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Paulson Letsholo

*Delft University of Technology, Design for Sustainability
Landbergstraat 15, 2628 CE Delft, The Netherlands,
Letshopm@mopipi.ub.bw*

Henry Christiaans

*Delft University of Technology, Design for Sustainability
Landbergstraat 15, 2628 CE Delft, The Netherlands,
j.c.brezet@IO.TUdelft.NL*

Krishan L. Kumar

*Industrial Design and Technology, University of Botswana,
P/Bag 0061, Gaborone, Botswana,
kumarkl@mopipi.ub.bw*

Designing Breakthrough Bamboo Products from Africa

- A Tool to Create Sustainable Livelihood in SADC Countries -

Abstract

Southern African countries are blessed with abundance of rich non-wood species including bamboo. Countries like Botswana, Zambia, Kenya and Tanzania have most resource-rich ecosystems in the continent. Previous studies have shown that, in these countries, non-wood products are among the diversity of resources that have contributed to the well being of local communities, particularly at household level where resources are used for subsistence and income generation.

The paper demonstrates how simultaneous improvement of 'form and function' through advances in style and technology may add the value dimension for global acceptance of the products designed and made in Africa. It is envisaged that a paradigm shift would be made by exploring the ways and means of sustainable bamboo product design, fabrication techniques, assess end-users needs for potential interventions, investigate opportunities for designing and developing low-cost efficient technologies, examine existing policies and procedures in the region and enhance profitability of alternative production systems and worldwide marketing. Consequently, the region is now poised to diversify the economy through industrialization with a focus on creating breakthrough products and export promotion. Little or no research has been conducted to examine the possibilities to commercialize such products for international markets. The research undertaken by the first author is based upon a research question: 'Is it possible to create sustainable livelihood opportunities by integrated designing and manufacturing breakthrough products made from indigenous materials, e.g., bamboo?'

Key Words: *Design, Breakthrough products, Value-addition, Sustainable Development*

1. Introduction

Governments and private sector enterprises in several African countries have lately recognized the fact that modern design and fabrication technologies can play a crucial role in value addition to the traditional products with indigenous materials.

It has been well understood in the Southern African Development Countries (SADC), including Botswana that the true potential of their natural resources can only be realized if they undertake the design and manufacture of their own products from the available abundant natural resources. They must consider the types of breakthrough products to be made on the basis of global studies and decide upon the modes of value addition in order to be globally competitive.

The paper focuses on the use of non-wood species including bamboo available in the Southern Africa region and explores the nature of intervention required in order to identify, design and fabricate value-added products for global export.

2. Economic Analysis of Non-wood Resources in Southern Africa

Africa is endowed with a wide range of natural resources and the Southern African region has abundant non-wood resources including light bamboo, which grows mainly around rivers and wetlands. The commercialization of certain non-wood products has already made a significant

contribution to the rural economy in many areas. The harvesting of bamboo/cane/reed and the basket weaving industry have provided cash incomes to many thousands of people who otherwise have little access to the cash economy. About 64% of rural people have been below the poverty datum line.

With the above in mind, it would appear that Non-wood products have enormous potential to alleviate poverty and unemployment amongst local communities. Non-wood products have traditionally played an important role in SADC. The most important Non-wood products would include foods, medicines, building materials and fuel-wood although they have not been successfully exploited on a commercial basis, the full potential of many Non-wood products has still to be realized. The products tend to circulate through the local informal markets where significant sums of money are not generated. If any tangible benefits are to be realized then it is imperative that any commercialization programme encompasses every related facet. Failure to do so could result in large population not benefiting and the valuable resource base being severely damaged or destroyed.

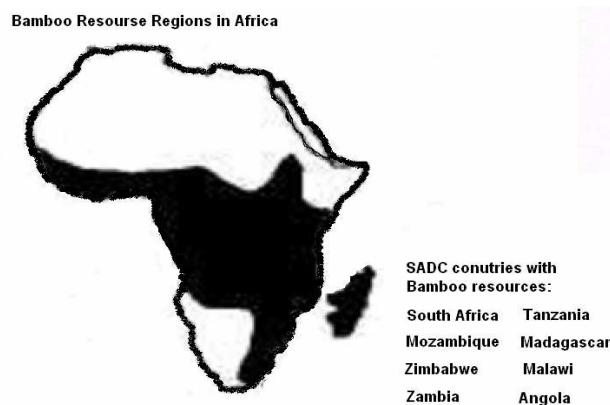


Fig.1. Bamboo Resources in Africa

Non-wood products can be divided into five separate categories; namely food medicines and bioactive products, extractive products, animal products, plant products, and insect products. The economy is heavily reliant on arable crop harvests however, uncertainty of a successful harvest means that there is always an element of instability in the economy. Diversification would in turn lead to increased stability. Non-wood products such as traditional bamboo products would appear to have the potential to diversify the economy. However, most of the products will be for the export market as the local market is too small to absorb the volume and diversity of products.

Since Non-wood products do not cause the kind of environmental degradation associated with arable and livestock agriculture (i.e. soil erosion, habitat destruction, reduction of biodiversity etc.) they could be sustainable to utilize as a valuable aid in subsistence income generation. Subsistence income generation is characterized by requiring low technology, high inputs (in terms of labor), and having low outputs. As such, subsistence production is very time consuming.

3. Critique of Available Non-wood Products

For a long period, design activities have been associated with products from industrialized countries. Of late, countries such as Botswana, South Africa, Kenya, Zimbabwe and Tanzania have tried to establish formal design activities by introducing Industrial Design programmes in their curricula. Design in Southern Africa is strongly linked with economic, social and political conditions that designers are confronted with. In the other countries mentioned the introduction of industrial design programmes is too recent to already expect any influence in industry.

General status of indigenous bamboo products in southern Africa is characterized by the use of primitive tools, such as machetes for the construction of tools handles, fish traps, baskets, containers and various other products. Although extremely valuable, these traditional products have a short life span and generate minimal value addition. Largest consumption of these products occurs in rural areas where there is no high-end processing. Raw materials are just cut and assembled without processing, which results in low value-added products, like benches and bamboo handicrafts. The current situation is characterized in two key areas as follows:

Design and production; 1) Lack of design skills/input and quality 2) Lack of infrastructure (appropriate technology) 3) Unstructured/individualized production 4) Lack of product differentiation & standardization 5) No project incubation models

Organizational & marketing; 1) Lack of information & dissemination 2) Inadequate support of marketing & promotion 3) Poor or no packaging at all 4) Lack of organized regional or national shows/fairs/exhibitions 5) Lack of supportive & adaptive policy 6) Lack of production, vocational & business development training. Some examples of traditional bamboo/cane products with limited design and product development are as follows:



A Table Lamp



A Basket



A Pig Kraal



A Candle Stand

However, while techniques and technologies exist in urban areas especially in institutions of higher learning, little has been transferred to collectors and craftsmen in remote areas. The transfer of knowledge could enable them to improve their product quality and design. Increasing the value addition of indigenous bamboo products, especially close to the collection site, begins with improved technology and current designs. Simple improvements are needed to reduce drudgery of collection and primary processing and enhance quality and consistency of finished products.

4. Global Market Survey: User Needs

The USA, under the African Growth and Opportunity Act (AGOA) and the European Union, under European Business Association (EBA) offer preferential treatment for indigenous bamboo products in SADC. There are opportunities in other markets established through bilateral trade agreements. Currently most bamboo products are sold domestically to local buyers and tourists with a few being exported to USA, Canada, Australia, Germany, UK and Japan. Other existing markets for SADC products are other Africans who buy and blend their craft skills and re-export them Europe and the USA.

It is difficult to increase the export of bamboo crafts due to failure to adapt to customer needs in international markets in terms of quality, designs, dimensions, standards, sizes and above all an ability to muscle a critical supply capacity in the sector. Low product development and limited knowledge on market access and low market development efforts are still inhibiting export growth in the sector. Unfortunately, efforts have not been made to promote the trade. Successful penetration of export and other markets will depend on the ability of local producers to form strong groups, develop capacity to produce critical masses, upgrade the quality to market standards as well as overcome the above stated constraints. Governments are advocating economic diversification and sustainable development; hence they seek to integrate bamboo handicrafts in the areas of investments, Micro, Small & Medium enterprises capacity development, product development, adaptation and innovations, and promotional support. The World Commission on Environment and Development (WCED-1987) emphasis the sentiment in its definition of Sustainable Development as a “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.

5. Tourism Market Survey & Promotion

Southern Africa's tourism potential is phenomenal and attested on the world tourism scene. The region has avoided the trap of courting mass tourism and instead is effectively marketing its eco-tourism and adventure-tourism, to this can be added the undeveloped cultural-tourism, religious-tourism and conference-tourism all of which ensure that any growth in the visitor numbers is sustainable and that development is not detrimental to natural environment and local culture. Different integrated tourism master plans were developed through partnerships of the SADC countries, United Nations Development Programmes and World Tourism Organizations for the period 1992 to 2002. Subsequent to that, tourism policies were approved and adopted through World Bank supported workshops and seminars. The direction of these policies was for tourism development to be socially, culturally and environmentally acceptable and become a vehicle for poverty alleviation.

Over the last decade, SADC countries witnessed an increasing number of tourist arrivals. This has been greatly attributed to privatization strategies being pursued by governments together with the prevailing national security especially in national parks. Very few tourists leave the region without a memento, handicraft souvenir or two purchased from the wayside vendors. Local craft shops or market yards such as the National trade fairs, craft villages or centres

attract many tourists. Most hotels and restaurants, in providing one-stop shop service to their clientele, have openings in their premises for Art and Craft exhibitions or sales. Airport duty-free-shops provide avenues for mopping up tourist's left over foreign currency on handicraft sales. Herein lies the potential, as tourism and handicraft trade go hand in hand. Handicraft sector development should thus be seen as complementary to the tourism industry especially where community tourism promotion is linked up with crafts and creativity of communities.

6. Government Policies and Procedures in Southern Africa

The governments in Southern Africa have over the last decade created a macro economic framework with the aim of stimulating and sustaining growth in economy. Inflation has reduced to a single digit; the external sectors have been liberalized with price deregulation and free transactions in foreign exchange. Governments have diversified themselves from economic activities thus ending state monopolies. However, some countries in Africa still lack comprehensive trade policies, which specify sector-specific export strategies. While some economic policies have been designed specifically to suit the promotion needs of the export sector, they largely address the needs of large business and industries and ignore the needs of small scale and medium business units in rural and urban areas. Various government policies, programmes and interventions in the export sector have largely disregarded the importance of indigenous products in rural livelihood. While poverty eradication schemes and medium term competitiveness strategies attempt to integrate export trade in their framework through macro level and infrastructure policy redress, the reality on the ground is that these measures have not impacted sufficiently at the enterprise level. The poverty eradication policy has paid little attention to the promotion of culture and indigenous products as a way of improving rural incomes and diversifying the export sector in SADC region.

Governments provide depreciation and investment allowances for investors and import duty exemptions for capital goods meant for production for exports. Some governments do not clearly specify the fiscal incentives to support small-scale producers. In most cases the investor license is limited to capital investment of US\$50,000 for locals and US\$100,000 for foreigners. Such figures automatically exclude local producers who are mostly micro and small operatives and who are unable to raise such investment capital to benefit from any incentive packages. Capital markets in this region are still fragmented and above all access to credit by most producers and traders is still cumbersome and expensive. Banks tend to favour large business with collateral security and isolated small businesses such as indigenous bamboo products in the provision of credit facilities. Although National Banks run Export Credit Guarantee and financial schemes, many exporters such as bamboo handicraft exporters are not capable of meeting the conditions needed to access the schemes. The pressing need for the bamboo craft sector development is micro level policy redress to support investment in the sector, capacity building, trade promotion, market research and entry and trade facilitation.

7. Identification of Some Breakthrough Products

Any attempt to define breakthrough products is quite complicated because many prerequisites have to be taken into account. The Breakthrough concept advocates for a collaborative effort involving professional designers and indigenous producers in the creation and branding of new design products that use regional vocabularies in unexpected ways to reach high end markets. Product oriented design and practice is being changed by new technologies, global marketing and internationalization of products and production. As the basis of manufacturing shifts in response to commercial forces, the role of the designers and craftsmen is becoming increasingly strategic. Design practitioners need to be able to think about the identity of

products and their cultural backgrounds, issues underpinned by the need for innovation, and economic, sustainable and ethical thinking.

As the rapid pace of globalization changes the role of the designer, the means of production and the market itself, at an ever-increasing rate, new approaches must be taken. The idea of breakthrough products is focused on the creation of partnerships with manufacturers, indigenous communities and crafts organizations in Southern Africa and to create market-ready contemporary bamboo design products. As one of the key connections between the factory floor and the market, designers have a pivotal role to play in the real futuristic world we live in.

The breakthrough concept strives to produce goods that fuse quality with creativity beyond just low cost. For a long time, design in Southern Africa has been relegated to handicrafts and regional products. Bamboo breakthrough products are intended to shift and or convert handicrafts into high quality products. The region's expertise is engaged in low-to-mid-end products, as many brands grapple with the quality and creativity gap that exist within the region. In part, the intention of advocating creative communities ensuring the nature of product development would lead to sustainability. At its core, designers are urged to look beyond the individualism but explore the consumer philosophies that currently drive design practice to include investigations of craft production and indigenous artifact in developing countries. The aspiration is to create a human centered and partnership based model of design collaboration that produces sophisticated hybrid products that are launched in high end markets. Implicit is the idea that design practitioners must focus on strategic development and redefine the designer's role in contemporary context. This paper recommends the implementation of product lines and market collaborations in SADC region for sustainable design practice.

There are many positions for design in contemporary culture. Designers need to be alert and knowledgeable in their fields and there has to be an awareness of design and making as a positive engine for change in the larger context of contemporary social concerns. This paper proposes an approach that posits an ideal that can incorporate this ongoing dialogue in the SADC region that allows producers and communities to translate designs with their unique skills and regional materials to produce sophisticated hybrids.

If indigenous bamboo products in the developing world are to be valued properly and create sustainable livelihoods, their design must realistically reflect skills of the local producers who make them. The aim is to avoid the mentality that perceives craft skills as primitive and incorporate these skills, and technologies to produce products with international market potential. In this context, the designer's role is expanded to include the development of new creative strategies, the creation of appropriate research protocols and the building of infrastructure in addition to the traditional knowledge base of craft and design practice.

In general the designer is at the mercy of the crafts in a good way. Handmade production does allow one to make things that are still impossible for machines; the variations and imperfections give life to details, and add a literal human touch to minimal designs. Mostly this produces wonderful results. One of the major needs and constraints faced by these communities relates to adequacy of infrastructure and access to international markets. For example, the lack of complementary industries contributes to the difficulty in securing and creating new networks and distribution channels.

8. Research Question and Intended improvements

It is increasingly harder to find the right product concept and the time and processes needed to bring that bamboo concept to market. Technological innovation and maintenance of

manufacturing standards are still an intrinsic part of developing successful products; if a product does not connect with the values of consumers, it will fail in its intent. The concept of value addition should be incorporated in traditional bamboo products to ensure that they have competitive edge on international market. Value addition is defined as a process of increasing the value, quality and acceptance of indigenous products/services in trade, in order to generate increased income and employment opportunities, especially for poor and otherwise disadvantaged people (B. Belcher et al. 2003). It is suggested that value addition should be implemented at all stages of production, particularly at the plant development stage.

In view of the complex nature of the subject, it is necessary to undertake research and development by posing a general research question, such as: *'Is it possible to create sustainable livelihood opportunities by integrated designing and manufacturing breakthrough products made from indigenous materials, e.g., bamboo?'* and breaking it down into sub questions on suitability of indigenous material properties, availability, designing, manufacturing, export potential and sustainability. Each of those sub questions would be studied with reference to primary and secondary information to be obtained from the region. For example, mechanical tests must be carried out to determine the permissible tensile, shear and bending stresses of the indigenous bamboo samples collected from different places in the region.

It would also be necessary to state a research hypothesis, such as a null hypothesis: *'Designing and making breakthrough products in Africa will make no significant difference in sustaining the livelihood opportunities.'* The first author has initiated a research with a set of objectives derived from the above research question and the hypothesis. Each of those objectives would be achieved through comprehensive study and experimentation, as explained above. One of the ways of assessing the current scenario and disseminating information about the design intervention being proposed is to conduct a seminar by inviting a representative sample of craft-designers in the region.

Improved species of cane and bamboo need to be developed through sustained research. Selective breeding and improvement studies should be supported to maintain the high quality of raw material. Developments of improved preservation techniques that are eco-friendly are urgently needed. Diversifying bamboo products and their uses to create enough variety and style will be a vehicle for market development. Technology development in laminated and composite products based on design explorations and new applications will ensure unique strength of bamboo products.

A systematic programme of technology development aimed at addressing the needs of the entrepreneurs, designers and craftsmen is essential. New tools and simple machines are required to meet quality and consistency in standards of demanding markets. Promotion of remarkable local achievements will facilitate the construction of an infrastructure to document and disseminate outstanding local achievements. This will encourage the broader participation of the various local and distant beneficiaries.

It is important to address the main problem of lack of design intervention in the production of indigenous bamboo products in SADC. This shortcoming has created a negative image for products in international markets. It is crucial for industrial designers in SADC to play a role in developing innovative designs that capture bamboos possibilities, linking into trends to create products with market potential. Trend setting design products are usually launched in high-end markets and later copied by the lower markets segment. Therefore, it will be a good idea to designers to focus on making innovative bamboo products capable of gaining positive status and receiving exposure that will then trickle down to lower end mass markets. Organizing bamboo design competitions and workshops will also help introduce bamboo as a promising

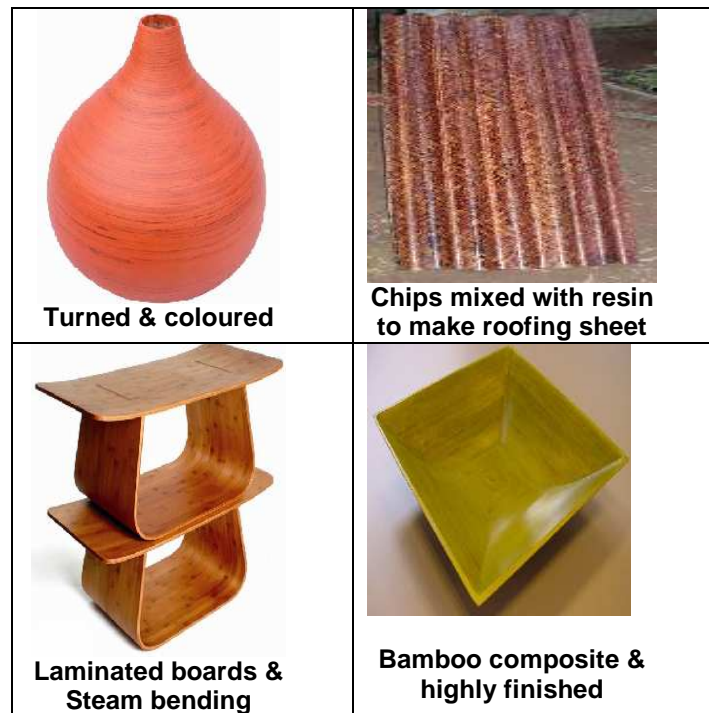
designer material. This will help avoid the problem of copying wood processing techniques which do not utilize the specific competitive qualities of bamboo (such as flexibility) as a material. Material –focused designers could come up bamboo composites by combining the material (e.g. crashed bamboo, chips and heat bending) with modern resins. Below are examples of bamboo products reflecting the past, present and envisaged future trends:



Traditional → Hybrid → Advanced

The above pictorial representation sums up attributes of both traditional and future improved bamboo products. It is envisaged that through design intervention breakthrough products can be achieved by gaining insight from a consumer’s perspective and along the production chain, about commercialization of indigenous products in international markets. With respect to internal weaknesses and external threats that result in low market share and in view of the competitive advantages and external opportunities, which exist, it is necessary to focus on design integrated production. This includes chain management, institutional capacity, resource development, competition from substitute products, legislation, communication and information transfer, knowledge and familiarity, distribution, price, promotion (marketing and sales), image and market trends.

The paper advocates the value of a Design/Technology approach in order to achieve breakthrough bamboo cane products. The products should exhibit the following qualities as shown by the pictures below: The products demonstrate a high standard of design creativity whereby bamboo/cane material has been changed in composites enabling designers and manufacturers to turn them on the lathe and use moulds to produce unique objects.



9. Conclusion

The creation of breakthrough products from SADC presents an opportunity for poverty alleviation in local communities. This approach encourages a shift from subsistence to commercial farming of the resource material (bamboo/reed). Local communities will experience improved production through utilization of appropriate technology. Environmental degradation will be greatly minimized due to improved sustainability consciousness/education. It is without doubt that many people in Southern Africa depend on bamboo handicrafts for a living. However, the markets being served by craftsmen tend to be saturated by low quality and material intensive products and suffer from lack of product diversification. The result is reduction of profit and increment on the pressure over environmental resources. Therefore, it is necessary to explore whether sustainable breakthrough designs can play a significant role in improving the financial and economic viability of bamboo/reed handicrafts in this region. This concept may strengthen the industry base for sustainable and viable product innovation by improving the expertise on design, technology, marketing, and knowledge base.

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MR PAULSON LETSHOLO

ACADEMIC HISTORY

Year	Institution	Qualification
Jan. 2007 to date	TU Delft, Holland	Doctoral Studies
Sept. 2001- Sept. 2002	Bournemouth University (UK)	MSc –Eng. Product Design
1993-1998	University of Botswana	B.Ed-Design & Technology
1989-1991	Lobatse S.S. School	O. level

Projects supervised so far:

Mechanized Multiple Calf-Feeding system.
(1st prize National Design for Development Awards)
Gravity-Fed Broiler (Chicken) Drinking Water Dispenser.
Litter control machine
Pneumatic controlled (Plastic) Press Forming Machine.
Collapsible (Cattle) Bull Rack.

Departmental Work

Departmental B.Des.(D&T) Programme Coordinator responsible for:
Preparing Final Major Project Schedules for staff members & Students,
Making sure that students are assessed as per Major Project guide lines,
Facilitating Major Project oral presentations,
Compiling marks for Major Project,
Teaching Practice and industrial training supervision,
Overall assessment of the industrial training exercise.
ID&T Academic Advisor
ID&T Departmental Board Secretary (2000 – 2005)
ITS specialist- Responsible for entering IDT results.
IDT&T representative- FET FAPRC