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Innovative Solutions and Technological Interventions for Employment Generation and Sustainable Livelihood in Kerala, through Handmade Paper Production and its Value Addition

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Abstract

As part of research activities in Research Institutions and Universities of India, a number of innovative technologies and ideas are developed. After the completion of the research projects, most of these innovations and ideas are not commercially exploited. Most of the innovative technologies are lying idle in different organizations. Transfer of new technologies for employment generation and sustainable development is the only remedial measure for poverty alleviation and sustainable development. Establishing small scale industries by the villagers in Kerala, will boost the per capita income of the local community, and an attempt is made by implementing a project sponsored by Department of Science and Technology, Government of India, under the heading, *i-STED* (Integrated Science Technology and Entrepreneurship Development) by Swadeshi Science Movement (SSM) a non-profitable charitable Institution, mobilizing unskilled villagers to become small scaled entrepreneurs in the field of value addition of handmade paper, to produce diversified products for sustained income generation of poor village community. This will also minimize the consumption plastic products in the form of Carrey bags for stationary, thus creating an eco-friendly atmosphere.

Keywords: Handmade paper production, recycling of waste materials, Technology transfer, Value addition, Sustainable income.

INTRODUCTION

Department of Science and Technology, Government of India, has sanctioned an *i-STED* (Integrated Science Technology and Entrepreneurship Development) project entitled "Innovative Solutions and Technological Interventions in Industries and Clusters to create Science and Technology based Entrepreneurship Development and employment in Kerala" under the research activities of Swadeshi Science Movement, Kerala. The project envisages the implementation of three schemes namely production of 1) Virgin Coconut Oil and coconut by products 2) Papaya cultivation, extraction of Papain and production of value added by-products 3) Handmade paper production through clusters/entrepreneurs and its value addition. The project is being implemented initially in 6 districts of Kerala *viz*. Kasargod, Wayanad, Malappuram, Idukki, Quilon , Trichur and latter extended to Palakkad district. The sanction for the project was obtained in January 2017 and the project period is 5 years.

Transfer of new technologies for employment generation and sustainable development is the only remedial measure for poverty alleviation in India, since more than 70% of India`s population is living in villages. Farming and agriculture is the major activity of most of the villagers and in fact they are always at the mercy of middle man with respect to the agricultural product marketing. That means, the market prizes are controlled by the middleman, not the farmers who produce them through life long effort. Thus most of the village communities are not getting a sustainable income regularly and their living conditions are getting worse day by day. The development of small scale industries, with simple knowhow and innovations are the only remedial measure to overcome this situation. As the part of the current i-STED project an attempt is made to enhance the per capita income of village community by giving training and logistic support to start new ventures in the field of recycling of agriculture waste to handmade paper and to produce value added products like paper bags, molded articles etc.

Objectives:

The Project envisages the following objectives *viz.* i) Development of entrepreneurial skills for optimum utilization of local resources, ii) Popularization of identified innovative technologies among entrepreneurs, iii) Scaling up of viable technologies in agriculture, and engineering for sustainable development through formation of “clusters and small-scale industrial units” and iv) Creating a business eco-system by establishing effective forward and backward linkages and marketing strategies.

Study area:

Six districts *viz.* Kasaragod, Wayanad, Malappuram, Thrissur, Idukki and Kollam, in Kerala State were selected initially, and later Palakkad district was also added for the study based on the initial field survey regarding the availability of resources and economic status of the villagers.

METHODOLOGY

The first and the foremost activity under this project was to create awareness among villagers regarding the need for starting small scale industrial units either individually or in collective form, for which a number of meetings were organized with the assistance of local bodies. As the second stage, entrepreneurship development programmes (EDP workshops) were conducted in different districts for the selected potential entrepreneurs. As the third stage hands-on training were given in handmade paper production at Kumarappa National Handmade Paper Institute (KNHP) and for paper bag production in different districts.

The major steps involved in the production of handmade paper are as follows (Muraleedharan and Perumal, 2010):

1. *Waste paper processing,* which involves drying of waste paper, powdering the paper and pulping the dried paper powder with water in the ratio 1:5 for about three hours in hydropulper;
2. *Bio-pulping and bio-bleaching* of hay or other plant materials – the dried and powdered plant parts will undergo the process of bio-pulping and bio-bleaching using micro-organisms like *Pythium* sp., *Pediococcus* sp. or *Trichodeerma* sp.; to avoid unhealthy chemical bleaching. The bio-bleaching will continue usually for 3-4 days to get a better result. Usually the paddy straw and similar materials are having 36% cellulose, 34% hemicelluloses and 12-13% lignin content (She *et.al*.2012). Since the presence of hemicelluloses and lignin in the pulp will impart colour change and affect the pulping procedure, it is highly necessary to breakdown the hemicelluloses and lignin molecules, and that is why bio- bleaching is recommended.
3. *Mixing of different quality pulps and binding addictives/binding agents* in desired proportions will be done for getting different quality of paper. It is better to add 10-12% bamboo pulp, reed pulp or cotton waste pulp to enhance the strength of the paper; since they contain more long fibered cellulose. On experimental basis we tried elephant dung instead of plant materials at KNHP, Rajasthan, during the training period, and we got quality paper with off-white/yellowish colour without using any chemical bleaching.

A group of 40 participant got trained under the project at Kumarappa National Handmade Paper Institute (KNHP), Rajasthan in handmade paper manufacture and value addition (Figs.1-3).

As the part of the project, to create new small scale units among women entrepreneurs, workshops were conducted (Figs.4 &5) in different districts with the help of local Panchayat/self help groups.

Fig.1.First batch of Trainees of handmade paperproduction at KNHP

Fig. 2.Powdering of plant materials

Fig.3.Pulping and bleaching

Hands-on training in value addition of handmade paper (mainly in paper bag making), using handmade paper procured from Coimbatore in Tamilnadu and Rajasthan, were conducted in different districts with the help of trained professionals (Figs.6).

Fig. 4.Entrepreneurship awareness workshop

Fig. 5.Entrepreneurship Development Programme

Fig.6. Trainees on Paper bag production

Fig.7. Hands-on training on paper bag production

Fig.8. Value added paper products

Under the project activities, so far 10 industrial units were formed in different districts (Table, 1) and about 100 people (mostly women) are direct employees, working in these units. More over the use of plastic carry bags are replaced to a large extend due to functioning of such small sale units. Govt. Of India Mudra loan facility was availed by the entrepreneurs for start-up venture.

Table.1. Number of productive units in different Districts

Kasaragode	1
Wayanad	3
Malappuram	Nil
Idukki	2
Thrissur	2
Kollam	2
Total	**10**

As far as the marketing of products, the manufactures are directly selling their products in various stores as per the demand. The initial steps of formation of marketing co-operative society are in progress.

RESULTS AND DISCUSSION:

The thickness of the produced sample handmade papers ranged from 156 to 160 µm. The Grams per Square Meter (GSM) of the produced handmade papers ranged from 160 to 190 g/m²; burst index ranged from 4 to 5 kPam²/g and tensile index ranged from 70 to 90 Nm/g. The beneficiary of this programme is mainly village women who

want to have their own income for living. Thus women empowerment is also an unforeseen goal of this project. The entrepreneurs are getting an average net income of Rs 5000-15000/ month. Since handmade paper production is not yet started commercially, currently handmade paper is procured from other states of India, mainly from Tamilnadu and Rajasthan for value addition.

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