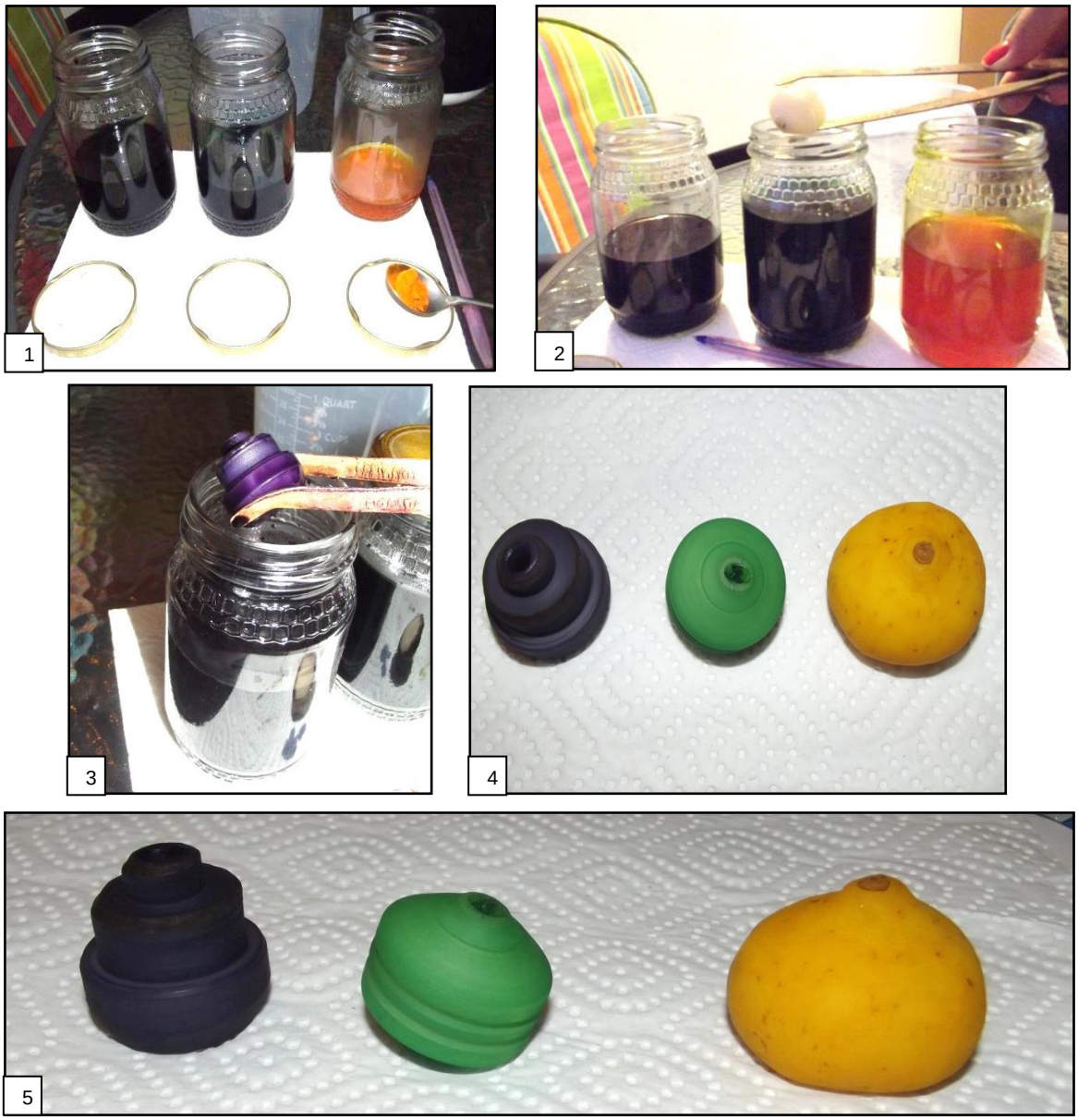


Figure 4.6: van Wyk, 2014. ***SES 2_Dyeing (turned nuts) with natural leather dyes***

1.) Dye solutions are prepared by mixing a ¼ teaspoon of powder pigment into luke-warm water (2.) Nut is placed onto (green) solution and stirred around to encourage adherence to exposed flesh of nut. (3.) Colour is visible on nut in 15 minutes. Darker pigments displayed a faster absorption rate and intensity compared to lighter colours (4.) Top view of dyed nuts (5.) Brown skin on violet nut appeared darker due to absorption of pigment. Intensity appeared slightly duller in green nut, when dry.

4.4.3 Session 3: shaping and polishing

Session 3:	**Shaping nuts in various manners to alter the shape of the nut**
Aim:	Generate a list of crafting techniques and explore shaping of Makalani nut in addition to other shaping techniques such as filing, burring, and sanding.
Method:	Various shaping techniques were identified by drawing on the researcher's implicit knowledge as a jeweller. Shaping techniques include various mechanical processes and was carried out in a workshop with the required machinery and tools. The dyed nuts were also polished in this session. Techniques were tested, and documented with photographs and note taking.
Location:	Vocational training workshop (Windhoek, Namibia)
Participants:	Researcher (M.van Wyk)
Background information:	Although evidence of shaping Makalani nuts exists in practices such as jewellery establishments, shaping of nuts by means of slicing, filing and cutting - a technique yet to be completely adopted amongst crafters. Polishing, as a surface treatment of the Makalani nut is yet to be seen in the Namibian market.

Table 4.5: SES 3_summary of APPENDIX 2: Shaping nut (filing, turning, burring, sanding, cutting)

		SINGLE EXPERIMENT: SESSION 3	16 JULY 2014 (filing) 28 AUGUST 2014 10:15 – 11:40 (burring [hollowing out], sanding, cutting/slicing)
		TECHNIQUE(S)	FINDINGS/ NOTES/ OBSERVATIONS/ THOUGHTS
		Sanding nut to remove outer brown skin	• Brown skin of nut is removed by means of sanding in order to expose the ivory-coloured flesh. This is intended to facilitate absorption of colour
		Cutting (nut in half	• Nut cuts fairly easily. Cut using a medium-sized sawblade on a mounted scroll fret saw. • Cutting action is better when slightly dampened – which just requires a quick rinse in cold water and then drying to be cut. Friction of blade cutting nut resulted in slight browning in colour on some areas. Had a similar smell to burnt popcorn – perhaps the oil flesh reacting with the heat generated from the blade friction. • Cutting time: +-3-5min • Inside Ø: Oval – 15mmm x 13mm • Nut (whole) weight: 13.24g
		Cutting (a slice of nut)	• Cut off slice: oil layer visible on flesh of nut. Oil is transparent in colour – sheen on nut flesh. • Slice is translucent. Thickness between 3mm (thinnest) – 4mm (thickest) • Cutting time: +-3-5min • Slice weight: 2.37g
		Filing top half of nut (with a metal file)	• File exposed area of nut – semi-sheen visible when filing. • Matte white/ivory coloured fleshed exposed when filing outer brown skin off with a rough file. Matte ivory appearance • Not a lot of shavings generated by filing, Nut quite 'sticky' – perhaps due to oil content in nut
		Hollowing out bottom (with a miniature burr)	• Hollowed nut out with a round burr (pendant motor drill) to generate shavings in order to have shavings to polish with • Burring generates better shavings, but still not enough to polish with. **Yes**: burring was successful. **No**: Shavings generated were not enough for polishing with • The nut reduced in weight but was still structurally sound. • The thinning of the approximately 5mm thick wall, to that of 1-2mm thick still allowed the hollowed half to be a strong shape
		Sanding (sanding cont.)	• Sanded slightly on the top of the nut. Slight sheen visible. More than when nut has only been filed • Brown layer removes fairly easily • Inner layer (flesh) is a whiter colour. Easier to see sheen of oil on lighter coloured-flesh • The nut is sanded with a rough grit sandpaper (400) to remove the majority of the brown skin • A range of finer grit of sandpaper (600-1200) is used to remove the remainder of the brown skin and give the ivory-coloured flesh a uniform finish
		Facet Makalani (nut on sanding belt- 180 grit sandpaper)	• Nut was sanded on electric sanding belt • Shaped fairly easily • Matte surface, however sheen is visible due to heat generated from friction between nut and sandpaper • Popcorn smell ☺ • Lots of fluff generated from process
		Shaping on grinder	• Created vertical grooves by pressing nut against the surface of the grinder (stone) • Nut shaped easily on grinder • Particular design generated very little shavings

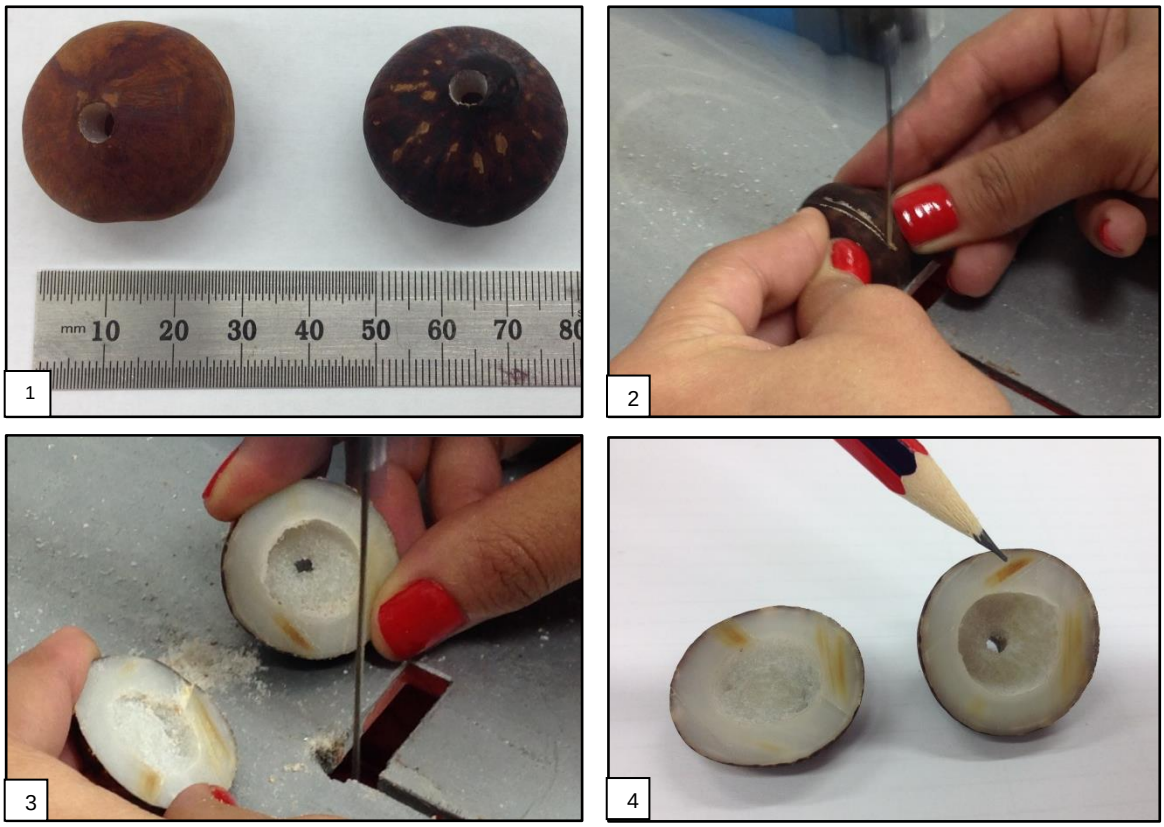


Figure 4.7: ***SES 3_Shaping nuts (slicing nuts)***
1.) Whole Makalani nuts (20mm- 30mm in diameter). 2.) Nut is sliced in half (horizontally) on a fretsaw. 3.) Blade glides through nut easily, despite generating of heat between the sawblade and nut flesh. Minimal sawdust is generated. 4.) Brown marks on nut indicate where friction has generated enough heat to discolour the ivory-coloured flesh.

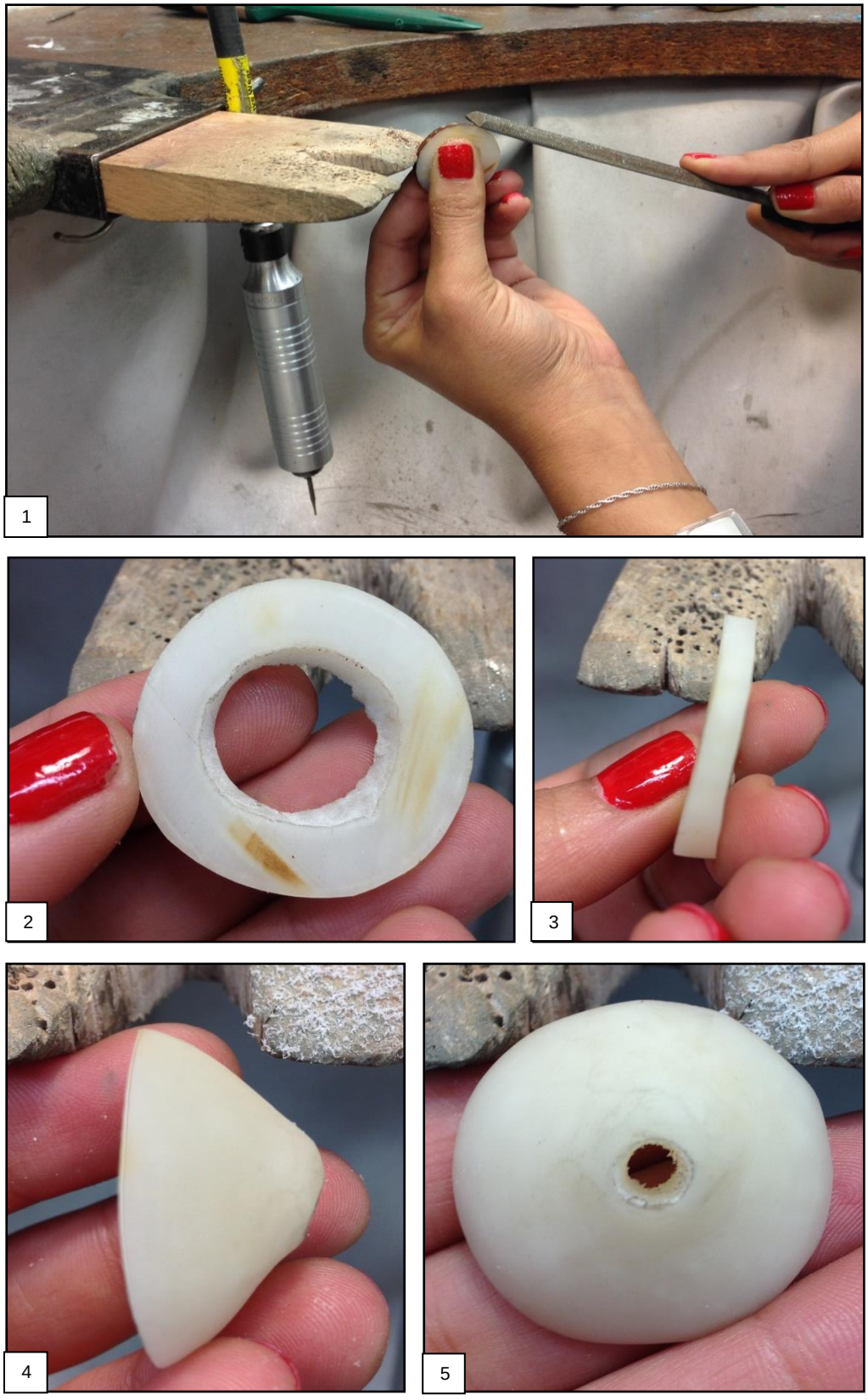


Figure 4.8: ***SES 3_Shaping nut (Filing with metal file)***
1.) Centre hole is drilled in base of nut (2.) Nut is placed onto rotating centre of lathe machine (3.) The nut is shaped by the tip of a mounted chisel, creating an even diameter. (4.) Filed top half of nut (side view) (5.) Filed top half of nut (top view).

Figure 4.9: ***SES 3_Slicing nut (Using a fret saw)***
1.) Centre hole is drilled in base of nut. 2.) Nut is placed onto rotating centre of lathe machine. 3.) The nut is shaped by the tip of a mounted chisel, creating an even diameter. 4.) Filed top half of nut (side view) 5.) Cut section of nut: slice (top view). 6.) Slice varying in thickness: 2-3mm thick (side view).

Figure 4.10: ***SES 3_Polishing nut (Using mounted motor polishing machines)***
1.) Section of nut is polished with resin polish and a soft, fabric buff. 2.) Nut is superficially discoloured by melted polish Sheen is visible. 3.) Brown skin is removed in varying degrees by polish. Dull sheen is visible. 4.) Dyed and carved nut (yellow food colouring) displays a dull sheen. Superficially covered by melted polish. 5.) Clean, polished section of nut (interior). 6.) Clean nut: sheen is more visible on raised areas of yellow dyed nut. Brown skin remains dull.

4.4.4 Session 4: turning on lathe (shaping)

Session 4:	**Turning nut on lathe (shaping)**
Aim:	Generate list of crafting techniques that incorporate changing the physical shape of the nut, other than carving off the brown skin
Method:	Practical guidelines were drawn from literature based on lathe work done on tagua nuts. Exploring the capability of the Makalani nut as a material to be shaped by chisels and emery paper. Process were tested, and documented with photographs and note taking.
Location:	A vocational training centre (Windhoek, Namibia) and Jewellery workshop (Cape Town, South Africa)
Participants:	Researcher (M.van Wyk)
Background information:	Shaping has been hugely successful when changing the natural aesthetic of the tagua nut. By turning nuts on lathes and using various chisels to shape the body of the nut. Whole nuts can be made into components that aid construction of new forms and objects. Although evidence of shaping Makalani nuts exists in practices such as jewellery establishments, it is not commonly practised by crafters.

Table 4.6: SES 4_summary of APPENDIX C: Turning nut on lathe (shaping nut)

		SINGLE EXPERIMENTAL SESSION 4	5 - 10 SEPTEMBER 2014 (shaping on lathe)
		TECHNIQUE(S)	FINDINGS/ NOTES/ OBSERVATIONS/ THOUGHTS
		Nut A: Basic external shaping and **hollowing** of nut (pink nut)	• Nut A was placed on lathe. • Even outer diameter needed to be established. • Drilled hole in centre (top) for rotating centre of the lathe to fit nut. • Turned nut – evened outer surface, by using various chisels to create a uniform diameter. Hollowed out from base. • Smooth, matte finish due to 180 grit sandpaper used. • Nut is semi-translucent. • Walls still fairly thick (2-4mm thick).
		Nut B: **Tapering** nut on Turning & Fitting lathe (See **Figure 4.11**)	• Starting dimensions: 35mm x 33mm x 27mm (h) – nut oval in shape. • Evened out outer diameter: 26mm, done to increase surface area for chuck to grip onto. • Chuck dents outer part of nut. • Wall thickness is compromised due to irregular internal hollow cavity inside Makalani. • With even outer diameter: nut is more translucent in some areas compared to others. • Nut eventually cracks under strain from chuck and opposite revolving centre. • Wall thickness was inconsistent, and strength compromised. • Two centres not completely opposite one another due to irregular/organic shape but didn't seem to impact turning. • Shaving away at the nut had to be executed slowly in order to not 'burn' the nut from heat generated (friction) between chisel tool and nut. • Oil is present and can be smelled when nut heats up (by means of flame-absent heat.)
		Nut C: **Tiered** nut (violet nut)	• Starting shape of nut is irregular (uneven surface and measurements in diameter if nut: semi-oval shape to start with. • First step: even out outer diameter. • Turned 3 stepped-tiers: biggest tier – 30mm in outer diameter, 2nd layer: 25mm outer diameter. • Turned nut at 555RPM. • Slight facet placed on bottom of nut in order to removed brown skin
		Nut D: Creating grooved **patterns** on (green nut)	• Outer diameter established in centre part of nut. • Ends turned to smaller points. • Various chisels used to create deep grooves on nut.

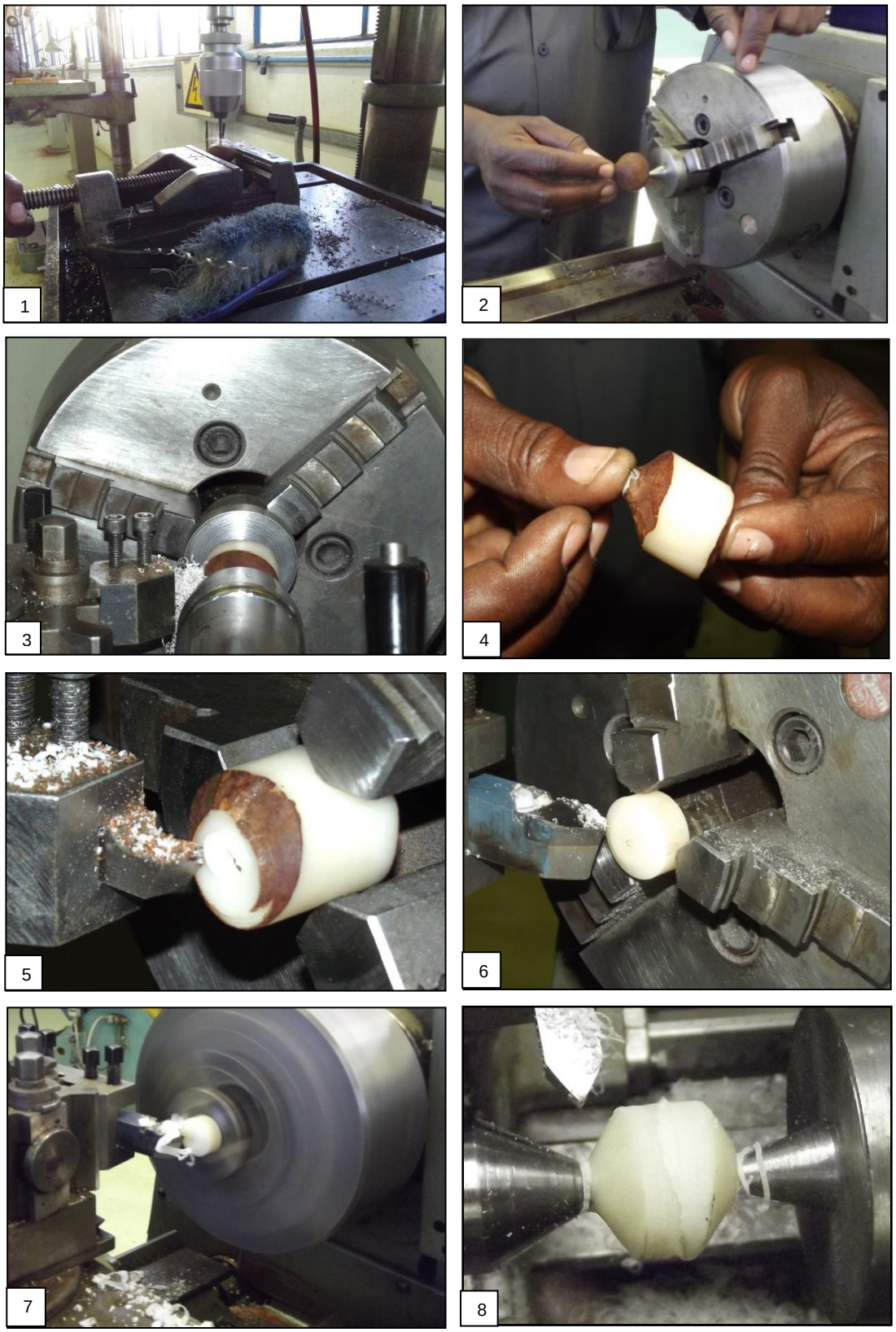


Figure 4.11: ***SES 4_Turning of nut on (industrial) lathe***
1.) Centre hole is drilled in base of nut (2.) Nut is placed onto rotating centre of lathe machine. (3.) The nut is shaped by the tip of a mounted chisel, creating an even diameter (4.) Nut with even diameter: ready to be placed in chuck (5.) Faceting of nut: shaving away uneven top (6.) Nut reduces dramatically in size when opting for even dimensions (7.) Wafer thin shavings generated from shaping the nut are shaved off in curls (8.) The nut has an even diameter and a facet on the top and bottom. Wall thickness has been compromised.

4.4.5 Session 5: carving dyed nuts

Session 5:	**Carving shaped and (organic leather) dyed nuts**
Aim:	Generate a list of crafting techniques by exploring the combination of two specific manufacturing techniques: dyeing and carving. Using nuts that have been turned on a lathe into various shapes and then carving onto the coloured surfaces, a black ball point pen is used to sketch a design that will be carved out.
Method:	The combination of 'old or usual' knowledge (carving with a scalpel blade) will be combined with "*new or unusual*" knowledge. The difference is the fact that the carved surface is matte and has a different surface colour (when compared to the usual smooth, brown skin).
Location:	E.R.≠Eichab's place of trade (Windhoek, Namibia)
Participants:	Master crafter (E.R.≠Eichab) and Researcher (M.van Wyk)
Background information:	Although evidence of shaping Makalani nuts exists in practices such as jewellery establishments, carving of shaped *and* dyed nuts remains a technique not often used in Namibia by crafters.

Table 4.7: TES 5_summary of APPENDIX D: Carving dyed nuts

TEAM EXPERIMENTAL: SESSION 4	12 - 13 - 10 AUGUST 2014 5 SEPTEMBER 2014 (carving shaped and (organic leather) dyed nuts and polishing)
TECHNIQUE(S)	FINDINGS/ NOTES/ OBSERVATIONS/ THOUGHTS
Carving	• Dyed nuts do not need to be sanded as they have been prepared prior to dyeing • Designs are sketched onto the nuts (freehand) using a black ball point pen • Dyes nuts are carved into the dyed flesh, as per the usual carving method. • The result is a contrast between the majority colour (dyed) flesh and the internal ivory-coloured flesh • The modified shape did not influence the difficulty of carving into the surface of the nut.

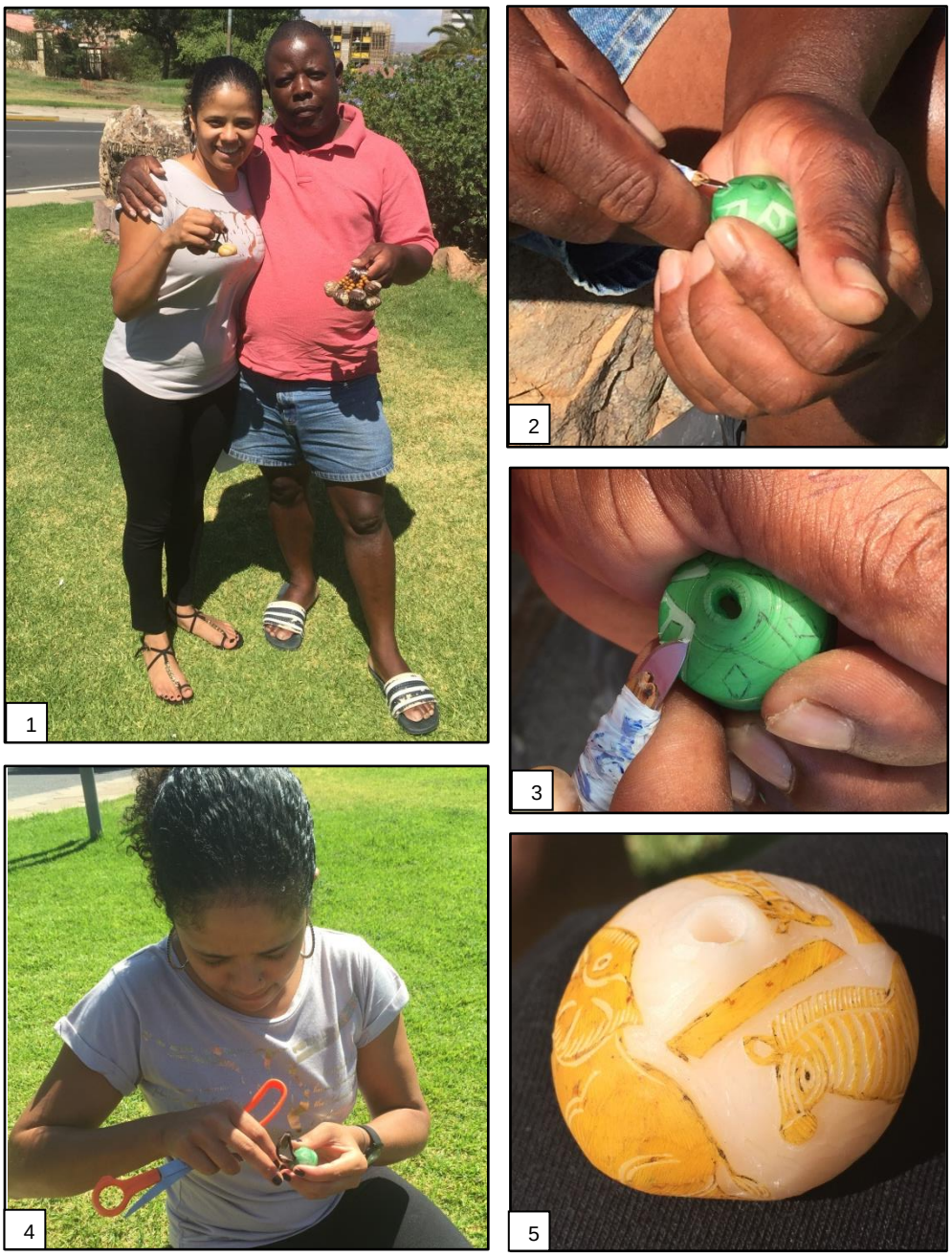


Figure 4.12.: ***TES 5_Carving of dyed nuts (organic leather dyes)***

1.) Erwin.R ≠Eichab (right) and Michelle van Wyk (left). 2.) Nut dyed with green leather dye being carved by E.R.≠Eichab. 3.) Geometric patterns are handrawn (freehand) with a black ballpoint pen. 4.) M.van Wyk, directed by E.R.≠Eichab to insert leather thong into the top of the Makalani nut, using a pair of scissors.

4.4.6 Session 6: dyeing and carving naturally dyed nuts (*Otjize* dye)

Session 6:	**Dyeing nut with natural pigment found in Namibia (*Otjize*)**
Aim:	Dyeing and carving Makalani nuts dyed with *Otjize*. Carving pink nuts. Reflect on all techniques and discuss the process of each. This would include evaluating the feasibility of using the technique in everyday crafting.
Method:	Using the natural dye (*Otjize*), to dye Makalani nuts. Dye process takes place at the master crafter's place of trade. Pre-sanded nuts are placed in dye and process is documented. Discussion is had around the technique and aesthetic of pink nuts (van Wyk & ≠Eichab, 2014b; 2014c).
Location:	E.R.≠Eichab's place of trade (Windhoek, Namibia)
Participants:	Master crafter (E.R.≠Eichab) and Researcher (M.van Wyk)
Background information:	*Otjize* is a potent natural dye used by Oshiwambo women to colour traditional garments. The dyeing process is very simple and requires no heat. The powder is sold in small quantities by Oshiwambo women at the local markets.

Table 4.8: TES 6_summary of APPENDIX D: Dyeing nuts with *Otjize* and carving dyed nuts

	TEAM EXPERIMENTAL SESSION 6	3 SEPTEMBER 2014 (dye with *Otjize*) DECEMBER 2014/JANUARY 2015 (carving of dyed nuts)
	TECHNIQUE(S)	FINDINGS/ NOTES/ OBSERVATIONS/ THOUGHTS
	Preparation of nuts	• Nuts are prepared by removing the thin brown seedcoat that covers the ivory-coloured flesh. • Several methods can be used: filing, sanding, carving or shaving off the brown skin to expose the flesh underneath. • The inner flesh appears to be porous as it easily absorbs any form of colour it is exposed to (including dirt). • Care is taken to keep prepared nuts clean in order to best reflect colour absorption.
	Preparation of dye solution	• 250ml cold water in a Foamalite container. • Add in a pinch (less than ¼ tspn) of *Otjize* powder, mixed. • Stir lightly using a non-porous utensil to avoid absorbing any pigment • All powder should be dissolved • *Otjize* is an opalescent green colour with a magenta undertone when dry. • The vibrant pink (magenta) colour is seen when contact is made with water.
	Dyeing process	• Prepared nuts are placed in pink solution. • White flesh was exposed. • Colour develops quickly – pigment has taken to nut at 5 minute check in. • 10minute check: colour has more depth and is almost the intensity of the solution. • Vibrant pink after 15 minutes (saturation point seems reached as nut has the colour intensity of the solution) • Water temperature affects the rate of absorption and colour saturation: • Colour absorption is effective even in cold water, however using warm water speeds up the rate of pigment absorption.
	Carving dyed nuts (*Otjize*)	• Sketches are made on the dry pink nut with a black ball point pen • The black ink adheres easily to the nut • Once the design is finalised, the nut is carved as per usual with a sharp scalpel blade. • The freshly dyed pink canvas creates a contrast between the newly exposed ivory-coloured flesh. The pink colour along with the black ball point lines and exposed ivory flesh, mimic the colours found in *Ondelelas* (traditional Owambo dresses).

Figure 4.13: ***TES 6_Dyeing of nuts with Otjize***

1.) Turned nut: bottom view (2.) Turned nut: top view (3.) Master crafter preps cold water for mixing dye (4.) *Otjize* powder is sprinkled in cold water (5.) A pinch of dye immediately dissolves in water (6.) Nut is placed in pink solution (7.) Nut is checked after 1 minute (8.) Nut is checked after 10 minutes (9.) Whole dyed nuts (sanded).

Figure 4.14: ***TES 6_Carving of dyed (Otjize) nut.***

1.) Various dyed nuts 2.) Nut dyed with *Otjize* being carved by E.R.≠Eichab. 3.) (from left to right) Brown Makalani nut, lightly sanded Makalani nut, carved Makalani nut, sanded and dyed (*Otjize*) nut.

4.5 Summary

The short term intentions of the quasi-experimentation within the Single Experimental and Team Experimental Sessions were to generate crafting knowledge pertaining to the Makalani nut. This knowledge would feed into the already existing pool of indigenous crafting knowledge in Namibia. The experiments were documented in conclusion to be successful or unsuccessful, with a detailed documentation of the process and relevant findings. The experiments did not serve as a separate entity to the body of research but was structured in a manner that would enrich the findings in the literature.

CHAPTER FIVE
DISCUSSION

5.1 Introduction

The central aim of the research was to contribute towards the body of crafting knowledge in Namibia by firstly, assessing what existing crafting methods were being used to create products from Makalani nuts and then to explore other manufacturing techniques that could add value to crafted products. The third aim was to establish a list of crafting techniques, drawing on the outcomes of the experimental sessions, which would allow the researcher to identify possible universal crafting techniques for vegetable ivory. The final aim was to explore the possibility of establishing a Namibian aesthetic within the context of crafting Makalani nuts. This chapter explores the extent to which the chosen research methodology facilitated achieving the aims identified at the start of the research process. The limitations of the study are reviewed in order to evaluate what measures might have been taken to overcome them in the various contexts. The opportunities identified for further exploration will be covered in Chapter SIX. In summary the chapter covers:

1. The **analyses and discussion** of the experimental session findings presented in Chapter four
2. The **challenges and successes** of the methodology
3. The **discussion points that emanated** from physically engaging with the Makalani nut
4. The **limitations of the study**

5.2 A brief recap

Makalani nuts, a variety of vegetable ivory found in Namibia, were initially sourced as a by-product, as they were left behind once the dried Makalani palm fruit had been consumed. As the popularity of the carved nut grew amongst tourists, so did the demand for the nut as a crafting material. As the demand for the nut as a crafting material grew amongst carvers, so too did its potential as a source of generating income. This is especially true for Namibians who had grown up with the tradition of carving nuts, and had developed the hand skills as traditional knowledge passed on from community elders. Carving, using a small, sharp blade mounted onto a make-shift handle (a small stick), is currently the most popular crafting technique for the Makalani nut. The tool was assembled with ease, using materials that were easily accessible from the crafter's immediate environment. Despite the common-knowledge amongst avid crafters that the Makalani nut is part of the family known globally as vegetable ivory, the exploration of this nut as a crafting material had been mostly limited to carving and very much so at a craft-level. The first research aim of this body of work looked to establish the crafting methods used to craft the Makalani nut. What was made evident from this initial investigation was that the chosen method of crafting was linked to the resources immediately available, as well as the knowledge of what was most cost effective when creating a product. The sub-sections in this

chapter will discuss this finding in greater detail along with the quasi-experiments. These experiments were set up with the aim of establishing crafting techniques that would appeal to the Namibian crafter on similar grounds. The quasi-experiments were named and classified as SES (Single Experiment Sessions) and TES (Team Experiment Sessions) for the purposes of this study. The method of data analysis was inductive, and the findings of (both single and team) experimental sessions were looked at with the intention of identifying results that contradicted or confirmed the knowledge found in literature, and discussions generated in the unstructured interviews with the master crafter.

5.3 Overview of experimental sessions

Table 5.3.1 below is a recap of the experimental sessions (quasi-experiments). The sessions are made up of Single Experimental Sessions (SES) and Team Experimental Sessions (TES). The SES involved either the master crafter **or** the researcher at a certain point in time, experimenting with a crafting technique. The TES involved the master crafter **and** the researcher and took place in Windhoek, Namibia. In the TES, the researcher found it an ideal time to conduct the unstructured interviews, as this helped ease the pressure of seemingly expecting a 'correct' answer compared to an honest answer, while engaged in practice. The outcomes of the sessions below were compared to what was found in the literature about the various techniques. The outcome of the experimental sessions either confirmed or contradicted the value of the manufacturing techniques within the context of being used with the Makalani seed. The confirmation or contradiction of the findings in the literature would surface in the *method* in which the technique was applied to the seeds. An example of these differences and similarities is that although dyeing worked well on both the Makalani and tagua nut, the difference in technique method with the Makalani nut, was that the tagua nut was not carved once dyed. Common practice would be to carve the tagua nut *prior* to dyeing.

Table 5.1: Overview of experimental sessions with Makalani nut

Aim	Experimental session Single Experimental Session (SES) Team Experimental Session (TES)	Outcome	Confirmed knowledge in literature
	TES 1: Determine most-prominent crafting technique(s) and resources used	Carving is the most prominent crafting technique used currently. A scalpel blade mounted onto a stick is used as the carving tool. Key rings are the product mostly made by Erwin.R.≠Eichab.	**Yes.** Literature stated that carving is a popular technique.
	SES 2: Dye nuts (using food colouring, natural pigments from vegetables, natural leather dyes)	• Food colouring and natural leather dyes: successful colouring of flesh. Colour saturation was successful despite depth of penetration being fairly shallow. • Natural pigment from vegetables: only beetroot was successful	**Yes**. Dyeing is a popular technique used on other varieties of vegetable ivory.

	SES 3: Shaping and polishing of nut	Nut shaped easily, using files and saws to manipulate the structure. Dyed nuts polished easily but a matte surface did not easily reflect polished areas	**Yes**. Alteration of the spherical shaped nuts are easy to achieve as documented in the literature.
	SES 4: Turning nuts on a lathe	Various shaped nuts. Some wall thicknesses were compromised depending on desired shape	**Yes**. Turning nuts on a lathe is a popular technique when shaping vegetable ivory.
	TES 5: Carving nuts dyed with natural leather dyes	Dyed nuts carved similar to the normal nut with the thin brown skin. The ivory-coloured flesh was contrasted by the bright colours. New aesthetic for the Makalani nut	**Yes**. Carving dyed nuts proved successful. Literature shows nuts are carved then dyed or only carved in their natural state.
	TES 6: Dyeing and carving nuts dyed with *Otjize*	Prepared (sanded) nuts were dyed in an *Otjize* solution. Nuts were carved when dry as per usual carving method.	**Yes** was successful as a dyeing technique (which is found in literature). **No**, dyeing with *Otjize* is not documented in literature.

5.4 Challenges and successes of the Single and Team Experimental Sessions

5.4.1 TES 1: Establishing the most prominent crafting technique used by crafters when producing Makalani nut products.

The first unstructured interview with the master crafter Erwin.R.≠Eichab was introduced in the form of an initial enquiry: "***What*** *is a Makalani nut and* ***how*** *do you create your products from it*?" The master crafter explained how the palm fruit is dried as a means to gather food for the drought seasons. The fruit of the *Hyphaene petersiana* palm are picked whilst they are green and placed in baskets to dry. The fruit hardens and turns from a bright green colour to that of a deep, warm brown. The outer skin (exocarp) hardens and can be picked off prior to eating the dried fruit. The fibrous flesh has a sweet, almost syrup-like smell, which is very similar to the smell of molasses. The taste of the fibrous fruit is sweet and rich when one chews the fibre. The fruit is eaten slowly because it is hard and requires extensive chewing. Once the fibrous layer has been removed in its entirety, a hard shell is revealed. The Makalani nut is housed within this hard shell. The master crafter explains that one needs to use a small (hack) saw to make an opening, in order to create a weak point in the hard, shell-like cover. Once a line has been sawn, a general purpose hammer is used to crack the shell with force. Depending on how far the line was sawn, the shell cracks along the opening. The shell is then pulled apart to reveal the nut inside. The nut is cleaned by removing the thick seed coat and scrubbed clean to reveal a small, slightly oval nut, measuring an average of 35mm in diameter. The nut is prepared for scraping by keeping it immersed in water in a closed environment. In this case the nut has been tied

inside a plastic grocery shopping bag with water in it. The nut has been soaked overnight or longer and is softer than it would be when comparing it to a nut having just been harvested from the husk. The nut is scraped clean and left to dry in the sun. The appearance of the nut is similar to that of a brown fig.

A black ball point pen is used to sketch on the outer (brown) skin of the nut and then the desired sections are carved away by slicing away at the thin brown skin. The depth of this cut is not very deep as the blade loses stability; the deeper it cuts into the nut. The best results are achieved by slowly slicing away at the brown skin and then deepening the exposed areas if so desired. Most times the carvings do not need to be very deep because the contrast that is desired is created by the difference in colours of the outer and inner flesh. Great care needs to be taken when slicing away at the nut as this technique requires a steady hand, exerting a uniform pressure in order to guide the blade across the flesh of the nut. The scalpel blades are extremely sharp and Mr.≠Eichab admits to sustaining multiple injuries in the past, some less severe than others. He explains that wearing protective gear when carving the nuts would feel unnatural as it creates a barrier in-between his hand and the nut. Carving the nut requires the carver to gain a *feel* for the material to be carved, along with the pressure needed to create incisions and develop them into elegant, smooth slices.

The ivory coloured flesh, although being hard to the touch, lends itself to the process of mechanical shaping. This means that the nut responds well to shaping by tools made from a harder material (i.e. tool steel). The material hardness of vegetable ivory is said to be 2.5 on the Moh's scale ranging from 1 to 10 (See *Hardness* in Table 4.3, with 10 being the hardest material. A diamond has a classified rating of 10). The ivory coloured flesh can therefore be dented. When pressing tools against the surface of the nut, care needs to be taken to not mark the newly exposed flesh as any form of colour (even that found in the form of grease or dirt) takes easily to the fair-coloured inner flesh. The nut's ability to absorb colour is discussed in sub-section 5.4.2. Upon close inspection with the eye, the nut seems to show no indication of grain and so cutting is optimal due to the blade being able to slide in any direction. This allows for accurate and acute angles to be created if desired. The extent to which the blade is pressed into the nut determines the amount of resistance placed on the blade – meaning that the deeper the blade is pressed into the flesh of the nut, the more difficult it is to manoeuvre the blade.

5.4.2 SES 2: Dye nuts (using food colouring, natural pigments from vegetables, natural leather dyes)

The second, single experimental session involved the colouring of the Makalani nuts. When dyeing Makalani nuts, the researcher chose to use environmentally friendly dyes to align the practice with the stream of Sustainability in the study. The thin outer, brown skin covering the Makalani nut seems to be less inclined to absorbing colour compared to the ivory-coloured inner flesh it covers. The brown

skin appears to possess waxiness when rubbed with a cloth, which leads one to assume that the nut must contain some form of oil or wax. Despite this apparent water-resistant property of the outer brown skin, the nut still absorbed some of the dyes it was exposed to in the sessions (see **Figure 4.4: SES 2_Dyeing nut with food colouring (blue)**). The brown skin absorbs the black ink from the ballpoint pen with ease, despite this *waxiness*. The nut was exposed to various dyes in the sessions, with some nuts having had their entire outer brown skin removed. Other nuts had sections of the brown skin left intact. This was done in order to better understand the reaction of the nut when dyed with eco-friendly dyes. The absorbed dye was more visible on the inner flesh of the nut than in the brown skin. This is because the ivory-coloured flesh is lighter in colour, is thus a better indicator of the effect of the dye colour. The absorption of colour was successful however the depth of colour penetration was fairly shallow. The extent of the dye-penetration coloured the entire nut and acted as a substitute for the brown skin that had been sanded away. The newly coloured surface of the nut could then be sliced into, to once again reveal the ivory-coloured flesh – only this time the contrast of the lighter flesh will be against that of a colour other than brown.

The vegetable dyes had a variety of outcomes-dependent on what vegetable was used in the experiment. The dyeing session using beetroot was the only successful dyeing experiment conducted with vegetables. Vegetables were chosen for their colour and for availability in Namibia. Literature identified several natural dyes found in vegetables, however a large number of those vegetables were not available in Namibia and others that were, were imported or too expensive to purchase on a large scale for the sole purpose of dyeing. The cost of buying the vegetables was also a factor that was considered. The materials chosen by the master crafter to craft the nut with were in essence ones that were easily accessible and affordable (such as the handmade carving tools using a stick). The dye from the beetroot was potent enough to colour the surface of the nut **(Figure 4.5: SES 2_Dyeing nut with beetroot)**. The nut used in the experiment had been cut in half and carved – leaving some ivory-coloured areas exposed and others covered by the brown skin. This nut was able to absorb colour from the exposed areas including where it had been sliced in half (i.e. the back of the nut). The natural, hollow cavity found inside each nut is clearly visible in this piece. The absorption of pigment is mostly visible along the edge of the hollow cavity. The pigment is not visible along the external edge of the nut where the brown skin is still attached. This could be due to the skin having absorbed the dye, and the fact that the dye does not appear as clearly on the brown skin, despite being present. The depth of the red colour obtained with the beetroot was less than that found in the dyeing session with the red food colouring (see **Figure 4.2: SES 2_Dyeing nut with food colouring (red)**). The dye session with broccoli was not successful due to the lack of pigment released when the vegetable was boiled. The second option for creating a natural green-coloured nut was to experiment with using the pigment from local wild spinach. The spinach, known locally as *Ekaka*, is easily accessible in Namibia. The researcher sourced a dried cake of *Ekaka* at a local market in Windhoek, Namibia. The *Ekaka* released

a brown-green pigment when boiled in salt water but was not potent enough to completely discolour the (sanded) Makalani nut. When extracted from the brown-green solution, the nut appeared slightly darker than its usual colour. However upon drying, the nut returned to its natural ivory-like colour. The nut, when boiled in clean water, released a brown pigment from the skin of the nut. The light brown solution did not discolour the ivory-coloured flesh. The nut absorbs colour well however the dye needs to be fairly potent for it to absorb permanently into the flesh, especially if further crafting techniques are going to be used on the nut after dyeing it. It does not seem necessary at this stage to seal the nut in order to retain the colour. However this could be a point of departure for further research.

5.4.3 SES 3: Shaping and polishing of nut

The third experimental session included techniques that involved changing the natural shape of the Makalani nut by breaking it apart in several ways. The session took place in Cape Town, South Africa. Various tools were used for the shaping of the nuts, including metal files, saws and miniature round burrs. Makalani nuts that are approximately 30mm in diameter were sliced in half with a mounted scroll fret saw (see **Figure 4.7: SES 3_Shaping nuts (slicing nuts**). The nuts were cut in half with ease, despite generating heat from friction caused by contact with the sawblade. It was evident that the nut contains oil that is released when the nut is exposed to friction. A slight discolouration was visible on the inside of the nut halves. The brown marks left on the nut were caused by the sawblade rubbing against the nut and generating heat as the cutting took place. A smell similar to popped corn was noted when the nut was cut. This smell further suggested that the flesh of the Makalani nut contains oil. This nut oil could aid the process of cutting by acting as a natural lubricant. The presence of the oil is less noticeable in the shavings of the nut, especially when coming into contact with water. While the tagua nut is cut on machines to create thin slices to be used as buttons for example, the Makalani nut seems best suited for cutting when it has been soaked (van Wyk & ≠Eichab, 2014). When shaping the nut with a file, the *feeling* while placing the file onto the flesh could be described as being *sticky*. A build-up of nut filings in the teeth of the file was noted. One could easily rub these filings into a small ball as they seemed to adhere to themselves when squeezed. When exposed to water, the filings become slightly transparent and form an off white-coloured paste.

Session three included polishing the nut. This was done on a mounted polishing machine using a resin polishing compound. Resin polish is white in colour but is intended to leave an object with a lustrous finish, without any discolouration. The amount of shavings generated from shaping the Makalani nut varied depending on the method of shaping. The shavings produced from one nut were still too little in volume to use as a polishing medium. The ability of the tagua nut to generate sufficient shavings with which to polish the nut could be related to the size of the tagua nut. Tagua nuts are generally larger in size and so generate greater amounts of shavings when changing the original shape of the nut by means of filing and sanding. The attempt to polish the carved Makalani nuts with shavings was unsuccessful. No difference in appearance was noted between the state of the Makalani nut before and after it had been polished. Further research on polishing could be undertaken to better understand the

dynamics of creating a lustrous surface (polishing) on the Makalani nut. This is noted in Chapter SIX under the recommendation to develop the methods for best practice with set techniques.

The literature and videos on tagua nut crafting indicate that the dry shavings from the nut can be used as a polishing medium. The shavings from the tagua nut create a highly polished surface when pressed against a rotating nut, mounted on a lathe. While it has been established in practice that the shavings can act as a polishing compound when rubbed against the nut at high speeds, it is yet to be confirmed if the shavings have an abrasive effect on the surface of the tagua nut. The hardness and texture of vegetable ivory lends itself to fabrication alongside other durable materials such as metals. The nut can be filed and shaped with great precision, and so would be valuable in the context of jewellery manufacture. In addition to the durability of the nut and its ability to absorb colour, the lustrous finish achieved by polishing a sanded nut with resin polish highlights several properties that are useful when designing and manufacturing jewellery that contains durable organic material. The opportunity to use a natural, sustainable material in precious jewellery elevates the nut from a crafter's material to that of an alternative source of ivory that can be used to craft truly authentic Namibian jewellery. This speaks to two of the research aims set out at the start of the study, namely to distinguish universal crafting techniques for vegetable ivory and to identify an aesthetic that identifies the Makalani nut with Namibia. The amount of shavings generated in the experimental sessions three and four, in this research, did not facilitate polishing the nut with its own shavings. This could be explored in greater detail where larger amounts of shavings could be used as a polishing medium. This would follow the theme of sustainable practices for this research.

5.4.4 SES 4: Turning nuts on a lathe

This experimental session looked at the shaping of the Makalani nut by turning it on a lathe. The technique involved machinery that was not readily accessible to Mr.≠Eichab. The machinery (lathe) is stationed in a vocational training centre (in Windhoek, Namibia) and within a jewellery department (Cape Town, South Africa), to which the researcher has access. The technique of turning the Makalani nut on a lathe had several differences when compared to a tagua nut. The Makalani nut was drilled into at the base of the nut. This was done to create a centre point for setting the nut onto one of the rotating centres of the lathe (see **Figure 4.11: SES 4_Turning of nut on (industrial) lathe**). When turning a tagua nut, the nut is mounted onto the lathe by hammering it onto a single rotating centre with a general purpose metal hammer (Sañudo, 2014; Gdlb55, 2012). The problem with having only one rotating centre is that the nut does not always stay on the metal point. Some online videos show crafters using glue to mount the nuts onto the lathe. The nut is then removed by thinning out the point of attachment with a chisel. When the point of attachment is weakened enough, the nut can easily be snapped off. This creates a safety hazard, as the nut can fly off the metal centre at any given moment while turning. The Ecuadorian tagua crafters who use the technique of turning nuts on lathes have however found a way of keeping the nut in place while it is shaped - with repeated hammering as well as placing pressure on the nut, in a manner that pushes the nut towards the rotating point. In this

manner the nut remains on the rotating centre. This allows the nut to be shaped while decreasing the chance of it becoming dislodged. The main goal of shaping the nut on a lathe is to create a uniform shape while maintaining a smooth, even surface. This is done by using a variety of different shaped chisels, pressed against the rotating nut at various stages. The nut can also be hollowed out when a chisel is pressed against the top of the nut and worked down to the inside of the nut. Various sandpaper grits are pressed against the rotating nut in order to refine the surface of the nut. The final finish achieved with the tagua nut on a lathe is a highly polished shine. The accumulation of shavings from shaping the nut provides a sustainable polishing medium. The tagua and Makalani nut are both able to be shaped on a lathe and sanded to a matte finish. The main difference with turning these vegetable ivory nuts is that it is not practical to polish the Makalani nut with its own shavings. The second difference in technique is that the Makalani nut has a larger internal hollow cavity than the tagua nut does. Some tagua nuts have been found to have no internal cavity. The size of the internal cavity is important because it determines the wall thickness of the nut. The wall thickness is an important factor to consider when turning a nut as shaving away at the nut to create a uniform exterior reduces this wall thickness. Since the internal cavities are normally not a uniform shape, it is difficult to know what the wall thickness is at any given time. One is able to observe the degree of transparency of the nut wall whilst turning it, with an increase in translucency indicating a thinner wall.

The Makalani nut was easily shaped on a lathe, however the first nut that was turned showed signs of weakness in the structure caused by a thinning of wall thickness. The wall thickness (the width of the nut measured from the inner wall to the outer wall) varied once the nut had been turned. A reduction in wall thickness when creating a uniform diameter on the rotating nut was inevitable. The varying wall thickness was visible in the change in colour as well as cracking in the nut. In order to achieve a chosen diameter, it is recommended that a larger nut is selected for turning. This ensures a greater chance of retaining the structural integrity of the vegetable ivory. Smaller sized Makalani nuts can thus be used for creating shaped products that do not require specific and uniform diameter-sizes, but still lend themselves to the technique by allowing for patterns to be created. Makalani nuts did not need lubrication whilst being shaped on a lathe. Once turned, the nuts had a slight nut-like smell – very similar to that of coconut.

Turning Makalani nuts on a lathe would require smaller tools (chisels) and access to workshops with lathe machines. The smaller chisels can be made by modifying tool steel rods or existing, or even larger existing chisels to suit the desired outcome of the nuts. YouTube video footage documenting the turning of tagua nuts reveal that lathes used by crafters to shape nuts are very low-tech (Sañudo, 2014; Gdlb55. 2012). It is difficult to determine from the YouTube video footage on how these lathes are acquired by the crafters. The researcher does not speak Spanish and experienced a language barrier as one of the challenges in the study. Despite the being visually informative, the majority of the videos documenting the sourcing and crafting of tagua nuts by crafters, are narrated in Spanish. Supposing

that the low-tech lathes are shared amongst members of the crafting community, the researcher noted the opportunity for facilitation of required machinery as a key area for government to intervene and meet the needs of crafters. The Ministry of Trade and Industry (MTI) of Namibia has already moved towards facilitation of manufacturing enterprises by implementing policies such as exemption of machinery and equipment from value added tax (VAT). Another form of support that the ministry has made available is to provide assistance for small or medium enterprises (SMEs) through the MTI's Equipment Aid Scheme, when purchasing machinery. This in turn creates employment and aligns with the goals outlined in the NDP4 of Namibia. Financial support from the Namibian Ministry of Trade and Industry for purchasing equipment requires aspiring manufacturing business owners to register themselves as an SME. Erwin.R.≠Eichab (master crafter) has registered a company that trades in handmade goods. This is also a requirement for applying for tenders given out by the Namibian government. However a current obstacle for Mr.≠Eichab is the formal business plan required, with details of what costs are involved in setting up a crafting workshop. Until practical solutions and support systems are identified to assist Mr.≠Eichab to overcome the task of writing up a feasible business plan, the likelihood of using turning as a manufacturing technique for Makalani seeds are not sustainable for him. Even if he were to gain access to a workshop in Windhoek, Namibia, it would mean him not being able to sell his products during that time of manufacturing. This is contradictory to his current situation, where he is comfortably able to craft his products at his place of trade.

5.4.5 TES 5: Carving nuts dyed with natural leather dyes

The nuts that had been dyed with natural leather dyes were successful as an experiment. The technique is not that much different to Mr.≠Eichab's usual practice of carving Makalani nuts. As seen with the Makalani nuts that have been dyed with food colouring, the nuts dyed with natural leather dyes also created a new aesthetic. The brightly coloured nuts contrasted beautifully with the exposed natural ivory-coloured flesh. The one point that surfaced in an unstructured interview was that the new range of colours seemed unfamiliar as a natural product found in Namibia (van Wyk & ≠Eichab, 2014c). Perhaps the brown skin of the Makalani nut is what linked it to nature and resonated with the tourists who purchased it. The other crafters were fascinated by the brightly coloured Makalani nuts, and the idea that the nuts could be treated to change their appearance created a different dynamic amongst the crafters. Erwin.R.≠Eichab seemed protective of the new concept developing within the research. He was not comfortable sharing his new knowledge of dyeing the Makalani nuts, with the other younger crafters initially. When probed about his reaction, he stated that he needed time to understand what the new technique of introducing colour could mean for the products he would like to make. He mentioned that he had taught many of the other crafters with him to carve Makalani nuts, yet some did not create carved nuts with understanding or passion. He felt that the creating of a Makalani nut into a product required some form of relationship with the material and that relationship was rooted in understanding the material. He noted that some of the other crafters did not respect their product and often created bad quality craftsmanship and sold those nuts to popular tourist destinations. Mr.≠Eichab

explained that the knowledge extracted from the experimental sessions was new and needed to be protected, by first fully understanding how it would impact the Makalani nut as a crafting material.

When carving the dyed nuts, the sessions would often be held at his place of trade but far away from his usual standing place which was closer to the palm trees and the other crafters. The dyed nuts were easy to sketch onto and carved well. The nuts in this team experimental session were dyed after having been turned on a lathe. The added grooves and new external shape did not pose any limitation to the technique of carving (see **Figure 4.12: TES 5_Carving of dyed nuts (organic leather dyes**). The black ink from the ballpoint pen sketches was more visible in the colour Makalani nuts than the natural nuts with the brown skin. Mr.≠Eichab seemed very pleased with the results of this experimental session. The one limitation of this technique is the dye, which is a high quality, natural dye used in leather dyeing techniques in a successful leather dyeing firm in Windhoek, Namibia. The dyes are imported in mass quantities in a powdered form from Germany. The researcher was able to acquire some of the base colours as samples, to test the reaction of the Makalani nuts to the dyes. Acquiring dyes could pose as another obstacle to Mr.≠Eichab as an individual crafter; however this could be overcome by gaining the backing of the MTI as a registered SME. The formalised state of Mr.≠Eichab within a registered enterprise could lead to the MTI providing the surety and financial assistance needed to import and use these natural leather dyes as a crafting material. Training sessions on how to use the dye could be facilitated by the dye specialist at the leather dyeing factory, if an incentive is given that would benefit both parties in the new partnership. Further research is needed on the extent of dye penetration, using the natural leather dyes. The dye solutions are re-usable if stored in sealed containers and can dye several batches of nuts before being depleted. The dye solution is at its optimal effectiveness when at a temperature of 32-35 degrees Celsius. The dye will however also work in colder temperatures but will take a longer period of time to reach saturation point (i.e develop a rich colour).

5.4.6 TES 6: Dyeing and carving nuts dyed with *Otjize*

The final team experimental session involved dyeing sanded Makalani nuts with *Otjize* dye and then carving the dyed nuts with a scalpel blade. The technique of dyeing the matte Makalani nuts, using *Otjize* as a dye, was the sustainable solution for colouring the nuts a bright colour. *Otjize*, a powder that appears as a dark shade of green has an opalescent shimmer to it. The powder is sold in small quantities (usually less than half a teaspoon – 5ml) in small plastic bags. It can be purchased from Oshiwambo ladies who make and sell traditional Oshiwambo dresses (known as *Ondelelas*).

Figure 5.1: *Thusnelde and Kavere.* Maggi Barnard, 2013.

Figure 5.2: *Traditional Owambo dress* [dyed pink with Otize] Travel New Namibia, 2013.

Once this powder comes into contact with moisture (like water), it stains the material in which it has come into contact with a brilliant magenta pink colour. Despite the powdered dye being sold by these women traders in markets, there is a cloud of secrecy as to what the powder is actually made from. Some traders stated that it is the dried bark of a special tree that has been pounded extensively to form the fine powder. Other women believe it to be a shell that has been crushed to form the concentrated dye. The women who sold the *Otjize* dye could also not confirm the real name for the powder, with some admitting that they called it *Otjize*. This is the name used for the dye in this research. Due to language barriers, it was difficult to ascertain if the women were protecting what they may have deemed to be sacred indigenous knowledge (Cheikhyoussef & Embashu, 2013:2). The women briefly explained that a small amount of powder dye could be dissolved in an empty 2L coke bottle with some cold water. The temperature of the water did not affect the potency of the dye. When handling the small packet in which the dye was sold, the powder instantly stained one's fingers with a shade of pink. The sweat of one's hand activated the dyeing capacity of the powder. The bottle could be closed and stored to be used at a later stage. The instructions of using the dye were very similar to those used with the natural leather dyes, except for needing a higher temperature dyeing solution. The powder is also readily available to Namibian crafters and a packet can be purchased at local markets for ten Namibian dollars. The longevity of the *Otjize* as well as the simple method of use, makes it a suitable dyeing method for crafters. The bright pink colour is synonymous with traditional Oshiwambo culture. The women use the *Otjize* dye to colour traditional shell necklaces made from small discs.

Ekipa (large traditional buttons) were carved from animal ivory in the past and stained with ochre. Since products made from animal ivory have been linked to fuelling the poaching of elephants and rhinos, vegetable ivory has been welcomed as a sustainable alternative to the sought-after carving material. Vegetable ivory is a popular crafting material amongst crafters, as it can be carved and is similar in colour to animal ivory. The sourcing of vegetable ivory can be done in a sustainable manner as harvesting of the palm fruits that house the nut are not necessarily fatal to the palm trees (Bernal, 1998:73). This provides an environmentally friendly foundation upon which to develop solutions for

problems such as high unemployment, especially amongst the youth. The carving of the nut was skilfully executed, and delivered a beautiful new aesthetic for the Makalani nut. The one difference between a carved nut dyed with *Otjize* and a regular carved nut (with its brown skin in attached) is that dirt easily adheres to the dyed nut. This could be attributed to the matte surface of the nut caused by the removal of the brown outer layer by means of sanding. The pigments in the dyes permeate the flesh of the Makalani nut without difficulty if the dye solution is fairly concentrated. There seems to be no need for a sealant in order to retain the colour, however further research could be done on the effect of a natural or environmentally friendly sealant would have on the nut. This would be framed by the accessibility of the sealant to the crafters. Exploring various methods of sealing the nuts that have been dyed and carved is another area for potential further research.

5.5 Contribution of research

The research served as an educational experience for both the researcher and the master crafter, and generated conversations linked to creativity and the expression thereof. The overall aim of the research was to contribute towards the existing body of crafting knowledge in Namibia. The main areas of contribution are:

- Identifying techniques that are suited to the material in order to enhance the range of achievable aesthetics that informs the practice of Namibian (Makalani nut) crafters
- Contributing towards the body of knowledge and understanding of a local, indigenous material (i.e. confirming the versatility of vegetable ivory as a crafting material)
- Identifying key areas that could develop existing human capital (Erwin.R.≠Eichab) and align the crafting process of Makalani nuts with the goals as listed in the National Development Plan 4 (NDP4) of Namibia. This starts with Erwin.R.≠Eichab within the context of this research.

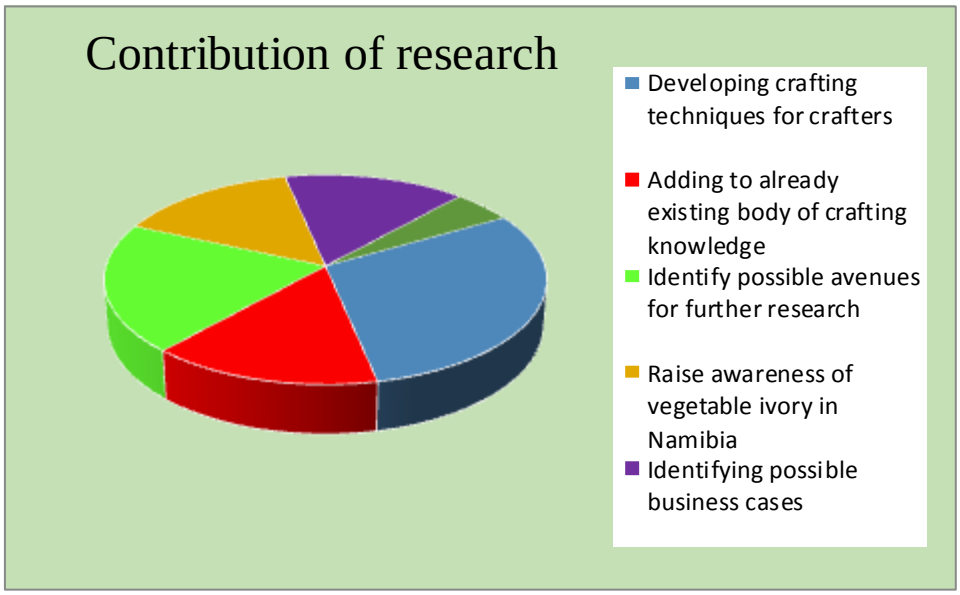


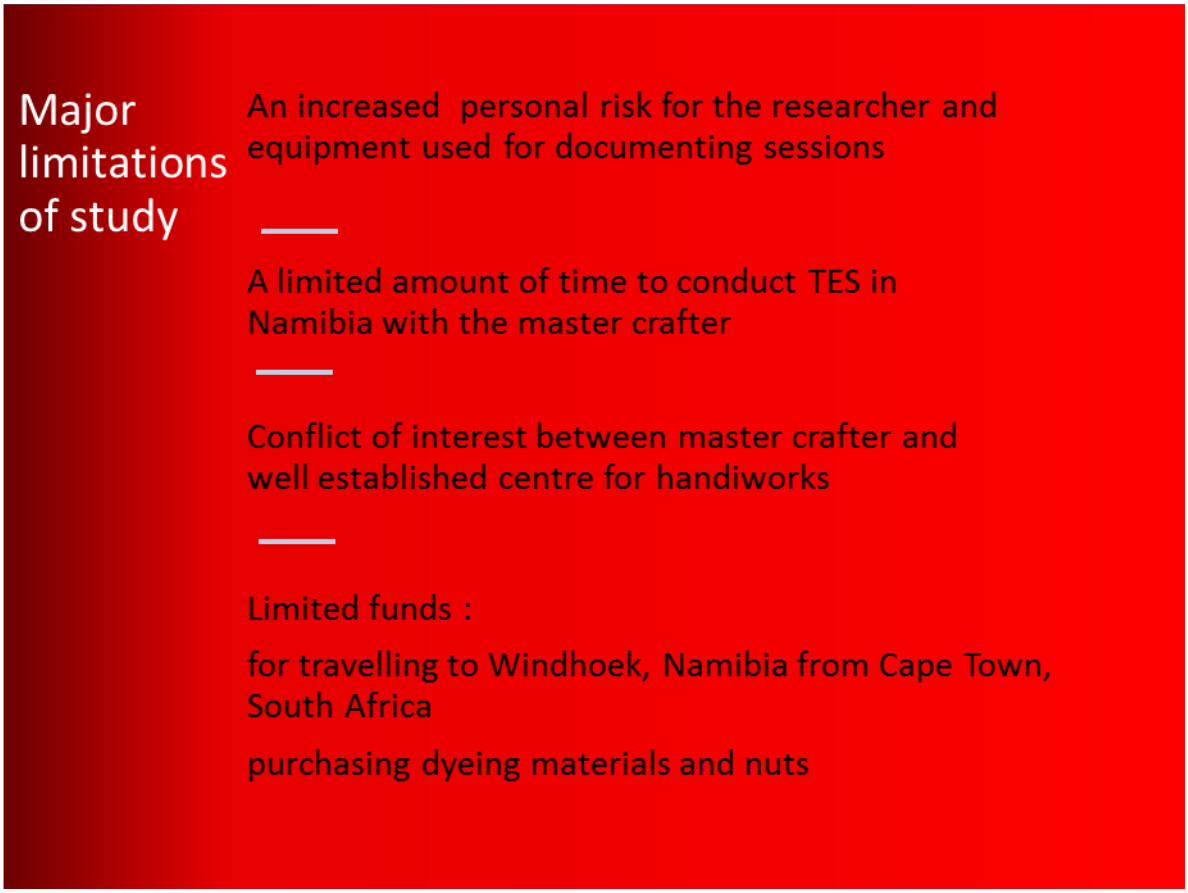
Figure 5.3: Overview of research contribution (Author's construct)

The research confirmed the value of vegetable ivory as a sustainable crafting material within the context of Namibia. This confirmation was consistent with what is found in the literature. The techniques used to dye and shape vegetable ivory in Namibia are similar to those used to dye and shape the variety of vegetable ivory found in Ecuador. The similarities include the capacity of the nut to be coloured using potent but natural dyes, the ability to cut, carve and turn the nuts using various tools, as well as the versatility of the nut to be used as a local material that reflects the indigenous crafting knowledge of the country from which it originates. The differences include the finer details in the *method* of the various techniques. While both the tagua and Makalani nut can be sliced into discs, the tagua nut seems able to be cut without the lubrication of water. The Makalani nut responds best to cutting when wet. A popular techniques used to craft tagua nuts is shaping these nuts on a lathe. The lathes used are simple and different to those used for the purposes of this study. The lathes used to turn the Makalani nut were industrial lathes stationed in workshops. According to the video documentation found online, this meant that the type of lathe used to turn the Makalani nuts in the SES4 was of a superior standard to those used by crafters in Ecuador. What is worth mentioning is that the lathes used in SES4 are not easily accessible to the public, and would need a formal agreement and training in order to make use of them. This contradicts the current practice of sourcing resources for crafting needs in Namibia, where Mr.≠Eichab sources his materials and tools from his immediate environment. The inability to easily access machinery without established relationships with the respective training institutions could be a point to be addressed in further research. The exploration of dyeing as a crafting technique highlighted the sound decision of using *Otjize* as a sustainable, accessible form of dye. The aesthetic of the pink colour is an echo of that found in some *Ondelelas* and traditional jewellery (*Onyoka*) made from shell. This pink aesthetic could be incorporated when designing a new sustainable range of traditional buttons (*ekipa*) carved from Makalani nuts. This alternative of material sourcing for carving *ekipa* could be an additional contribution to the research.

5.6 Limitations of the study

The limitations of the study were split into two categories, depending on the perceived impact they had on the study. The major limitations (red block) were deemed as having a greater degree of impact on the study, and as affecting the activities (methods) and structure of the study in a substantial way. The minor limitations (orange block) were seen to be less influential (but not less important) in impacting the planning and structuring of the study but did affect the activities (methods) to a certain extent. Some limitations were positioned in both categories, depending on the specified context. The limitations are listed in the Table 5.2.

Table 5.2: Major limitations of the study (Author's construct)



The table below lists some of the important minor limitations of the study.

Table 5.3: Major limitations of the study (Author's construct)

5.6.1 Personal risk

The study took place in two cities; namely Windhoek, Namibia and Cape Town, South Africa. The Team Experimental sessions (TES) took place at Mr.≠Eichab's place of trade in Windhoek, Namibia. This was specifically planned in this manner, in order to minimise the inconvenience the study had on his daily routine. The documentation of the experimental sessions and unstructured interviews threatened to interrupt his daily sales. The nature of selling at a tourist destination required Mr.≠Eichab to approach tourists as they visited the national monument where he was stationed. Documenting the process by photographing carving and dyeing sessions, exposes his place of work. This is an ethical issue because his interest in the study was to explore possible new ways of crafting the Makalani nut, but trading with his nuts at his current place of trade is deemed illegal by the City of Windhoek (CoW). The City of Windhoek has specific zones that have been demarcated for crafters. Mr.≠Eichab is not stationed in this craft area and shares his current place of trade with several other Makalani nut-crafters. This area is set apart from the designated craft-trading areas which trade in products made from stone, wood, woven and beaded materials. The use of Mr.≠Eichab's photographs and real name in this study places him at risk of being removed from his current place of trade, despite him insisting that his real name should be used. The researcher is originally from Windhoek, Namibia but lives and studies in Cape Town, South Africa. The master crafter, Erwin.R≠Eichab lives and works in Windhoek, Namibia. The researcher travelled by car from Cape Town to Windhoek several times during the period of study, at her own expense in order to conduct the team experimental sessions as well as the unstructured interviews. The distance travelled between Windhoek and Cape Town is approximately 1400km in one direction. The amount of long distance travelling increased the personal risk of the researcher. The personal risk of the researcher was further increased by the fact that she was the only female conducting interviews in a public space, where the crafters have been known to get robbed. The video recording and photographic documenting of the experimental sessions required the use of expensive digital equipment in order to ensure high quality footage for the data collection phase of the research. This was a safety risk as the risk for being mugged was increased by standing with the equipment in hand. In order to minimise the personal risk, the researcher scheduled the TES early in the day when several tourists frequented the national heritage site and place of trade. When it was possible, the researcher also conducted the interviews with a trusted friend waiting in close proximity. Mr.≠Eichab spoke of having a manufacturing schedule at his place of residence, however to ensure personal safety and lower her personal risk, the researcher did not conduct any data collection from this site.

5.6.2 Threat to business or opportunities

Ethical consideration needed to be given to the well-being of Erwin.R.≠Eichab's current business. The study required that the Team Experimental Sessions (TES) be conducted at his place of trade, in order to test the practicality of using new techniques with as little disruption as possible. Conducting the sessions at his place of trade (in a public space) also contributed to an increase of the personal risk of

the researcher. Mr.≠Eichab's story of how he came to craft and sell his Makalani products at the national heritage site, was one that highlighted sensitive issues with well establish centres that caters to the tourist market. Erwin's involvement in this study could result in the designing and manufacturing of a new range of Makalani nut products that are completely different to those sold in these well-established tourist-geared handiwork markets. Depending on the manner in which the findings of this study are disseminated and used to elevate and empower Erwin, he could still lose out on the opportunity to sell his wares in an established centre trading in crafts, as his work could present a threat to small scale businesses trading in Makalani nuts.

5.6.3 Efficacy of research – experimental sessions in Namibia & RSA

The research required that experimental sessions be conducted together (including both the researcher and the master crafter), to facilitate discussion about the process of a technique and its effects on the Makalani nut. Due to time constraints as well as limited finances, the number of TES conducted had to be halved (3) and the other 3 sessions had to be conducted as SES. The researcher paid for all expenses incurred in the research with her own finances. She used her personal vehicle to travel to Namibia from South Africa in order to conduct the TES. These sessions were conducted during her vacation periods, and did not exceed lengths of more than a week at a time. The researcher and master crafter encountered more challenges in terms of scheduling meeting times that suited both parties. At times when the researcher was able to travel to Namibia, Mr.≠Eichab had to travel out of town during long weekends and festive holidays. It would not be ethical to request him to stay just to conduct the research as this could influence his perspective of the research. There was a slight language barrier between the researcher and the master crafter; with English proving to be a difficult language for the crafter to effectively express his thoughts. It was agreed upon that the chosen language of communication would be Afrikaans (a language spoken by many Namibians).

The major limitations shaped the manner in which the research was structured – as time and finances were limited resources. The restricted access to the workshop in Windhoek, limited the study as the master crafter could not participate in a TES for techniques such as turning the Makalani nut on a lathe. The minor limitations shaped the approach taken in each experimental session and were accommodated as they surfaced in the TES.

5.7 Summary of chapter

The master crafter had a positive approach towards the development of knowledge through testing the manufacturing techniques. He acknowledged the potential that the new techniques had to generate a new range of products. This would widen the scope of his target market – seeing as the more traditional, natural aesthetic could still be sold to foreign tourists, whereas the new pink aesthetic or ability to carve Makalani nuts into contemporary, sustainable *ekipa* might appeal to the younger local market. The increased popularity of vegetable ivory as a crafting material could, however, signal environmental risks that include the increased number of communities using NTFPs, as a resource to generate income. This could negatively affect the environment to suffer as a consequence. Even without the forests, from which NTFPs are harvested, being protected, the quality of life for crafters may still improve as a result of income generated from selling products made from NTFPs (Lybbert, et al, 2002:127). The approach to addressing the demand for vegetable ivory will therefore be closely linked to sustainable practices with regards to harvesting the material and managing the environments from which the come. The World Commission on Forests and Sustainable Development (1999:2), recommended that "*the world's rich forest resources [are used] to improve life for poor people and for the benefit of forest-dependent communities*." The use of Makalani nuts in Namibia would be an ideal context in which to apply this recommendation, provided that sustainable harvesting practices are followed. This speaks to the practice of sustainable development and to the long term goal of reducing unemployment amongst Namibians.

CHAPTER SIX
CONCLUSION

6.1 Introduction

As in the case of the tagua nut, there is much to be gained from conducting further research around the growth and production possibilities of the Makalani nut. This could be split into two main research areas, namely palm growth and non-timber-forest products. Each area could branch into several smaller research areas – including, but not limited to, community based projects linked to the palm products. The crafting of Makalani nuts holds the potential to act as a catalyst in changing the manner in which the material is sourced and crafted by local craftsmen, as well how the nut is perceived on a local and international platform.

6.2 Revisiting the aims and objectives of the research

The researcher set out to answer the following research questions:

1. What are the current craft-related uses of the Makalani nut within Namibia?
2. How can the crafting techniques of other vegetable ivory products found globally, inform the exploration of manufacturing techniques regarding the Makalani nut?
3. What crafting techniques and practices have been successful with the tagua nut found in Ecuador, South America?
4. How can experimentation with the craft techniques add value to the craft products made from Makalani nuts?

In addition to the research aims, the objectives of the study were as follows:

1. To determine the (most prominent) craft-related uses of the Makalani nut and what techniques and resources are used when crafting them;
2. To generate a list of methods that can be used as a guideline to inform the practical experimentation with the Makalani nut use recipes and techniques that are used by Ecuadorian tagua-nut crafters;
3. To inform the craft-related data of the Makalani nut, with regard to functional and decorative contexts. The process was documented and recorded as new data to inform and refine the process of manufacturing; and

4. To identify findings of the practical experimentation that added to the body of craft-knowledge of Namibia. This is *in addition* to the already existing undocumented, indigenous knowledge of the Namibian people.
5. The possibility of highlighting universal manufacturing techniques, whilst establishing an aesthetic that speaks of Namibian origin, was an additional outcome.

6.3 General conclusion and proposed recommendations

In conclusion, it is valuable to reflect on the key points in the research, as seen in Figure 6.3.

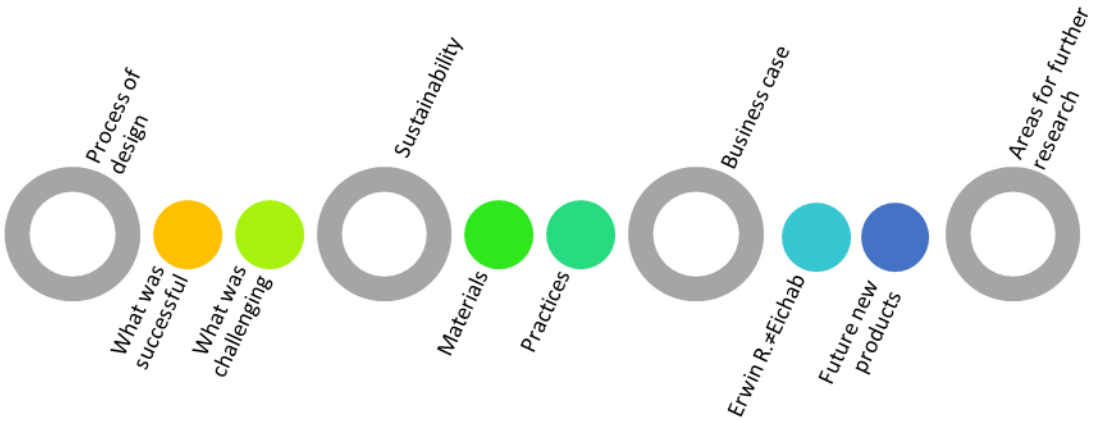


Figure 6.1: Summary of key points in data (Author's construct, 2015)

6.3.1 Process of the design of the study: Successes and challenges in the research

The **process of design** within the study started with the need to first establish the preferred manufacturing techniques used by the master crafter, Erwin.R.≠Eichab to produce crafted Makalani nuts. The time line below illustrates the experimental session process. Various experimental sessions took place involving the researcher and master crafter, or one individual at various times.

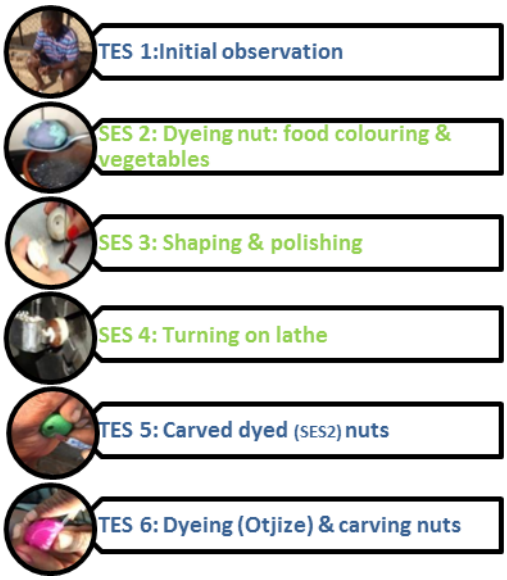


Figure 6.2: Summary of Experimental Sessions (Author's construct)

The **successes** of the research included the knowledge gained by both the researcher and the master crafter. This knowledge included:

- The ability of Makalani nut to be dyed and the extent to which the nut absorbs dye;
- A new aesthetic in terms of shape and colour;
- Inspiration (for Erwin.R.≠Eichab) to develop a wider range of crafted products;
- Inspiration (for the researcher) to include vegetable ivory into contemporary jewellery designs such as that of Monique Péan;
- An increased awareness of what equipment would be required to facilitate some of the techniques;
- Versatile techniques with which to develop training material from; and
- Identifying possible areas for further research.

The **challenges** of the experimental sessions included:

- Increased personal risk of the researcher, which in turn influenced the location and time allocated to the experimental sessions and unstructured interviews;
- The need to travel long distances (by car) between two countries in order to conduct team experimental sessions;
- Unaligned work schedules meant that the master crafter was not always available to meet when the researcher was, and vice-versa;
- Conducting interviews at Erwin's place of trade helped to minimise the interruption of his daily routine, but meant that the researcher was surrounded by several crafters (strangers) at any given time;

- Conducting interviews in a public space meant being exposed to the elements (high temperatures and thunder showers during the Namibian summer);
- Scheduled and limited time working on a lathe in workshops in Windhoek, Namibia;
- Increased risk of expensive equipment (smartphone and tablet) used to visually document the experimental sessions being stolen; and
- The language barrier: the agreed upon language for the unstructured interviews and TES was Afrikaans, but some technical terms are difficult to explain in or do not exist in Afrikaans [The researcher is fluent in English and Afrikaans, the first language of Erwin is Damara].

6.3.2 Sustainability: materials and practice

A prominent theme in the research is that of sustainability. The researcher made every effort to consider and align all decisions that were taken pertaining to the study to this theme. The dyes used in the study were intentionally sourced, depending on their status as being natural dyes and on their availability. The dyeing documented in Single Experimental Session 2 (SES2) highlighted the fact that the natural leather dyes were incredibly effective as a colouring medium but were not easily accessible to Mr.≠Eichab as a crafter. The possibility of creating an arrangement that facilitates access to this dye would need to be within a formal structured agreement, between the respective leather factory and an established body (such as the Ministry of Trade and Industry) that represents Mr.≠Eichab as a safe and profitable investment. Training in best practice techniques when using the dyes would also be necessary. This knowledge could then be disseminated in training workshops that would be hosted by Mr.≠Eichab. The TES6 showed *Otjize* to be very well suited to creating a Namibian product, by Namibian hands using natural Namibian materials. The most valued aspect of dyeing with this natural powder is that it is a technique that can be implemented immediately, as the *Otjize* is readily available, affordable, can be re-used and is easy to use at Mr.≠Eichab ‘s current place of trade with minimal tools (bowls and water) required.

6.3.3 Business case: Erwin.R.≠Eichab and future new products

The opportunity to develop a business case for Erwin.R.≠Eichab is linked to two factors. The first factor is that he is already familiar with the Makalani nut business, and secondly, he has been training other crafters in an attempt to help them generate some form of income. With the right support, Mr.≠Eichab could increase the knowledge of several crafters by drawing on his own tacit indigenous knowledge, along with what was seen in the experimental sessions in the research. Mr.≠Eichab’s ability to easily adapt his skill of carving to the added techniques means that with further training he could have a wide portfolio of work. This combination of two pools of knowledge, old and new, can inform the design process of new products made from Makalani nuts. The researcher has identified

fine jewellery as a possible avenue of development, where segments of carved and/ or dyed Makalani nut can be incorporated into a jewellery range that reflects the design sense of Namibian craft within an age old practice such as fine jewellery. The proposed line of jewellery could then elevate the Namibian vegetable ivory from a craft material by encasing it in precious metals. Mr.≠Eichab could possibly be trained in several jewellery manufacturing techniques in the future, and thus enrich his craft by further developing his skillset.

6.3.4 Areas for further research

There are three main areas that have been identified for further research, namely:

- Developing detailed methods of best practice for selected techniques that are best suited to crafting with the Makalani nut;
- Explore various sectors into which the Makalani nut can be used as a material; - such as the (button) manufacturing industry, jewellery industry, training institutions;
- Identifying an accessible, hands-on approach to developing a business case for crafters such as Erwin, by simplifying the process of setting up a small workshop and place of trade. This business case must focus on developing the crafter as a business person.

6.3.5 Recommendations

The limitation of time constraints within this study meant conducting experiments in the limited available time. In future research, the extent to which each technique is tested can be explored in greater depth, to determine more detailed recommendations for methods of crafting. This would then be a means of developing the best practice-methods of the techniques explored in this study. A finding of the experimental sessions was that a Makalani nut can be dented, due to its softness of 2.5 (Moh's scale classification). In the light of this recommendation, future experiments could look at whether the nut could be branded by warm materials such as metal stamps, etc. The nut reacted to heat by turning slightly brown due to the friction generated by the sawblade in the mounted jig-saw cutter (See **Figure 4.7: SE Session 3_Shaping nuts (slicing nuts**).

The second recommendation of this study is that possible ways of utilising Makalani nuts to a greater extent, in various sectors, is identified. Examples could include manufacturing sectors, such as button making or in the manufacture of fine jewellery, as well as in training institutions where Arts and Crafts are taught.

Further research is needed to identify ways of creating a permanent space for Mr.≠Eichab where he is able to create his products, in a safe environment that allows him to set up a workshop where he could employ other crafters. This could also serve as a training facility in order to develop skills in unemployed youth. The underlying goal of the process that streamlines the setting up of a workshop

should be to develop the crafter into an independent, well-equipped businessman/ business woman that is strategically placed to train other aspiring crafters.

6.4 Implications for further research

This study's main aim was to create greater awareness within the Namibian crafting community of vegetable ivory's potential to take on various appearances using a variety of manufacturing techniques.

Risks to be considered when introducing new knowledge and techniques into a crafting environment include displacing original indigenous crafting techniques and having no guarantee of benefiting the participants involved (Filho, 2013:64-65). It is important to retain the authenticity of indigenous crafting practices. Through careful observation, along with the acknowledgement of the already existing knowledge crafted Makalani products carry, a detailed documentation of how the findings could impact the practice of crafting in Namibia in the long run could be considered. This approach to further exploration would require a longer period of time, in order to identify the best practices for specific communities of Makalani crafters. A future study with a larger and more diverse sample group could aid in determining whether the new knowledge of manufacturing techniques (within the context of Namibia) would be beneficial in uplifting the crafting community in the long term.

6.5 Summary

The research set out to identify various crafting techniques that were successfully used with the tagua nut, the South American variety of vegetable ivory. By generating a list of manufacturing techniques to be tested on the Makalani nut, the African variety of vegetable ivory, the research documented the process and outcomes of these techniques. Despite the limitations of the study- which included the challenge of conducting research between two countries - the findings of the research highlighted a possible Namibian aesthetic that could enrich the products made from Makalani nuts. A distinctly Namibian aesthetic could be achieved by using a natural, indigenous powder (*Otjize*) that is anchored in tradition and a Namibian identity. The technique aligned itself to sustainable practice that could be adopted by the crafting community immediately. The study further revealed challenges that the researcher and master crafter faced while conducting the experimental sessions. These challenges, when addressed in future, could enrich the findings of this research and benefit the crafting community in a holistic manner.

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MAKALANI NUT PRACTICAL EXPERIMENTATION LOG_DYEING				
DATE	TECHNIQUE(S)	TIME (TAKEN) 24:00	FINDINGS/NOTES/OBSERVATIONS/THOUGHTS	TECHNIQUE SUCCESFUL Y/N
16/07/2014	Dyeing (red food colour)	09:30-09:40	Sanded bottom of whole nut with 100 grit sand paper to expose ivory flesh. Solution: 500ml water, 1tspn salt, 3 tspns red food colouring Bring to boil on high heat setting on stove	Yes
		09:43	Place nut in boiling red solution	
		10:14	Colour check 1: Bottom absorbed colour well. Sides only slight colored (with brown skin on) Brown skin appears with a red tint	
		10:28	Colour check 2: Deeper red colour. Better appearance when wet. Lightens slightly to a dull red when nut is dry.	
		10:43	Take nut out.	
16/072014	Dyeing (yellow food colour)	10:15	Sanded bottom and ¼ of side of nut. Solution: 400ml water, 1 tspn salt, 3tspns yellow food colouring Bring to boil on high heat setting on stove	Yes
		10:29	Place nut in solution. Boil for 30 min.	
		11:00	Colour check 1: Colour well developed	
		11:29	Colour check 2: deep egg yellow colour on exposed nut areas. Colour very similar dry to when nut is wet.	
16/07/2014	Dyeing (blue food colour)	10:15	Sanded bottom and ¼ of side of nut. Solution: 400ml water, 1 tspn salt, 3tspns blue food colouring Bring to boil on high heat setting on stove	Yes
		10:35	Insert nut into blue solution. Boil for 15 minutes	
		10:50	Colour check 1: Colour very well developed. Strong blue colour. Very dark. Almost black.	
		11:30	Colour check 2: Exposed nut is very blue. Section of nut still covered in the fine brown skin has a blue tint to it. Colour is so deep, almost black. Nut is cracked at the base – has 'splits' on the base of the nut. This is due to too much water having been absorbed. E.Romances (crafter) mentioned that the nut need not be submerged in liquid for too long for it to become soft. Lengthy	

APPENDIX A: Dyeing log

APPENDIX A (continued)

			submissions lead to risks of the nut absorbing large amounts of water and then splitting. Causing irreversible splits in the nut. The nut also becomes more porous and the surface is more uneven and textured.	
28/08/2014	Dyeing (fresh beetroot)	10:15	Weighed 2 small beetroot bulbs – 109.58g. No leaves. No stalks. ½ nut – carved with elephant motifs Dry nut weight: 10.26g Sliced beets into slices. Placed sliced beets in 500m of cold water in clear glass bowl. Stove setting on high (6).	-
		10:30-10:40	10 minutes of boiling resulted in a fairly deep red colouring of the water – colour seeps from beets into water. By 15 minutes of boiling, water colour is a deep red.	
		10:52	Beets lose colour.	
		11:05-11:10	½ nut inserted into red solution and boiled for 5 minutes. Superficial colouring takes places. Exposed ivory flesh turns slightly red. Inside of nut seems more receptive to absorbing the colour. Perhaps the rough/ unsmoothed/ unsealed (?) surface. 100ml more water is added to bowl in order to completely submerge nut in red-coloured solution. Added 1tspn of salt.	Yes
		11:32	Deeper red colour visible on exposed ivory parts	
		11:36-12:06	Colour appears darker/ more intense when wet. Exposed ivory coloured flesh looks pinks once liquid air-dries on it. Added 100ml more water in order for nut to remain submerged.	Yes
28/08/2014	Dyeing (fresh broccoli)	11:05	158.83g of fresh broccoli cut up into 500ml of cold water. Brought to boil in order to release colour.	
		11:17	Closed lid of dish to retain water (level).	
		11:26-11:40	Broccoli didn't produce a lot of colour. Very light green, no real pigment in water. No point in placing nut in solution. No effect in colour. Only softens outer layer of nut. Switch off stove.	No
03/09/2014	Dyeing nut A with Otjize (pink dye)	15:00-15:30	250ml cold water in a Foamalite container. Stir in a small pinch (less than ¼ tspn) of Otjize powder, mixed. Placed nut in. Otjize is potent even in small amounts. Otjize is an opalescent green colour with a magenta undertone when dry. The vibrant pink (magenta) colour is seen when contact is made with water.	Yes

MAKALANI NUT PRACTICAL EXPERIMENTATION LOG_SHAPING				
DATE	**TECHNIQUE(S)**	**TIME (TAKEN) 24:00**	**FINDINGS/NOTES/OBSERVATIONS/THOUGHTS**	**TECHNIQUE SUCCESFUL Y/N**
11/08/2014	Cutting using a mounted jigsaw cutter	11:00-11:05	Nut cuts fairly easily. Cut using a medium-sized sawblade on a mounted scroll fret saw. Nut cuts better when slightly dampened – which just requires a quick rinse in cold water and then drying to be cut. Friction of blade cutting nut resulted in slight browning in colour on some areas. Had a similar smell to burnt popcorn – perhaps the oil flesh reacting with the heat generated from the blade friction. Cutting time: +-3-5min Inside Ø: Oval – 15mmm x 13mm Nut (whole) weight: 13.24g	Yes
	Cutting	12:00-12:05	Cut off slice: oil layer visible on flesh of nut. Oil is transparent in colour – sheen on nut flesh. Slice is translucent. Thickness between 3mm (thinnest) – 4mm (thickest) Cutting time: +-3-5min Slice weight: 2.37g	Yes
	Filing: top half	12:30-13:00	File exposed area of nut – semi-sheen visible when filing. Matte white/ivory coloured fleshed exposed when filing outer brown skin off. With a rough file. Matte ivory appearance. Not a lot of filing generated by filing, Nut quite 'sticky' – perhaps due to oil content in nut.	Yes
	Burring: bottom half	14:10-14:15	Hollowing out of the nut with a round burr (pendant motor drill) to generate shavings in order to have shavings to polish with. Burring generates better shavings, but still not enough to polish with. **Yes**: burring was successful. **No**: Shavings generated were not enough for polishing. The nut reduced in weight but was still structurally sound. The thinning of the approximately 5mm thick wall, to that of 1-2mm thick still allowed the hollowed half to be a strong shape.	Yes and No
26/08/2014	Sanding (1000 grit)	13:00-13:20	Sanded slightly on the top of the nut. Slight sheen visible. More than when nut has only been filed. Brown layer removes fairly easily. Inner layer (flesh) is a whiter colour. Easier to see sheen of oil on whiter colour flesh. A rougher grit of sandpaper (400) removes the majority of the brown skin with ease. A range of finer grit of sandpaper (600 -1200) is used to remove the remainder of the brown skin and give a uniform finish to the ivory-coloured flesh.	Yes

APPENDIX B (continued

05/09/2014	Carved dyed nut (Otjize)	-	Pink colour penetrated the top outer layer of nut. All ivory coloured-exposed areas are dyed. Carved away areas are white – indicate superficial level of penetration, but deep enough to colour nut. Contrast is now between bright pink and ivory colour flesh. Colour – if rubbed – seems fixed to nut.	Yes
10/10/2014	Hollowing out of half a Makalani nut	11:00-12:00	Using a 5.5mm diameter round burr on a motor pendant drill, burred out the wall thickness from an average of 6-7mm thick to approximately 1.2-2mm thick. Nut was firm and hard despite thinner walls. Weight was reduced significantly. Greater intensity of translucency on ivory coloured flesh (i.e. where brown skin had been shaved away by scalpel blade) Lots of fluff generated – not sure if it can be used for polishing	Yes
21/10/2014	Facet Makalani (nut on sanding belt- 180 grit sandpaper)	12:00:12:30	Nut was sanded on electric sanding belt. Shaped fairly easily. Matte surface however sheen is visible due to heat generated from friction between nut and sandpaper. Popcorn smell ☺ Lots of fluff generated from process.	Yes
21/10/2014	Shaping on mounted grinder (smooth grit stone)	14:00-14:15	Created vertical grooves by pressing nut against the surface of the grinder (stone) Nut shaped easily on grinder. Generated very little shavings.	Yes

APPENDIX C: Turning log

MAKALANI NUT PRACTICAL EXPERIMENTATION LOG				
DATE	TECHNIQUE(S)	TIME (TAKEN) 24:00	FINDINGS/NOTES/OBSERVATIONS/THOUGHTS	TECHNIQUE SUCCESFUL Y/N
05/09/2014	Turning on (fitting & turning) lathe – hollowing out nut (Nut A)	10:00 – 14:00	Nut A was placed on lathe. Even outer diameter needed to be established. Drilled hole in centre (top) Turned nut – even outer diameter. Hollowed out from base. Matte finish due to 180 grit sandpaper used. Nut is translucent. Walls still fairly thick (2-4mm thick).	Yes
09/09/2014	Turning nut on Turning & Fitting lathe (Nut B) – tapered bead	10:00 – 14:00	Starting dimensions: 35mm x 33mm x 27mm (h) – nut oval in shape. Evened out outer diameter: 26mm, done to increase surface area for chuck to grip onto. Chuck dents outer part of nut. Wall thickness is compromised due to irregular internal hollow cavity inside Makalani. With even outer diameter: nut is more translucent in some areas compared to others. Nut eventually cracks under strain from chuck and opposite revolving centre. Wall thickness was inconsistent, and strength compromised. Two centres not completely opposite one another due to irregular/organic shape but didn't seem to impact turning. Lathe work had to go slowly…in order to nut 'burn' the nut from friction between chisel tool and nut. Oil is present and can be smelled when nut heats up (by means of flame-absent heat.)	Yes & no
	Turning nut on T&F lathe (Nut C) – stepped bead	14:00-14:40	Irregular measurements: nut shaped – oval to start with. First step: even out outer diameter. Turned 3 *stepped-tiers:* biggest tier – 30mm in outer diameter, 2nd layer: 25mm o.d Turned nut at 555RPM.	Yes
10/09/2014	Turning nut on T&F lathe (Nut D) – bead with grooves	15:00-16:00	Outer diameter established in centre part of nut. Ends turned to smaller points. Various chisels used to create deep grooves on nut.	Yes

APPENDIX D: Polishing and carving dyed nut log

MAKALANI NUT PRACTICAL EXPERIMENTATION LOG_POLISHING

DATE	TECHNIQUE(S)	TIME (TAKEN) 24:00	FINDINGS/NOTES/OBSERVATIONS/THOUGHTS	TECHNIQUE SUCCESFUL Y/N
12/08/2014	Polish (resin polish)	14:00-14:20	Polished nut with white resin polish – to avoid discolouring nut flesh. Nut had been filed with a rough file but still had a slight sheen once polished. Perhaps a finer grit of sanding will deliver a better sheen. Nut weight: 4.77g	Yes
13/08/2014	Polishing (yellow nut) Carved nut.	14:30-14:32	Polished for two minutes with (white) resin polish on a polishing wheel. Soft muslin buff. Colour seems faded by polish, especially around the carved out animals. Slight sheen on colour. Rinsed in soapy solution in ultrasonic to remove fatty residue from polish. Time immersed: 3 min Outer layer of the nut absorbs water fairly easily, leaving surface feeling slight fluffy/ spongy – this causes loss of hardness and compromises the colour and accuracy of carving/ detail on nut. Oil smell present throughout polishing process and submersion in water. Whole nut weight: 15.10g	Yes
05/09/2014	Carved dyed nut (Otjize)	-	Pink colour penetrated the top outer layer of nut. All ivory coloured-exposed areas are dyed. Carved away areas are white – indicate superficial level of penetration, but deep enough to colour nut. Contrast is now between bright pink and ivory colour flesh. Colour – if rubbed – seems fixed to nut.	Yes

APPENDIX E: Information sheet and PISC form

Information Sheet

Dear Participant

Your participation in this study is valued.

Who is conducting this study?

This study is being conducted by Michelle van Wyk who is completing her Master's degree at the Cape Peninsula University of Technology, South Africa. Her supervisor is Veronica Barnes. Both their details can be found at the end of this document.

What is the study about?

The aim of the study is to identify unexplored techniques of manufacturing that could further inform the uses of the Makalani seed.

OR

This study looks at the craft-related uses of the Makalani seed to see what products are created from it as well as what other techniques could be applied when working with it.

Who can take part?

For this study, the researcher has chosen to focus specifically on Namibian crafters working with the Makalani seed.

What is required from someone who takes part in this study?

This study involves participating in two possible ways: an individual interview as well as a practical component. It is possible to only participate in the interview.
The individual interview will be conducted where the crafter manufactures his/her products.
The practical section will involve collaborating with the researcher by experimenting with various manufacturing techniques. The process and results of the practical section will be documented by photography and filming.
A second interview will then be conducted after the practical section has been completed. The interview will be captured digitally by photography and/or filming.

How could I benefit from this study?

By participating in this study, you are able to contribute towards generating data that will highlight important issues with regards to the Makalani seed and the crafting of it. This fits into a bigger body of knowledge of craft in Namibia. Recommendations can be made in

this study that address possible problems that crafters experience when working with the seed. You will also learn new techniques that are used globally on other types of nuts (vegetable ivory).

Are there risks involved when participating in this study?

When participating in this study, you might be introduced to several new techniques used to craft vegetable ivory. This may bring about challenges such as not having access to tools and/or machinery. However because this is a collaboration between yourself and the researcher, all these issues will be addressed and documented in order to successfully facilitate the testing of these new techniques.
Some techniques may not work on the Makalani seed and this may be frustrating in terms of feeling like time and effort have been sacrificed in vain. New techniques may require complying to certain safety regulations in order to execute them.
There are no other risks involved.

Do I have to take part in this study?

No, participating in interviews and/or experimenting with the seed is completely up to you. You may withdraw at any point during the study, should you feel unable to carry on. You do not have to give a reason for your decision. All data will be destroyed should you wish to withdraw from the study.

Will my identity be kept confidential if I part take in this study?

Yes, your name will be kept confidential and a pseudonym (false name) will be used in the study when referring to you. All pictures displaying your face will be blacked out. All information will be kept safe at the researcher's private home, on a password-protected computer.

Your information will only be used in this study and your identity will not be disclosed in any publication following this study.

Should you have any other questions or concerns, please feel free to contact the researcher or supervisor involved in this study. Their details are as follows:

Researcher: Michelle van Wyk
contact: (+27) 083 89 44 585
email: vanwykm@cput.ac.za

Supervisor: Veronica Barnes
contact: (+27) 021 460 3820
email: barnesv@cput.ac.za

Appendix B: Individual Consent for Research Participation form (PISC form)

Cape Peninsula
University of Technology

FID/REC/ICv0.1

FACULTY OF INFORMATICS AND DESIGN

Individual Consent for Research Participation

Title of the study: Unexplored avenues of adornment: a study of craft-related uses of the Makalani seed.

Name of researcher: Michelle van Wyk
Contact details: email: vanwykm@cput.ac.za phone: (+27) 083 89 44 585

Name of supervisor: Veronica Barnes
Contact details: email: barnesv@cput.ac.za phone: (+27) 021 460 3820

Purpose of the Study:

- To document and describe all craft-related uses of the Makalani seed in Namibia – this will include visually documenting by means of photography, filming and digitally recorded interviews
- To compare techniques used in the crafting of similar seeds (known as vegetable ivory) found globally
- To present findings, strategies and techniques that will better inform practice
- To contribute to the body of knowledge of craft in Namibia by addressing the issues of sustainability and participatory design

Participation: My participation will consist essentially of being interviewed, both through video and audio recordings. I will also participate in practically experimenting with applying various manufacturing techniques to the Makalani seed. I will do this in collaboration with the researcher. A second interview will be conducted after the practical experiments have been done. This too will be an individual interview and will be documented digitally.

Confidentiality:
The researcher assures me that the information I will share will remain strictly confidential.
I understand that the contents will be used for research purposes in an MTech study and as findings presented at a conference addressing similar issues addressed in this study. My confidentiality will be protected by Michelle van Wyk, by using making use of pseudonyms (meaning my real name will not appear in the study in any way).

Anonymity will be protected in the following manner (unless noted below). Anonymity will be guaranteed by blanking out of faces. Place names will not be disclosed but rather places will be referred to in a vague descriptive manner. The risk involved for the participant is exposing his place of trading to whoever reads this study. This could cause him to be moved as this is one the national heritage sites and therefore no trading is allowed by the City of Windhoek. Crafters have designated trading areas within the city.

Conservation of data: The data collected will be kept in a secure manner. All digitally recorded interviews and videos will be stored securely on a personal computer with a password. The personal computer will be kept at the researcher's private residence to which only she has access. Original data will be kept for five calendar years for audit purposes.

Voluntary Participation: I am under no obligation to participate and if I choose to participate, I can withdraw from the study at any time and/or refuse to answer any questions, without suffering any negative consequences. If I choose to withdraw, all data gathered until the time of withdrawal will be destroyed.

Additional consent: I make the following stipulations (please tick as appropriate):

	In thesis	**In research publications**	**Both**	**Neither**
My image may be used:				
My name may be used:				
My exact words may be used:				
My practical work done with the Makalani seed, (and used by the researcher in her practical exploration) may be used:				

Acceptance:

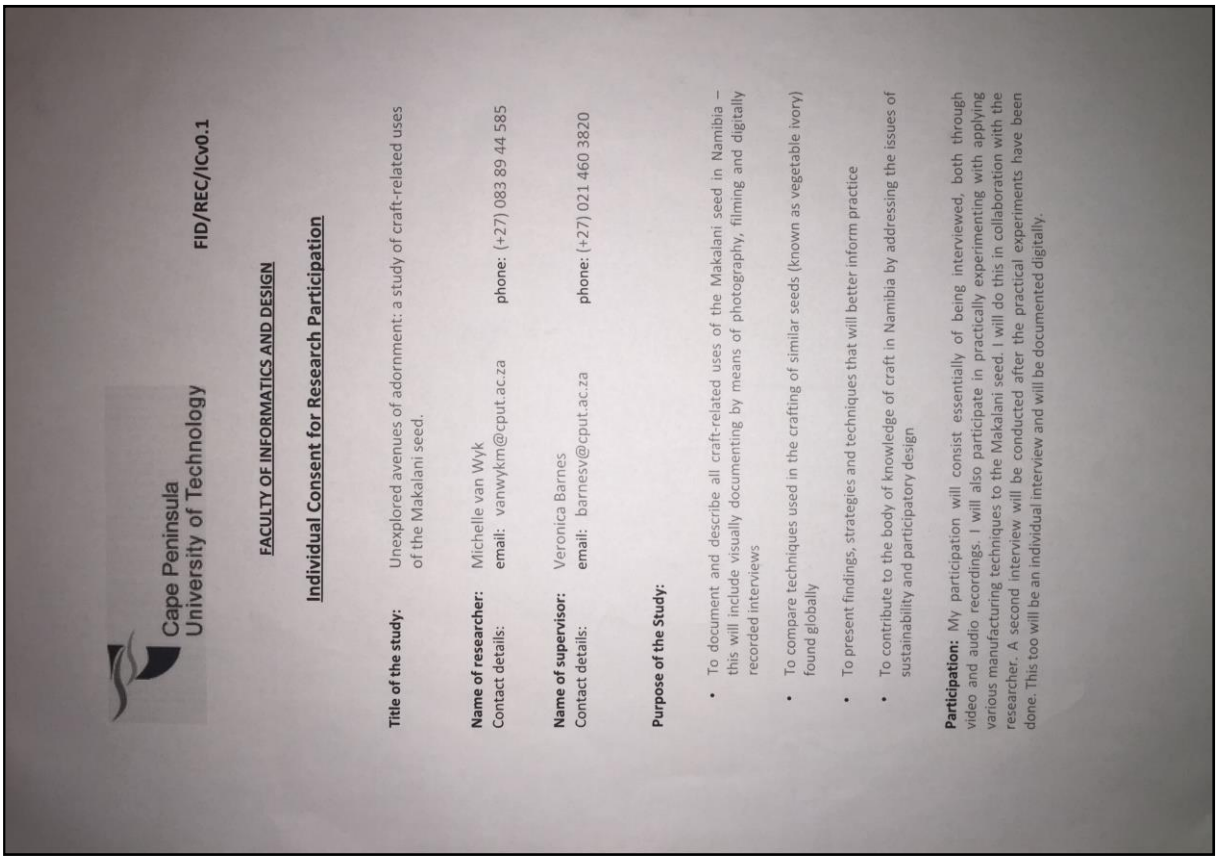
I, (print name) _____ agree to participate in the above research study conducted by Michelle van Wyk of the Design Department, in the Faculty of Informatics and Design, at the Cape Peninsula University of Technology. This research project is under the supervision of Veronica Barnes.

If I have any questions about the study, I may contact the researcher or the supervisor. If I have any questions regarding the ethical conduct of this study, I may contact the secretary of the Faculty Research Ethics Committee at 021 469 1012, or email naidoove@cput.ac.za.

Participant's signature: _____ Date: _____

Researcher's signature: _____ Date: _____

Signed Consent for Research Participation: Erwin.R.≠Eichab



Cape Peninsula University of Technology

FID/REC/ICv0.1

FACULTY OF INFORMATICS AND DESIGN

Individual Consent for Research Participation

Title of the study: Unexplored avenues of adornment: a study of craft-related uses of the Makalani seed.

Name of researcher: Michelle van Wyk
Contact details: **email:** vanwykm@cput.ac.za **phone:** (+27) 083 89 44 585

Name of supervisor: Veronica Barnes
Contact details: **email:** barnesv@cput.ac.za **phone:** (+27) 021 460 3820

Purpose of the Study:

- To document and describe all craft-related uses of the Makalani seed in Namibia – this will include visually documenting by means of photography, filming and digitally recorded interviews
- To compare techniques used in the crafting of similar seeds (known as vegetable ivory) found globally
- To present findings, strategies and techniques that will better inform practice
- To contribute to the body of knowledge of craft in Namibia by addressing the issues of sustainability and participatory design

Participation: My participation will consist essentially of being interviewed, both through video and audio recordings. I will also participate in practically experimenting with applying various manufacturing techniques to the Makalani seed. I will do this in collaboration with the researcher. A second interview will be conducted after the practical experiments have been done. This too will be an individual interview and will be documented digitally.

Acceptance:
I, (print name) ERNSTN ROMANUS *Eichab agree to participate in the above research study conducted by Michelle van Wyk of the Design Department, in the Faculty of Informatics and Design, at the Cape Peninsula University of Technology. This research project is under the supervision of Veronica Barnes.

If I have any questions about the study, I may contact the researcher or the supervisor. If I have any questions regarding the ethical conduct of this study, I may contact the secretary of the Faculty Research Ethics Committee at 021 469 1012, or email naidoove@cput.ac.za.

Participant's signature: *[signature] Date: 30.4.2014

Researcher's signature: [signature] Date: 30-04-2014

Confidentiality:
The researcher assures me that the information I will share will remain strictly confidential.
I understand that the contents will be used for research purposes in an MTech study and as findings presented at a conference addressing similar issues addressed in this study. My confidentiality will be protected by Michelle van Wyk, by using making use of pseudonyms (meaning my real name will not appear in the study in any way).

Anonymity will be protected in the following manner (unless noted below). Anonymity will be guaranteed by blanking out of faces. Place names will not be disclosed but rather places will be referred to in a vague descriptive manner. The risk involved for the participant is exposing his place of trading to whoever reads this study. This could cause him to be moved as this is one the national heritage sites and therefore no trading is allowed by the City of Windhoek. Crafters have designated trading areas within the city.

Conservation of data: The data collected will be kept in a secure manner. All digitally recorded interviews and videos will be stored securely on a personal computer with a password. The personal computer will be kept at the researcher's private residence to which only she has access. Original data will be kept for five calendar years for audit purposes.

Voluntary Participation: I am under no obligation to participate and if I choose to participate, I can withdraw from the study at any time and/or refuse to answer any questions, without suffering any negative consequences. If I choose to withdraw, all data gathered until the time of withdrawal will be destroyed.

Additional consent: I make the following stipulations (please tick as appropriate):

	In thesis	In research publications	Both	Neither
My image may be used:			X	
My name may be used:			X	
My exact words may be used:			X	
My practical work done with the Makalani seed, (and used by the researcher in her practical exploration) may be used:			X	

APPENDIX F: INTERVIEWS (2014a; 2014b; 2014c)

Interview 2014a: 2014.12.20
Place: Heritage site in Windhoek city (place of trading for Erwin.R. ≠Eichab)
Participants: Researcher (Michelle van Wyk) and Erwin.R. ≠Eichab (Mastercrafter)

MVW: Hi Erwin, I just want to ask you to a few questions, but also have more of a conversation. So there are no right or wrong answers. I just want to know what you think about some things. Is that ok?

E.R.E: Yes. I'm not shy. We can talk.

MVW: Thank you.

MVW: Can you show me how you get the Makalani nuts that you sell to the crafters ready for selling?

Yes. [He takes out his tools and begins to demonstrate how to remove the nut from the hard shell]
We take these fruits, the wamboes (Oshiwambo tribe) call it *Eendunga*. When we finish eating that fruit, we have to cut into the hard shell that covers the nut. The fruit is dried out to store for when they rains don't arrive. The dried fruit means that the nut is hard inside.
When we cut the hard shell we use a small saw, then hit it hard with a hammer to crack the shell open.

The shell is very hard and you have to hit it hard with the hammer, but the saw helps to weaken it a little bit. Once we crack the shell open, you can see the nut is brown and covered in a thick skin of brown stuff. That brown skin is difficult to take off just like that. So we soak the nut and make them damp. We place a few nuts in a bag with some water and leave it for a day or two. We know how to handle this nut. We have been doing it for very long.

The softened nut is easy to clean. We use a scissor blade to scrape off the thick brown skin. The water makes it softer. Then we let it dry a bit. Once the nut is dry, we sketch on it with a black pen.

You see this blade [shows a scalpel blade wrapped onto a short stick with a piece of plastic bag], we use it to carve the nut. It's very sharp.

MVW: Have you cut you yourself before?

E.R.E: Yes!, many, many times but I just take a cloth and wrap it around my finger or hand and carry on. I'm used to it by now. How learn to have a steady hand and how much pressure you need to apply. Cutting too deep is the main cause, because the blade it under pressure and often slips out of the incision you have made in the Makalani nut.

MVW: What sort of things do you sketch on the nut?

E.R.E: It depends on what the buyer wants. But these tourists that visit Namibia want to see animals. The most popular designs are the ones with animal carvings on them, especially the big five.
I learn to draw when I was young and it is something I enjoyed. We had Art at school and we had a very good Art teacher who could draw very well.
Now I find it easy to draw on these Makalani nuts. It's just another piece of paper to me, in a different form.

MVW: What do you use to draw on the nut?

E.R.E: I just use a black BIC pen. It works best because the ink is absorbed into the skin of the nut. The black line adds to the design. It works well with the brown skin and the carved out white areas.

MVW: Where did you learn to carve Makalani nuts?

E.R.E: My older brother used to carve these Makalani nuts on the farm. That's where I learnt how to harvest the fruit and the nut. Then when I came to Windhoek to look for work, I met a woman that worked with a Rhino foundation. They taught us how to work with the nut and how to sell the nuts to tourists. They taught us to talk to the tourists – to tell them about the Makalani nut, to call it vegetable ivory. The idea was that they could buy this ivory because it came from a plant and could be grown again. Unlike animal ivory. The woman taught us how to make keyrings and sell them to tourists. We used to make keys rings with carved Makalani nuts, which we would sell to the rhino foundation. Those days we made a good income.

MVW: So do you prepare and carve all your own Makalani nuts?

E.R.E: Not always. Sometimes I will pay someone to clean the nuts for me. N$1,50 per nut.

MVW: How long does it take you to carve one nut?

E.R.E:; It takes me a few hours from start to finish (removing nut from hard outer shell to a finished carved nut)

MVW: How many nuts do you usually sell?

E.R.W: On a good day I can sell close to 20 Makalani nuts. On a bad day you can sell three or no nuts at all. It just depends on the crown and your mood that day. Sometime you can convince people to buy, sometimes not. You have to see.

MVW: What do you do with the cash you generate from your daily savings? It is a risk to keep large amounts of

E.R.E: We need to bank it.
If you make N$300 per day then you need to bank at least N$150. You can keep the rest on you.

MVW: In terms of safety, is it not a risk to keep cash on your person?

E.R.E: Yes it is, but we bank most of it, otherwise you spend your money. The younger guys (crafters) tend to spend their money. Sometimes they are the ones that rob other crafters at knife –point. That is very wrong but they are also high or drunk when they do that.

MVW: When do most tourists visit? What is your peak season?

E.R.E: Both seasons, but winter is the busier season.

They visit mostly in winter, that when we can make a lot of money.

MVW: Would you be interested in working with me, to see what other things we can do with the Makalani nut? There are some techniques I want to experiment with on the nut to see if we can use them to create different products.

E.R.E: Yes I am willing to help you do this because I will also learn and I know more opportunites will come from knowing more. You just need to show me how.

Interview 2014b: 2014.09.05
Place: Telephonic interview (with Researcher – in Cape Town, South Africa calling Erwin.R. ≠Eichab in Windhoek, Namibia)
Participants: Researcher (Michelle van Wyk) and Erwin.R. ≠Eichab (Mastercrafter)

MVW: Hi Erwin, I have done some experiments here in Cape Town like we discussed when I was in Namibia.
I will be coming up to Namibia later in September (2014) to talk about the techniques we discussed. I want to know how you felt while trying out the new ideas of how to work with the Makalani nut.

E.R.E: Ok, no problem.

MVW: Thank you.

MVW: I tried slicing the nut on some machinery in a workshop in Cape Town, and dyeing it with some vegetables. I want us to use natural dyes to try to colour the nut. But everything we do must be in such a way that you will easily be able to re-do what I have done while in Cape Town.

E.R.E: I have seen that once can slice the nut using the scalpel blade. But you need to soak the Makalani so that it can absorb the water and become soft. Then you can cut thinner slices and make things that are not so heavy (like the key rings)

MVW: That's a good idea. If you try please take note of what you do and maybe we can talk about it when I am in Namibia.

E.R.E: I will.

MVW: I will bring down the shaped nuts so that we can colour them. I was thinking that we could buy some of that pink powder that the Owambo women dye their *Ondelela*'s with (Otijize). I just need to find out where to get it.

E.R.E: I think you can try the Single Quarters (local market where traditional Oshiwambo food and goods are sold by informal traders). Those memes (women) usually sell there. Maybe you can ask them.

MVW: Ok I will.

MVW: We can talk about the different methods I want to try and how you can use them along with your carving techniques.

E.R.E: Ok.

MVW: I need some advice on how to shape the nut without heating it up too much.

E.R.E: You can put it in some cold water while you work with it. Just not for too long because it will soften he outside of the nut a bit.
You can also boil the nut but not for too long, otherwise it will begin to break open or crack.

MVW: When I come down, where can we meet? What would be best for you?

E.R.E: It depends on what day you come to see me. Sometimes I arrive early and leave early because the tourists are not so many this time of the year. You can call me. Otherwise you can tell me where to meet you.
I will be at the usual place.

MVW: Ok. I will give you a call when I am in Windhoek to check when would suit you. I think its best we meet earlier in the day because I can ask a friend to come with me to help me hold my phone to take pictures.

E.R.E: Ok. We can work and talk there then.

Interview 2014c: 2014.12.20
Format: Unstructured interview
Place: Heritage site in Windhoek city (place of trading for Erwin.R. ≠Eichab)
Participants: Researcher (Michelle van Wyk) and Erwin.R. ≠Eichab (Mastercrafter)

MVW: Erwin what would you need to run a workshop on teaching people how to carve a Makalani nut?

E.R.E:We would need seeds, (Scalpel) blades, sticks, paper and something to draw the designs with.

MVW: What is the selling price for a Makalani nut on average amongst crafters?

E.R.E: Currently we charge anything from N$30 to N$100. It just depends on the day and what you've carved. Selling your product is also a skill you have to develop. If a tourist believes that your product is worth it, they will pay a higher price for it.

More than 10 years ago, we charged Namibian $25 per carved Makalani nut.

MVW: Do you outsource your carved Makalani nuts?

E.R.E: The people from the craft centres and tourist centres used to buy the carved nuts for that price, no matter how many we sold to them. The price was not less than N$25.00
That was the time that we could make a generous income. I knew then that my work was valued , as I valued it.
But now things have changed.

MVW: What has changed?

E.R.E: All these young boys who want to make quick money, have lowered the market value of the Makalani nut. They agree to sell nuts for as little as N5 or N$7, making it very difficult for us to maintain our asking price for the nuts we sell.
The business owners see the costs as being too much, and so they buy many nuts from crafters who are willing to sell their carved Makalani nuts at a lower price.
I must say thought that the quality of carving is not to be compared to the nuts that we have carved. You can see that the work has been rushed and has no passion in it.
It has only been made for money. There is no skill to be seen. No Namibian spirit.
It's a difficult situation and it makes the older craftsmen very angry.

What is the point of selling something you do not care about. All you want to do is spend the money on alcohol. There is no long term goal.
These are the same young men who will harass the tourists to buy their carved nuts, which makes all of us look bad. You have to know how to promote your product.
You have to sell the idea to the buyer, not just the nut.
People want a story.

Where did the young boys learn to carve, if they are not that skilled in it?

I trained some of these guys around here. But they only want to know the basics, They don't want to spend their time to practice.
Some of them cannot even draw, so I will sketch on some (Makalani) nuts and give it to them in exchange for them scraping some nuts clean.
I feel sorry for them sometimes and instead of giving them money, I decided to teach them to earn money. But sometimes alcohol wins the fight.

Would you still be willing to teach people to carve Makalani nuts if you could benefit from it in some way? Perhaps if you were paid to do it?

Yes. You know, I like this teaching thing. I like the fact that I can help someone to help themselves even when I am not there. That is why I teach the small children on the farm to carve as well. I show them what they can do with their hands to keep themselves busy and how they can gain some money one day.

MVW: Have you ever formally trained people to carve Makalani nuts?

E.R.E:Yes, once. I did a workshop in Otjimbingwe at home, where we stay. There are a lot of unemployed people there. My brother in-law arranged some funding for me to run a small workshop for a week. That was via the Ministry of Agriculture in 2004.
The money was funded by an organisation they called FFF. I can't remember what it stands for.
Training involved teaching the community members how to make a carving tool and how to sketch onto the nut.

We used prepared nuts because the process would take too long to do in one week. But those people know how to get the nut out of the hard shell. They eat that fruit.

MVW: Did you only teach them how to carve?

We made tools, and I showed them how to draw. Some could draw and other struggled. Even on paper. Then I showed them how to sketch on the nut and use the blade to cut out the parts that you want to get white.

MVW: What was the average age of the group you taught?

E.R.E: They were a mixed group, starting from ages as young as 8 years old and then going as old as 50 year olds too. Old people are full of energy there. They like making things with their hands you know, it keeps them busy.

MVW: Did you get paid by the (FFF) foundation for the training you gave?

E.R.E: No I didn't. There was only enough money for some paper and pens (to sketch with and draw designs on) and then some money to buy food for during the day.
I think people in the community enjoyed it, even if it was only for the food.
They supplied the blades, pens to draw with, some paper, food and we sat in a quiet area under some trees, and I gave the workshop.

MVW: How long did the workshop run for?

E.R.E: It was from Monday to Friday, from about 9am to about 5pm. But it was relaxed and I think the women really enjoyed it because they were the ones who asked the most questions and actually finished carving their (Makalani) nuts by the end of the week. The men were few and some just came to watch. There isn't much to do in those areas, so they came to watch mostly. Other tried carving. But the women were the ones who took the learning seriously. At the end of the week, they received a certificate that said they had completed the workshop. I could see it was a nice thing to have and take home. To be proud of. The certificates were awarded by the Ministry of Agriculture and were signed by me.

MVW: Do you see yourself as a teacher in the crafting community now, and perhaps in the future?

E.R.E: Yes I do. I do a lot for these young kids (pointing to the younger crafters) because life is hard. I know. That's why I work so hard. I have a business that is registered, that allows me to do business with many different things. But my Makalani nuts are my constant income. I love carving these nuts even though it is hard work. That is why I want to sell them as a product that has value. Not just some cheap nut that tourists come by for cheap.
We create pieces and those pieces are art. Art is worth the money.
That is one of the reasons I cannot sell my carved Makalani nuts to these business that the tourists visit, because don't care about us. They just want us to make money for them. They don't think about us.

I have a skill and I see myself as an entrepreneur. I want to sell these nuts as a business man that has his own shop. I want to be able to go to a workplace and not have to worry about being robbed by these guys looking for quick money. But it is difficult to get money to build your dreams. Even though I think this nut can make a lot of money. This nut is a good thing.

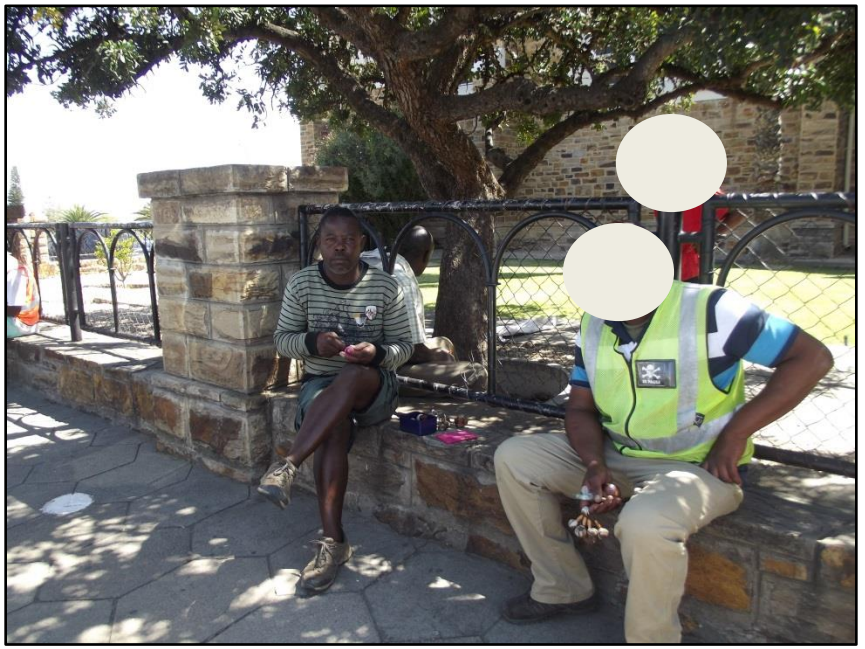
APPENDIX G: Additional images (see disc)

APPENDIX G:

Additional images of experimental sessions

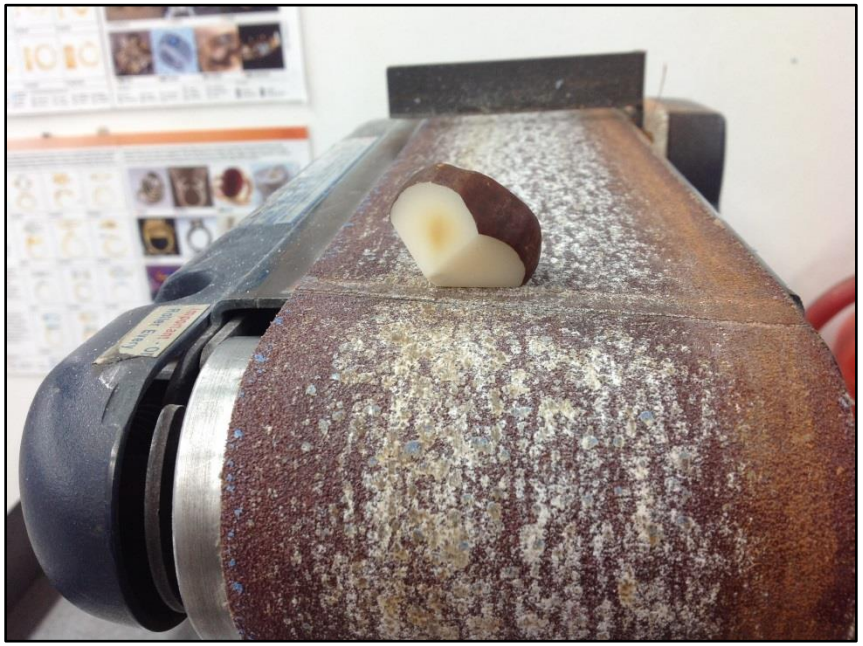
TES 1: Carving observation (initial)

TES 2: Dyeing Makalani nut (*Otjize*)

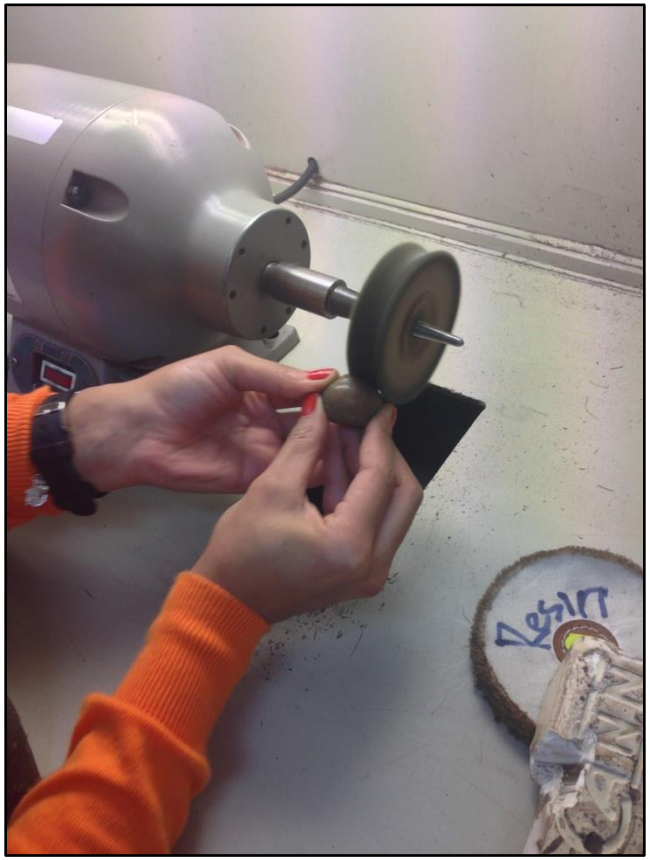


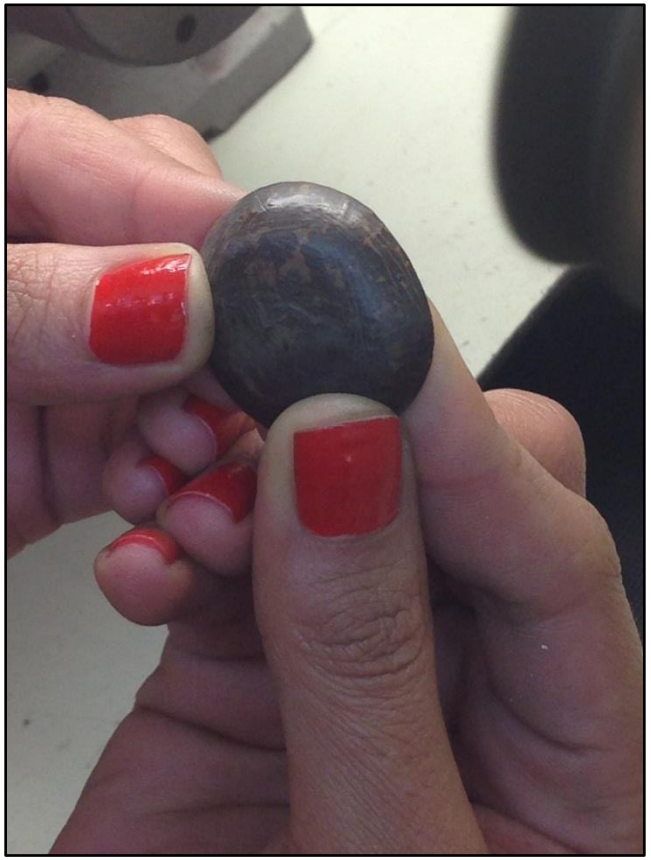
SES 3: Shaping nut on sanding belt

SES 3: Shaping nut on sanding belt (cont.)

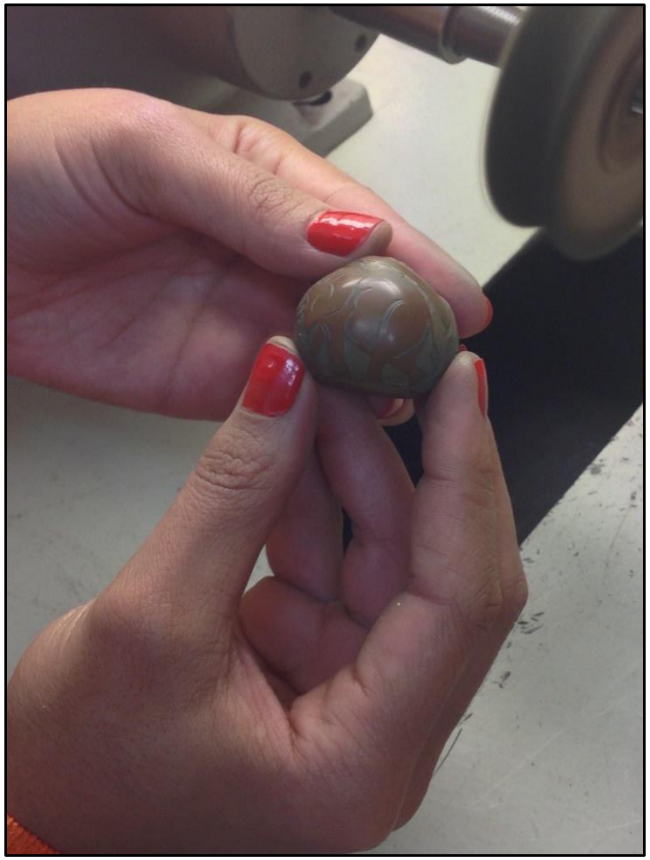


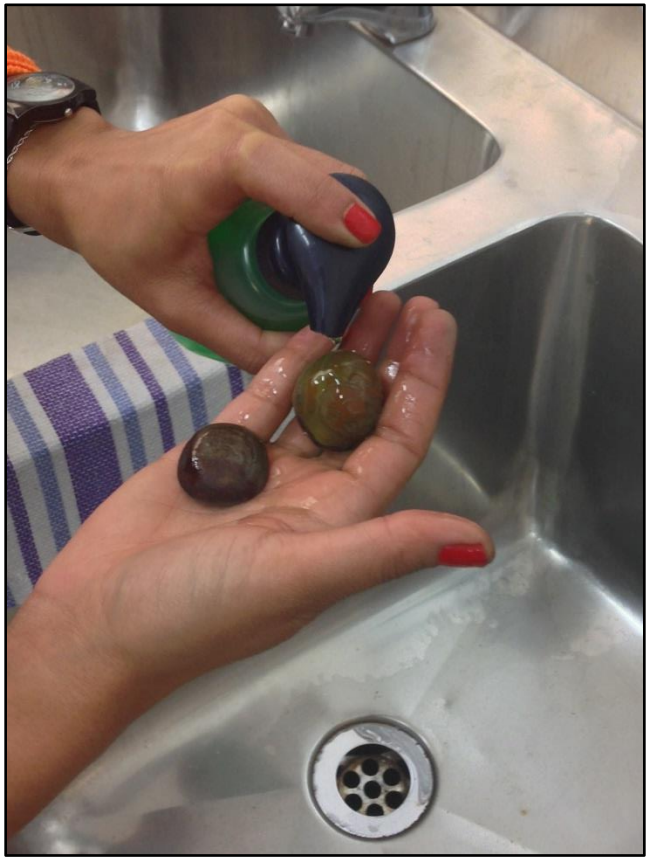
SES 3: Polishing



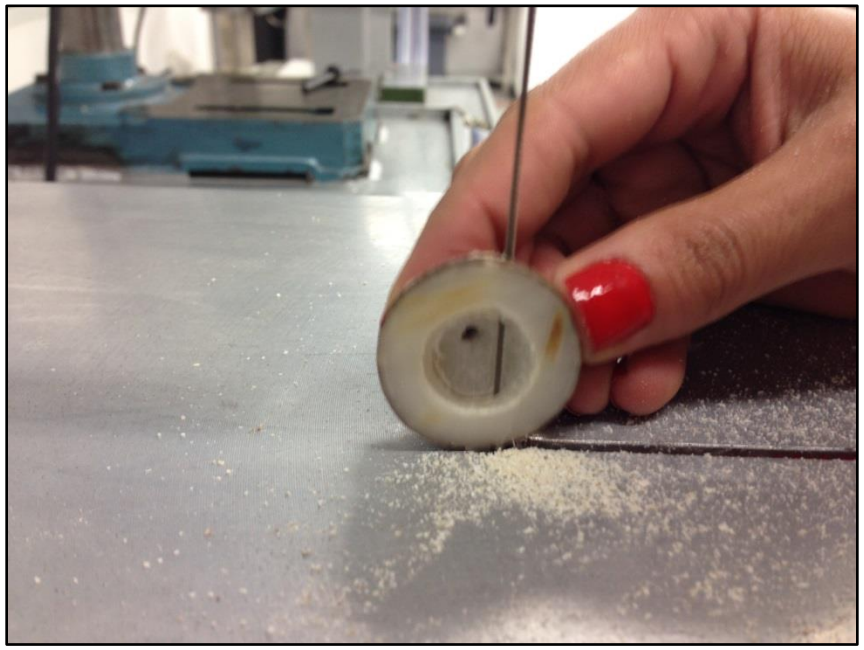


Cleaning polish from nut with soap and water

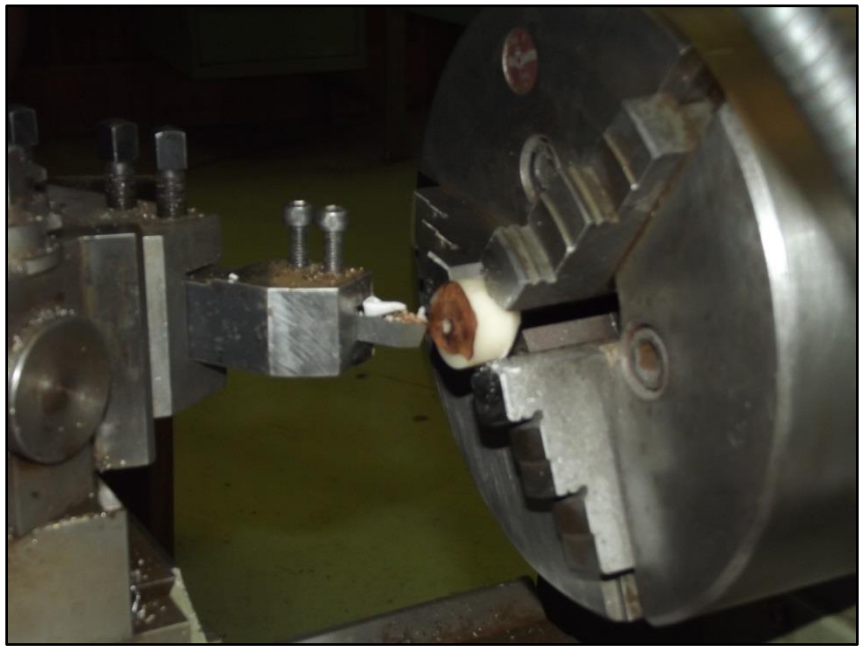


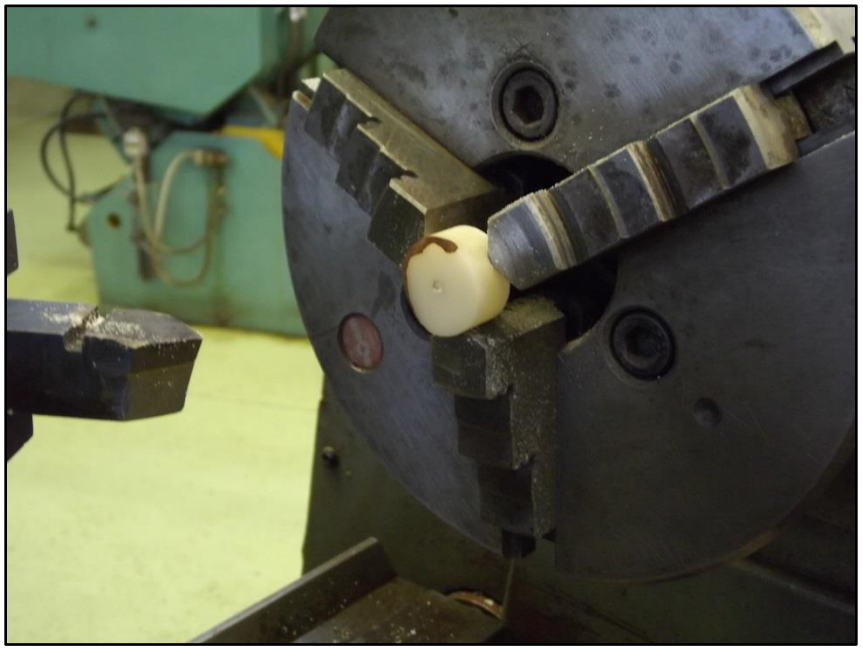


SES 3: Slicing Makalani nut

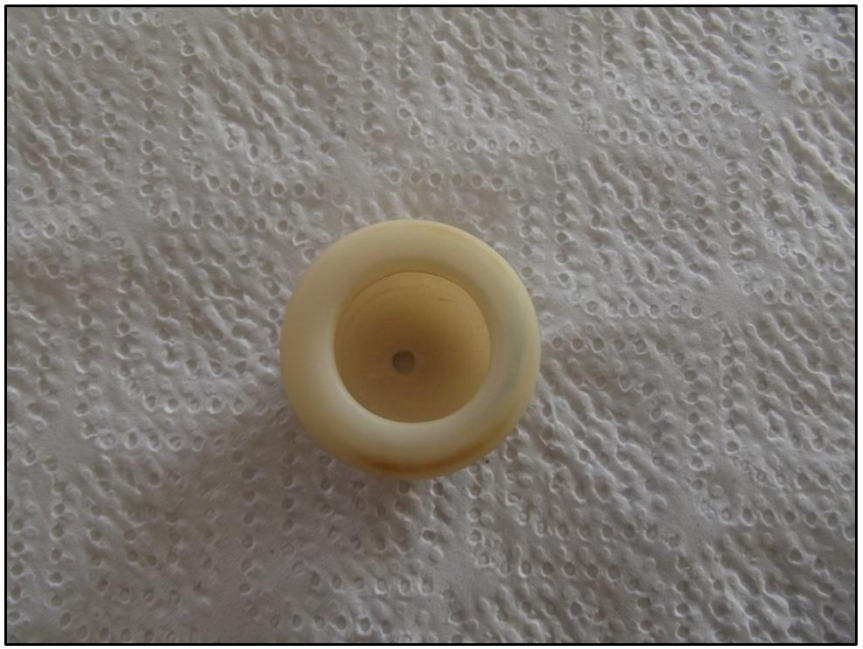


SES 4: Turned Makalani nuts





SES 4: Turned Makalani nuts (cont.)



TES 5: Carving dyed Makalani nuts

Dyed Makalani nuts: *Otjize* dye

Makalani nuts: dyed

Makalani nuts: carved (undyed and dyed)