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A Planned Market Intervention for the Bamboo Sector of Kerala

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I

INTRODUCTION

Bamboo grows in the tropical, sub-tropical and temperate regions of the world with uneven distribution based on annual precipitation, altitude, soil conditions and temperature. Bamboo, a viable replacement for wood, is an industrial raw material for traditional and modern sectors, an important source of food, medicine and integrally involved in culture and arts (INBAR, 1997). Bamboo was one of the important crops in the traditional agricultural setting of the home gardens probably due to its ability to meet the multifarious requirements of the farming community. From a raw material known as the "poor man's timber" bamboo is currently known as "the timber of the 21st century".

In Kerala, 28 species of bamboo grow of which the main species are *Bambusa bambos*, *Ochlandra travancorica* (OT), *Dendrocalamus strictus,* among others. Kerala has 11 types of thin walled bamboos called reeds (Ochlandra genera), which are used mainly for weaving purposes by the traditional artisans. There are six species of bamboo available in homesteads including reed of which *Bambusa bambos* is the dominant species, accounting for 96 per cent. This is followed by *Bambusa vulgaris* and reed, constituting 2.23 per cent and 1.38 per cent respectively (Muraleedharan *et al.,* 2007). The major consuming sectors of bamboo in the state are pulp and paper industry, traditional sector, export and households of which the consumption of pulp and paper is the major one, constituting 0.085 million tonnes. The total consumption of bamboo and reed in the state is estimated as 0.256 million tonnes (Muraleedharan *et al.,* 2007). In Kerala, approximately 3 lakh people, most of whom belong to the socially and economically weaker sections of the society, depend on bamboo for their livelihood (Nair and Muraleedharan, 1983).

Bamboos also contribute substantially to generating income and employment for the rural landless and the forest dependent communities. The employment potential of bamboo is very high and the major work force constitutes the rural poor, especially women. About 432 million workdays per annum are provided by the bamboo sector annually in India (Adkoli, 1994). According to a study conducted by the Indian Council for Research on International Economic Relations (ICRIER) (Anonymous,

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1985), bamboo and rattan products made the largest single contributor in the handicrafts sector in India in terms of employment, for instance, 6,09,000 additional jobs were generated during 1961-81. Moreover, the growth of this sub-sector has been reported to be steady. Between 1961 and 1981, employment rose from 2,97,000 to 9,06,000. According to estimates, women employment in absolute terms rose from 1,69,000 to 3,62,000 between 1971 and 1981. The bamboo industry of Kerala with immense economic potential in a labour surplus economy has an important role in both the traditional and non-traditional sectors. This paper attempts to assess the economic potential of bamboo resource along with a comparative study of the two sectors. Further, an organised institutional set-up providing livelihood security for the Marginalised Bamboo Dependents (MBDs) and a green tax having global importance are proposed, as the market forces are unable to account the environmental benefits of bamboo.

Study Area and Sample

A stratified three stage sampling design was adopted for the sample selection with the unit of study being a household. The study was conducted during 2004-06. The Panchayats in Kerala were stratified into two: those with bamboo growing predominantly and those with isolated bamboo clumps. A reconnaissance survey was carried out to identify the Panchayaths in which bamboo was found in homesteads. These Panchayats belonged to the first-stage unit of sampling. It was decided to select at least five per cent Panchayats from the two strata in proportion to their total number in each stratum. Panchayats in each stratum were selected at random and they formed the second-stage unit of sampling. The households with bamboo grown in home garden constitute the third-stage units of sampling. The MBD households of four Panchayats, viz., Varavoor, Thenkurrissi, Mundur and Parli, within Palakkad and Thrissur districts were taken up for detailed study and the unit of study covered 205 households.

Information pertaining to the household demand for different bamboo products and its substitutes, supply price, quantity supplied among others was collected with the help of a questionnaire. For understanding the market demand for the products a detailed market survey was conducted in different markets of the selected Panchayats covering 185 retail sellers of the products. To ascertain the economic and livelihood potential of bamboo-based activities, a comparative study of the organised and unorganised sectors was conducted.

II

RESULTS AND DISCUSSION

A) *Seraphic Handicrafts Co-operative Society*

The Seraphic handicrafts registered in 1980, as Co-operative Society is an organised small-scale bamboo industrial unit with a total investment of Rs.1,35,000/-.

The Society mainly concentrates on mat weaving among various other products. The work force of the society included 92 workers of whom 60 per cent were regular and the remaining part time labour. The experienced earned up to Rs.100 and others earned on an average Rs. 25 per day. The sales and wages disbursed to the members by the Seraphic showed an increasing trend during the period 2003-05 (Figure 1). The production process is divided into different stages (cutting, splitting, treating, ribbing, finishing and packing). The society follows labour intensive production technologies and the quantity produced was a function of labour, capital and raw material employed. During 2003-04 the society distributed Rs. 3,13,445/- into the local economy as wages.

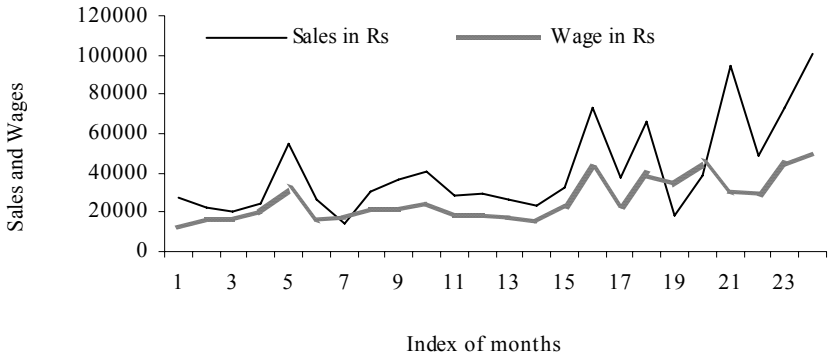

Figure 1. Sales and Wages of Seraphic During the Period 2003-05

Value Addition in Different Stages of Production

A comparative analysis of the sales volume and value addition of the society reveals that the value addition has a positive effect on the sales volume and the profitability of the society. Figure 2 illustrates the per reed value addition made by the Seraphic in the years 2003-04 and 2004-05. The raw material cost of reed increased during the year 2003-05 due to increasing transportation and other related cost. The increased division of labour and higher skills and efficiency attained by the labour help the society to reduce the share of wage requirement per reed from 2003-04 to 2004-05. Other costs also showed a decreasing trend due to increasing efficiency and economies of scale of increased production. In the face of severe competition the Seraphic cut down their prices by reducing per unit profit. The reduced price and high quality value added product increased the total revenue of the

society (Figure 3). Higher value addition in the aggregate level and reduced value addition per reed due to increased efficiency and skills ensures higher revenue to the society. The experience of Seraphic Co-operative Society shows that the labour intensive value addition thus ensures profitability and employment security in the organised bamboo sector of the state.

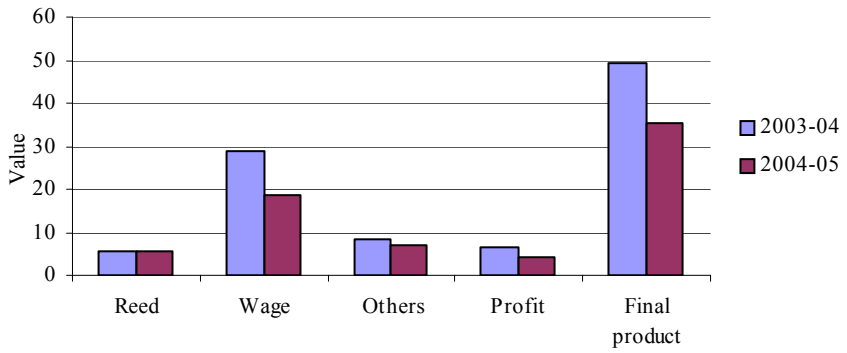

Figure 2. Value Addition on Reed by Seraphic in the years 2003-04 and 2004-05

Figure 3.The Aggregate Value Addition and Total Revenue of Seraphic During the year 2003-05

Marginalised Bamboo Dependents (MBDs)

The Marginalised Bamboo Dependents (MBDs) represents the unorganised bamboo sector of the state and they produce bamboo products for their day-to-day subsistence as well as for meeting the local seasonal demand. This group is endowed with traditional skills and working knowledge. Production here is a function of labour and bamboo and the role of capital in the production function is near to zero. With poor market linkages and high cost of production they are outside the mainstream of the bamboo productive sector.

Production Details of the MBDs

The entire bamboo related works are done by manual labour among the traditional weaving communities. The traditional weavers have their own products such as basket (*Kotta)*, Sift (*Muram)* and large mat *(Panambu)* among others. Production depends on the rural and agricultural demand for the product and these demands are quite seasonal in nature such that during harvesting season there is a high demand for bamboo baskets and the like (mats, baskets). These finished products cater to only local demand and are carried by head loads to distant markets or to individual households for sale. In the opportunity cost analysis, the forgone benefit of the MBDs is estimated based on the local wage rate offered to the bamboo dependent labour (Table 1). The estimated opportunity cost is greater than the earned benefit and the community is underpaid even during the peak period of sales due to the high cost of production and low price. The bamboo based productive activities in the unorganised sector also involves four stages as was seen in the case of the trained artisans. There also exist major differences in the different production stages of organised and unorganised sectors (Table 2).

TABLE1. OPPORTUNITY COST/ FORGONE BENEFIT OF MBDS

Production stages (1)	Earned benefit (2)	Required labour days (3)	Foregone benefit (in Rs.) (4)
Collection	2-3 poles	5.5	275
Processing	390-396 slivers	12	600
Production	40 small baskets	4	200
Marketing	40 small baskets	1	50
Total	Rs. 736	22.5	1125

TABLE 2. BASIC CHARACTERISTICS OF TWO BAMBOO BASED PRODUCTIVE SECTORS

Production stages (1)	Organised Sector (Trained artisans) (2)	Unorganied Sector (MBDs) (3)
Collection	• Large scale • Source- KSBC	• Small scale • Labour intensive
Processing	• Division of labour • Labour intensive techniques of production with mechanisation	• No division of labour, household based rural enterprise • Labour intensive mode of production with traditional tools
Production	• High capital and modern techniques of production, acquired skill through training. • Large scale production • High product diversification	• Low capital and traditional production techniques based indigenous knowledge • Small scale production • Low product diversification.
Marketing	• Caters to local, National and International market • Organised market structure	• Caters to local market • Self-labour • Unorganised market structure

Marketing of Bamboo Products

The determination of prices and outputs of various products depends upon the type of market structure in which they are produced, sold and purchased. Marketing is the weakest link in the production chain as far as the traditional workers are concerned where most often direct sales are undertaken. The indirect method refers to the sales through the retail or wholesale shops. The MBDs produce as much as possible from one collection and 88 per cent of the sample households conduct weekly sales. During the mango and paddy seasons the bamboo products are much in demand and the local market is very active and hence daily sales are carried out. Thus, the bamboo markets, as far as the MBDs are concerned, are characterised by high selling cost in real terms. Seventy four per cent of the sample households pointed out that the selling cost in real terms ranges from 10 to 15 per cent of their produce in real terms. As it is a household based rural enterprise it does not attract any trader to purchase these products from remote locations due to poor road access and lack of information.

Market Imperfection and Consumer's Surplus

The bamboo products of the MBDs are yet to reach the larger markets and attract national as well global attention. The market features of the products (Box I) made by MBDs are not so encouraging and this calls for strategic initiatives for their improvement. Although bamboo is a natural, strong fibre, having aesthetic looks and the products are environment-friendly the production rate is low and the cost of manufacturing is high. But, the major threat remains that these products are yet to

establish themselves. Competition with products such as plastics and other substitutes also poses threats. The utility of bamboo and plastic products are identical but there exists price difference between the two (Table 3). Market price and durability of a single unit of plastic product is higher than that of a single unit of bamboo product. However, the relative price reveals that the total economic cost over bamboo product is higher than that of plastic product for the same utility. The demand curve of two bamboo products and their corresponding plastic substitute products is derived from the primary data collected from the sellers and the consumers of these products. The price elasticity of bamboo *basket* is equal to that of plastic *basket* (Table 4) and the price elasticity of bamboo *sift* is higher than that of plastic sift. As the consumer surplus in case of the plastic product is higher than that of bamboo products people prefer plastic products to bamboo without considering the social and environmental cost. Imposing a green tax equivalent to the difference in the consumer surplus of these products will help to induce the substitution of environmentally hazardous plastic products by the environment-friendly bamboo products to some extent. The demand for bamboo products is elastic in nature, thus, the price is an important determinant factor in the market demand of these products. Thus, for making the sector more competitive adequate attention should be given to reduce the price and increase the quality of the products.

Box I. Market Features of Bamboo products of MBDs

- Seasonal demand
- Availability of large number of substitutes
- Small number of buyers and large number of producers
- High market price volatility among the sellers and markets
- Competitive market with buyers dominance
- Direct marketing with no advertisement
- Poor bargaining power
- Lower price elasticity of demand

TABLE 3. RELATIVE PRICE OF BAMBOO PRODUCTS

	Plastic/Rubber		Bamboo		
Product (1)	Price in Rs. (2)	Duration in years (3)	Price in Rs. (4)	Duration in years (5)	Relative price in Rs. (6)
Sift	65	2	35	1	70
Basket	40	2	35	0.5	140

TABLE 4. PRICE ELASTICITY OF BAMBOO/PLASTIC PRODUCTS

Products (1)	Consumer surplus (2)	Price elasticity* (3)
Bamboo basket	4.7	2.35
Plastic basket	5.7	2.35
Bamboo sift	3.3	2.95
Plastic sift	10	2.53

TOWARDS ACTION PLAN

Environmental Tax for Ensuring Sustainability of Nature and Humanity

Plastic and its products occupy importance in the day-to-day life of the people and these products pose great threats to the sustainability of the environment. Even though we cannot reject the sector altogether, we can encourage its substitution as far as possible by environment-friendly products. As all plastic products do not have perfect substitutes, the plastic industry should devote its resources for the production of those products, which have no environment-friendly substitutes. One of the benefits offered by the bamboo sector is its environment-friendly products but the market forces do not take into consideration this benefit in fixing the price. The relative difference in the market scenario of the two products highlights the high environment cost on the part of the plastic products (Table 5). The market forces determine the price only by taking into account the private cost and benefit and not the social cost. The proposed green tax is a tax proposed to be imposed on the environmentally hazardous products for reducing their unnecessary consumption and encouraging the use of environment-friendly products.

TABLE 5. RELATIVE DIFFERENCE IN THE MARKET SCENARIO OF BAMBOO AND PLASTIC PRODUCTS

Bamboo (1)	Plastic (2)
Consumer's point of View	
High market price	Low market price
Low consumer preference	Higher consumer preference
Low consumer surplus	Higher consumer surplus
Low demand	High demand
Social Point of View	
No environmental cost	High environmental cost
Policy initiative	
Improving the quality of the product	Imposing Green Tax

Imposing an Environmental Tax

The corresponding market share of bamboo and plastic products is illustrated below (Figure 4). In the Figure, 'oa' and 'ab' are the quantities sold by the bamboo and plastic sectors respectively. The average market price of bamboo and plastic

products is 'og' and 'ad' respectively. The consumer surplus of the bamboo products ('ΔIgh') is lesser than that of plastic products ('ΔIdf). The excess consumer's surplus earned by the plastic sector (ΔIdf - ΔIgh) is proposed to be charged as green tax.

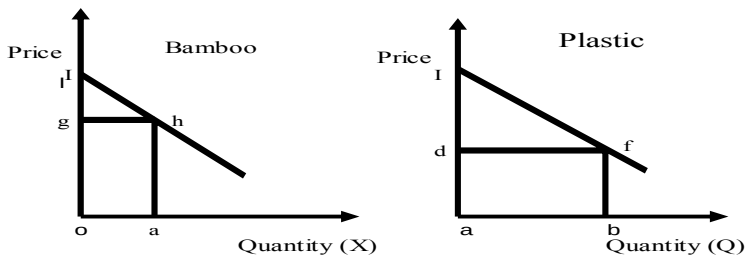

Figure 4. Market Share of Bamboo and Plastic Products

Imposing a Green Tax on Sift - A Product of MBDs

Sift is a semi-durable good produced by the traditional bamboo weavers for various household and agricultural purposes in Kerala. Traditionally this product is produced by the bamboo sector only. Even though at present market offers plastic substitutes, it is one of the major products of traditional bamboo sector in Kerala. The estimated demand function of the product is Q = 66.76 – 2.87 P with an R^2 value of 0.76 and Q and P represent quantity and price respectively. The market supply function of the product is equal to Q = 4.2 P – 56.5 and the corresponding R^2 value is 0.52. The estimated equilibrium price and quantity is equal to Rs. 17.50 and 17 numbers respectively. The estimated price elasticity of demand and supply is equal to – 2.95 and 4.3 respectively.

Plastic sift is the substitute product available in the market, which are relatively cheap and more durable compared to bamboo sift. Even though the uses and utility of the products are the same the low price attracts more consumers to the plastic product without considering the environmental cost imposed by the product on the society. The demand function of plastic sift is Q = 20.68 – 0.249 P with an R^2 value of 0.67 and the supply function of the product is Q = 0.8 P – 43 and the R^2 value is 0.54. The estimated equilibrium price and quantity is Rs. 60.7 and 6 respectively. The price elasticity of demand and supply is equal to -2.52 and 8.1 respectively. The estimated

consumer's surplus of bamboo and plastic sift is Rs. 3.3 and Rs. 10 per one single product (Table 6). By imposing the difference as an environmental tax on plastic sift ensures equality in the consumer's surplus and gives more preference to the eco friendly bamboo product.

TABLE 6. PRICE ELASTICITY AND CONSUMER SURPLUS OF BAMBOO AND PLASTIC SIFTS

Type of product (1)	Price (2)	Quantity (3)	Consumer surplus (4)	Price elasticity (5)
Bamboo	17.5	17	3.3	2.95
Plastic	61	6	10	2.53
Green Tax on plastic Sift = Rs. 6.7 Per Sift				

III

CONCLUSION

Bamboo sector in Kerala is labour intensive in nature and its employment potential is very high. Value added production, skilled labour and scientific method of production will ensure profit and employment opportunities in the sector. The livelihood security of the MBDs can be enhanced and improved through increased accessibility to raw material and market, skill development and adequate sustainable institutional support. The bamboo sector offers environment-friendly products but the market forces do not take into consideration this benefit in fixing the price. Imposing an environmental tax equal to the difference in the consumer's surplus will encourage the use of eco-friendly products.

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