

Tools, Small Technologies and Design for Bamboo Craft: Indian experience

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Abstract

Tools, Small technologies and Design play a significant role in repositioning of Bamboo Craft. A tool kit with 33 items and 4 small machines were developed at Bambu Studio, IDC under a U.N.D.P project on Bamboo and Cane. Seven Micro Common Facility Centres (MCFCs) were also initiated all over the country to train craft persons in the use of these tools and small technologies.

An integrated approach linking Design, Product development, Product specific technologies and Marketing is observed to be key factor for the development of Bamboo Craft. The paper elucidates the above linkages based on Indian Experience.

Bamboo Craft in developing countries is facing a crisis. Over 1.3 million craft persons in India, all over the country practice Bamboo Craft. Most of them belong to socially and economically disadvantaged groups and reside in remote villages. The craft is getting marginalized, as the earnings of craft persons are substantially low. Craft persons earn as low as Rs.30 to Rs.40 per day (less than 1 \$). Most of the craft persons and their children aspire to take up other lucrative trades and tend to abandon bamboo craft. Since 'bamboo' craft provides eco-friendly employment with least damage to the environments, 'repositioning of the craft' to employ the craft persons on equitable terms becomes highly significant. Reaching urban markets competing with mass produced plastic products is essential in this endeavour. Tools, low cost hand-operated machines and design play an important role in this context.

1.0 New Tools for Bamboo Craft

Indian craft persons are very innovative in adopting a single tool for various operations. Consequently we see one typical tool 'Dhau' used by craft persons for all operations like cutting, splitting, slivering, sizing and finishing of bamboo. However there are variations of the 'dhau' from region to region in India. Thus we see 'Naga Dhau', 'Manipuri Dhau', 'Assam Dhau', and 'Tripura Dhau' in different shapes (Fig. 1) in North East.



Fig. 1 : Dhaus from North East India.

‘Kathi’ is a common cutting tool in South as well as Northern parts of the country. Slight variations in the shapes are observed even within the region. In one workshop at Jharkhand we found 7 variations of the ‘kathi’ in the region.

Since all these tools have evolved over a time, ergonomically they are quite satisfactory. If we restrict our scope to the products, being made currently, one may even conclude that ‘no new tools are really necessary’. But single tool has high limitations when it comes to making new products with quality and in quantity. Even now we see few different tools being used by some craft persons for making new designs. Especially when the bamboo craft products reach modern markets and are compared with the standards and finishes of industrially produced goods, the need for new tools and small technologies becomes obvious.

A U.N.D.P. (United Nations Development Programme) project to develop tools for Bamboo and Cane was taken up by I.D.C. (Industrial Design Centre) at IIT-Bombay, through D.C.(H) [Development Commissioner-Handicrafts].

Hand tools used all over the world were studied. 100 tools were identified which are used for ‘Bamboo and Cane’. A tool list (Table 1) is given with addition of 9 IDC innovated tools. Bamboo craft persons are not exposed to wood-working tools. Use of selected carpentry tools and jigs for bamboo expands the scope of bamboo products to a great extent. All these tools were made and tried out to see their effectiveness.

Table 1: List of Tools

Sl.No.	Tool
1.	Crook stick
2.	Slasher
3.	Bill hook
4.	Axe
5.	Japanese Hatchet
6.	Thai Harvesting Blade
7.	Half-Round Scraper
8.	Pull Scraper
9.	Round Scrapping Knife
10.	Scrapping Knife
11.	Phillippine Knife (Parag)
12.	Short Planer
13.	Rounding Planer
14.	* Jig-Planer
15.	Common Hacksaw
16.	Adjustable Hacksaw
17.	Chinese Hacksaw
18.	Chinese Bow Saw
19.	Indian Bow Saw
20.	L-shaped Saw
21.	Common Hand Saw
22.	Coping Saw / Mini Hacksaw
23.	Key Hole Saw
24.	Assam Dhau
25.	Manipuri Dhau
26.	Tripura Dhau
27.	Matchette
28.	Chinese Broad Knife
29.	Round Knife
30.	4 Blade radial splitter
31.	8 Blade radial splitter
32.	12 Blade radial splitter
33.	16 Blade radial splitter
34.	Splitting Cross
35.	Splitting Wedge

36. Split axe
37. Lath making split axe
38. Chinese Matchette
39. Chinese Cleaning Knife
40. Chinese Small Splitter
41. Double edged cleaning knife
42. Chisel edged cleaning knife
43. Indian Foldable knife
44. Indian Splitting knife
45. Balinese splitting knife
46. Small shaving knife
47. Japanese Faceting knife
48. Chinese shaving Angle
49. Chinese shaving knife
50. Japanese Thinning knife
51. Shop knife
52. Bow hand drill
53. Hand Drill
54. Powered Hand drill
55. Common Scissors
56. Curved jaw Pruning scissors
57. Sheet trimmer
59. Strip cutter
60. Goose wing knife
61. Profile knife
62. Profiled Blade
63. * IDC multi purpose knife
64. Stick Rounding Plate
65. Stick Rounding Tin
66. Balinese Chisel
67. Ambu katti
68. * IDC fine splitting knife
69. Balinese Furniture knife
70. Bevel edged chisel
71. Scooping Chisel
72. * IDC gauge

73. Steel rule
74. Folding scale
75. Tailor's tape
76. Steel tape
77. Inside Caliper
78. Outside Calipers
79. Divider
80. Compass
81. Scooping Tool
82. Scooping chisel
83. Scooping Hook
84. Uniform Thickness Tool
85. Basket shaver
86. Sizing knife
87. Uniform Width Tool
88. * IDC Width sizer
89. Common files
90. Needle files
91. * Chisel edged rasp file
92. Sand Paper file
93. Sand Paper folding block
94. Spacing knife
95. Propping knife
96. Gimlet
97. * IDC piercing Tool
98. Heat Bending Tool
99. Cane Bending Tool
100. Bar Bending wrench
101. Straightening fixture
102. Straightening Vice
103. Wooden V. Blocks
104. Wooden Mallet
105. Bamboo Mallet
106. Carving Mallet
107. Common Hammer
108. * Rim Binding Needle
109. * IDC Weaving Tool

* *Tools innovated by Industrial Design Centre*

A tool kit was conceived after analyzing the various operations in bamboo craft and optimizing them for a comprehensive usage. A workshop with 30 to 35 craft persons, officials and private manufacturers was held at C.B.T.C.(Cane and Bamboo Technology Centre), Guwahati to obtain the feedback on the tool kit.

1.2. Tool Kit (Fig.2)



Fig. 2 : Tool kit in close and open position

The tool kit has been designed by A.G. Rao and Avinash Shinde with a team of engineers and other helping in its development. Lamicraft Enterprises, a Mumbai based company is currently making and selling the tool kits with an agreement with IIT-Bombay.

A manual with pictures illustrate the operation of each tool in the tool kit.

The final tool kit consists of 33 items.(Fig.3) Out of these 11 items are IDC innovations added to enhance the usage, 10 have been adopted and modified from the existing tools. Remaining are readily available ‘tools’ in the market.



Fig. 3 : Items of Tool kit.

Following operations lead to the choice of tools given.

Sawing, Scraping, Strip Making, Measuring, Marking, Weaving, Binding, Finishing, Sharpening.

2.0 Small Technologies

Small Technologies apart from ‘Tools’ play a significant role in bamboo craft used at village level.

The word ‘Small Technologies’ is being used to include non-powered machines, jigs and fixtures, Treatments, Colouring methods and Finishes.

2.1 Small Machines for Bamboo

Four small machines were identified for development in the UNDP project.

2.1.1. Splitting Machine (Fig.4)

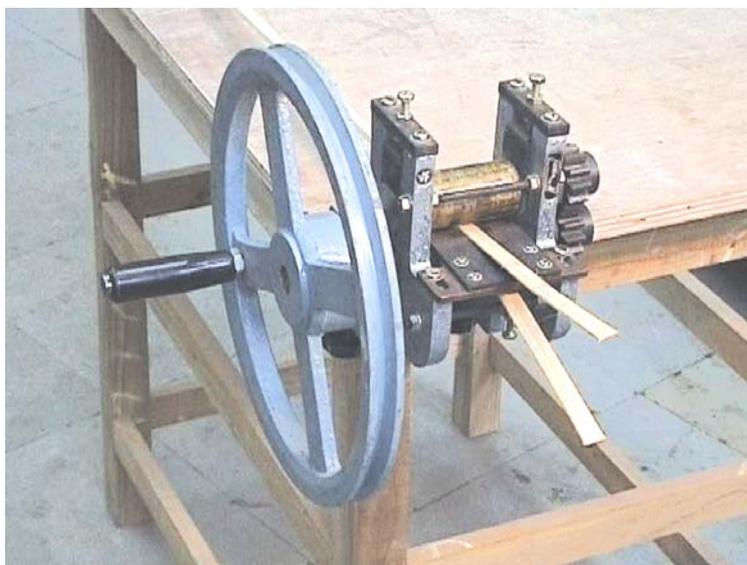


Fig. 4 : Splitting Machine.

Splitting Machine based on Chinese Model was developed with easy blade fixing and ease of manufacture as the main features. The machine splits 4 m.m. thick slivers into half giving 2 m.m. thick slivers. Further 2 m.m. thick slivers can be split into 1 m.m. thick slivers. Width of slivers can be upto 30 m.m. The machine is hand operated. It is possible to drive the machine with a small motor if electric power supply is available. The machine is easy to operate and even illiterate women in the villages are able to operate with little training.

2.1.2. Width Sizer (Fig.5)

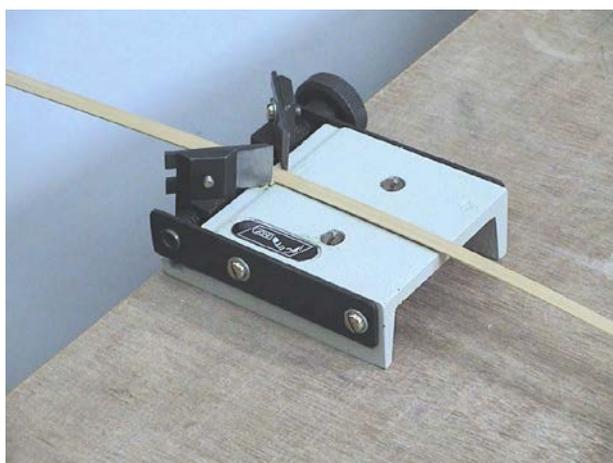


Fig 5 : Width Sizer

Width sizer sizes bamboo strips to equal width.

2.1.3. Thickness Sizer (Fig.6)



Fig 6 : Thickness Sizer

With thickness sizer, even thickness can be obtained pulling the bamboo strip under a blade, after adjusting to the required thickness.

2.1.4. I.D.C.Sander (Fig.7)

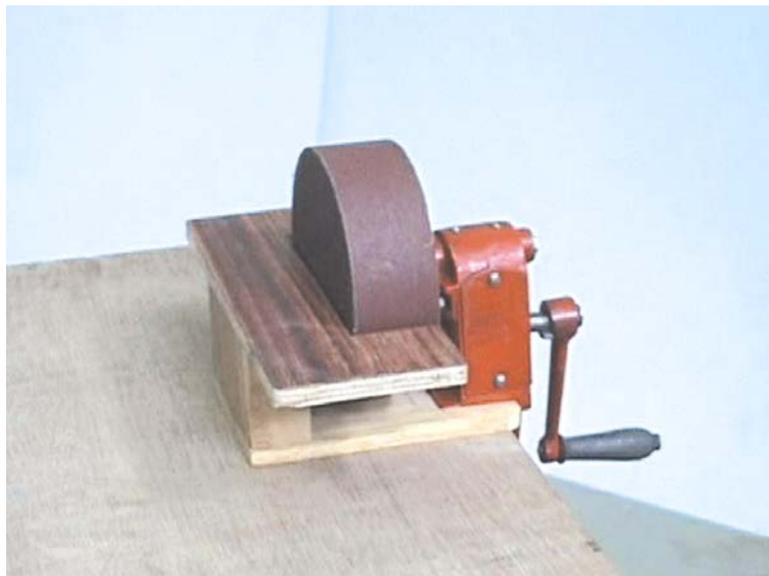


Fig. 7 : I. D. C. Sander

IDC Sander is an IDC innovation. It uses the mechanism of hand operated tool grinder. A sander drum facilitates finishing bamboo strips, small basket rims, plates etc.

The above four machines developed by IDC under the UNDP project are being produced by Kadirus, a small manufacturer in Mumbai under an agreement with IIT-Bombay.

2.2. Moulds, Jigs and Fixtures for Bamboo Craft

Moulds, Jigs and Fixtures become significant part of the small technologies for Bamboo Craft.

Traditionally there is little use of moulds for basket making except in places like Khonoma, Nagaland.

Simple wooden moulds, plastic moulds, knock down moulds, split moulds, have been developed at IDC and introduced to craft groups. (Fig.8)

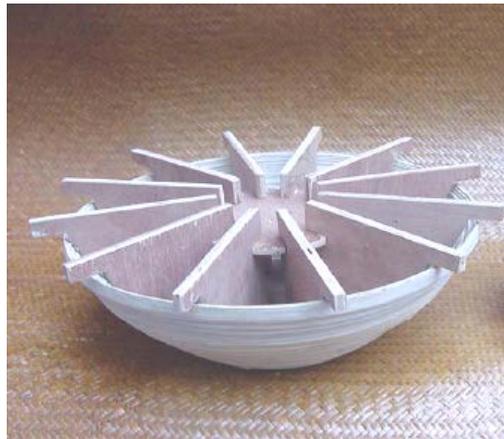


Fig. 8 : Knock down Mould for a bowl.

2.3 Product Specific Tools (Fig.9)

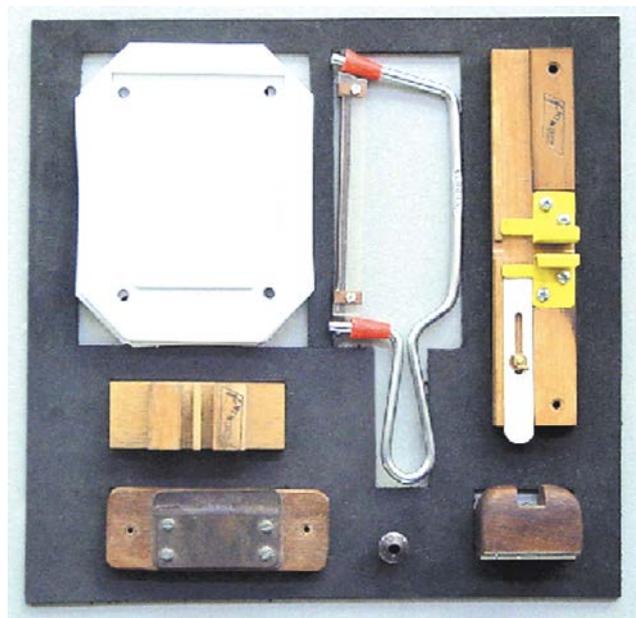


Fig. 9 : Product Specific Tools for a note pad.

To bring further refinement in bamboo craft products ‘product specific tools’ were developed for a single product ‘a Small Pad’. ‘18’ Product specific tools were developed in addition to ‘9’ standard tools to make the above product. Product specific tools consisted of templates, specific moulds as well as special tools to make specific parts of the product. Thus a half cut saw, a special tool facilitates cutting 1mm deep in a 2mm strip, with ease. A splitting tool helps to remove portion of the bamboo strip to give a precise ‘step’ in the thin bamboo strip, making flush joints in bamboo easily. Similarly a rounding tool and ‘knotch’ making tool help in making precise knotch in a round bamboo stick easy and elegant.

3.0. Design and Training

New Designs in bamboo Craft are essential to breath life into the ‘diminishing trade’. New Designs demand the use of new tools and technologies as well as investments.

‘Design for Bamboo Craft’ needs to incorporate some of the industrial design features like ergonomics (user convenience), stackability, Modularity, compactness in packing and combining with other materials with aesthetic quality to be able to reach wider Markets. Combining other materials like wood, jute, powder coated steel, brass, ceramics and even plastics with post-modern idiom in design is going to give ‘new boost’ to bamboo craft in the coming years. However in case of Bamboo craft combining design with product development as well as developing product specific small technologies will be key for success.

4.0 Micro Common Facility Centres (MCFCs)



Fig. 10 : MCFC at Diezhephe, Nagaland.

Reaching new tools, technologies to the remote villages all over the country is a major problem. The existing mechanisms operating through Govt. agencies are fragmentary in nature. They are often 'intimidating and less friendly' to the village craft persons.

Comprehensive schemes combining design, tools, technologies are lacking. With this background the concept of MCFCs (Micro Common Facility Centres) was proposed by I.D.C.

MCFCs cater to a group of 15 to 30 bamboo craft persons. Each of the MCFCs are given 2 sets of Tool kits, 2 sets of 4 machines (Splitting m/c., Width sizer, Thickness sizer, IDC Sander), some special tools, few new designs along with moulds and jigs to make new designs. A week long intensive workshops introduced to the working of tools, machines, finishes, treatments in bamboo as well as concepts of production planning, costing, marketing, etc.

A smoke chamber also is given to each MCFC.

'7' such MCFCs were assisted by IDC in the following places.

Through D.C. (H) [Development Commissioner Handicraft]

- Diezhephe (Nagaland) (Fig.10)
- Nalchar (Tripura)
- Barapeta (Assam)

Through K.V.I.C. (Khadi Village Industry Commission)

- Melghat (Maharashtra)
- Karjat (Maharashtra)
- Dahod (Gujarat)
- Wayanad (Kerala)

Under the MCFC scheme 2 trainers from each of the MCFC were trained at IDC for a week.

Trainers from different groups coming together provided a new opportunity of net working and learning between the groups.

Assisting '7' MCFCs has given a rich experience and insights. Some of the issues are elucidated below.

4.1 Continuity in Contacts:

It is important to develop a long-term relationship with each of the MCFCs. The currently executed 'project mode', though practical, does not meet the full requirements.

There are no institutional structure to give continuous guidance and help. Bambu Studio at IDC has started taking this role. But a formalized structure, which can interact in informal ways, is required.

4.2 MCFCs have inadequate knowledge of finance, Banking, Cash flow norms. Consequently they are unable to utilize the technology and training inputs. In the existing Govt. structures payments and cash flow are not to the advantage of an MCFC at a village.

4.3 Networking of MCFCs is essential for getting into urban markets, as the scale of products required is large. Production rates being slow and intermittent, 'reliability in product supply' does not exist today. A concept of 'Risk Marketing' is essential to be introduced to reach the village products to Urban markets. 'Risk Marketing Trusts' could come up which can ensure the quality and quantity of supply of bamboo craft products.

5.0 Sustainable Growth in Bamboo Craft

Technology requirements of MCFCs will continue. For a sustainable development new agencies will have to come up which can give following integrated supports to a group or network of MCFCs.

5.1 Product orders of large quantity spread over a period of say 6 months to 1 year.

5.2 Product specific Technologies to enable the MCFCs to produce and supply the products.

5.3 The agency should have quality control and packaging services to cater to the network of MCFCs.

5.4 Banking and Accountancy Services also need to be offered by the Central Agency to the MCFCs.

A sustainable growth of Bamboo Craft work is possible if 'few agencies with above mentioned functions' spring up, with Public or Private Finance, in several regions of the country.

Bibliographic listing

Salama.R. A. 1975. Dictionary of tools. George Allen & Unwin Ltd., London.

Gananharan. R and Mosteiro. A. P. 1997. Local tools, Equipment and Technologies for Processing Rattan INBAR, New Delhi.

Cort Louise Allison; Kenji Nakamura. 1995. A Basketmaker in Rural Japan. Smithsonian Institution, Washington D.C.

Training Manual. October 1999. International Bamboo handicraft Training course. Yiyang, China.

Cusack Victor. 1999. Bamboo World. Kangaroo Press. Australia.

