Technical back-up for Khadi and Village Industries sector
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One answer to the mounting unemployment problem of our country lies, as the author pleads, in massive rural industrialisation. The technical institutes of higher learning, he says, have a major role to play in this direction by providing technical back-up to the traditional artisans, craftmen and village youth. The IIT Guwahati has already shown the way by setting up Technical Back-up Unit (TBU) with the support of the KVIC and concentrating on non-conventional energy utilization, bamboo and canecraft, and development of a semi-automatic loin loom, the author points out.

Background
India has a unique distinction of having natural resources and huge manpower. The large-scale industries, both in the public and private sectors comprising indigenous and multinationals have made India proud of being in the forefront of many advanced technologies. However, the employment generation through these efforts is not adequate and millions of people still have no work on their hands, which in turn creates social tensions. Hence, a productive and competitive small scale but voluminous rural industrialization is the need of the hour for employment generation. The role of technical institutes of higher learning in providing desired R&D inputs to village industries sector is very important. Hence it was envisioned to set up a Technical Backup Unit (TBU) at Indian Institute of Technology Guwahati for providing necessary inputs to traditional artisans, craftsmen and village youth to upgrade their skills and accelerate the process of rural industrialization of our country with the support of KVIC. The major thrust of the TBU is to improve the design and quality of the products produced in rural industries, train the technicians, craftsmen and artisans to develop manpower for employment generation.

Accordingly, it was envisaged to concentrate on three areas where IIT Guwahati has expertise, viz., a) Non-conventional energy utilisation b) Bamboo and canecraft and c) Development of a semi-automatic loin loom. Dr. Pinakeswar Mahanta, Mr. Ravi Mokashi Punekar and Mr. Amarendra Das are spearheading these three areas of activities, respectively, along with 6 other faculty members.

I. Non-conventional energy utilization

As a first step, biogas digester and one set of vermicompost unit were set up at IIT Guwahati. These were constructed mainly for training purpose.

An exhaustive research was carried out to improve the efficiency of existing biogas plants. One of the important factors responsible for low yield from the biogas plants in the north-eastern region was less bacterial activity during winter. Laboratory scale experiments showed that if the temperature of the bio-slurry is maintained at a constant level, the bacterial activity is stable and the yield from the process can improve. Based on these observations, an improved two-chamber biogas plant was developed which could retain the slurry for a longer duration and fairly at constant temperature. This resulted in a high yield of biogas. The newly developed biogas model was appropriately named as "Samriddhi".
Three clusters, namely Karara, Maihat and Gorchuk were identified for implementation of the activities of the energy sub-sector. All the clusters lie in a radius of about 30 km from IIT Guwahati. In all these clusters, the biogas units were set up and rural youth were trained in their operation. This has resulted in energy saving to a limited extent.

Training was imparted in three modules viz. a) Biogas b) Vermicompost and c) Biogasification for the unemployed youth from rural areas.

A total of 61 unemployed youth were imparted training during the last two years on biogas, vermicompost and biogasification.

Installation of two vermicompost units and one improved biogas unit at two clusters viz. Maihati and Karara-Kadamtal was also carried out. Composting process has started at both these clusters. These will be used for training of entrepreneurs and unemployed youth.

Training material on biogas, vermicompost and biogasification was prepared in the local language (Assamese) and distributed among the trainees. This is being printed in a booklet form in Assamese language.

Project report on biodigester and vermicompost was prepared and given to two NGOs viz., Maihati Satra Krishi Farm Ltd. (Co-operative) and Bihlangani Development Farm for implementation in their respective areas of operation.

Energy crop plantation (Nahar plants 50 nos. and Karas plants 150 nos.) was done in the IIT campus. This was done with three-fold purpose. Firstly, it will be useful for extracting bio-diesel, which in turn could be used for bio-diesel studies. Secondly, the plantation will help in arresting pollution in the surrounding area. Thirdly, the entire programme will help in showcasing the use of bio-diesel to rural youth, who may in turn be motivated to undertake similar programmes in their villages.

A new burner for a kerosene-water stove was developed with and without porous media and tested for its efficiency. Further work in this area is continuing.

- Development of a zero head turbine on the laboratory scale is going on. A successful model of this kind will lead to development of an efficient zero head turbine, suitable for producing power from the rivers without requiring a potential head.
II. Bamboo and canecraft:

The second area of activity was in the use of locally available bamboo and cane resources for novel applications.

It was observed that while there is abundant resource in terms of cane and bamboo and also availability of craftsmen who can work with these materials, there is a dearth of furniture in the rural schools and health centers. Bamboo and cane have been used in the region for making a variety of utility items, but no one had envisaged their use as raw material for facilitating school furniture and hospital furniture items. A set of new, sturdy and ergonomic designs was developed for a variety of school and hospital furniture. Some of these furniture include class room benches, writing desks, office chairs, black board stand, book shelves, hospital bed, mobile patient chair, trolley, medical check-up bed, stretcher etc.

It was observed that life of cane and bamboo furniture is not as long as that of wooden furniture and hence economically non-viable.

Experimentation on chemical treatment of bamboo and cane has been performed on the local varieties of bamboo and the processed bamboo was put to use in the fabrication of the furniture prototypes.

The local craftsmen were invited to undertake training in the fabrication of bamboo and cane furniture. This served two purposes. Firstly, the local craftsmen were trained in the designing of novel furniture items. Secondly, the furniture produced through them was put to use. The first batch of craftsmen who were trained in the design and fabrication of these furniture items were engaged as trainers for future batches of trainees. A total of 29 nos. of craftsmen from various districts of Assam participated in the 10 days training programme.

The furniture produced with the help of trainees was donated to Abhaypur Prathmik Shala, North Guwahati and a Public Health Centre. These centers are proposed to be used to showcase effectiveness of bamboo and cane as alternative materials for furniture making. This will not only save the depleting forests, provide employment and create awareness in the use of bamboo and cane.

• An exhibition of furniture prototypes developed for school & primary health centers was put up in the KVIC-SEGP exhibition.
III. Design & Development of a Semi-automatic Loin Loom:

The third activity was undertaken in the area of development of a semi-automatic loin loom. A loin loom is a device used for weaving of clothes in all the tribal areas.

It was observed that the present type of loin loom had low productivity and the weaver had to face a number of physiological problems like backache.

A new semi-automatic loin loom was developed and prototyped. Trials were made on this new loom, which is a frame loom with a seat for the weaver. As against using only hands for all motions, the new design uses both upper and lower limbs for operating the loom.

Four weavers from Bongaigaon area in Assam were brought to the institute and they were introduced to the new loom. Foot pedal was used for tensioning and releasing the warp. This produced the material, which is of almost the same quality as the loin loom product.

Second trial was made after a gap of one month using 4 shafts of knitted heald instead of half shaft for forming a shed and the material woven was again found to be comparable.

Further work in this area is continuing, in order to increase the productivity and to make the loom foldable and handy so that one can easily carry the loom from one place to the other.
Conclusions:
IIT Guwahati, a premiere technical institute of the country, in addition to doing teaching and research in the high technology areas, is attempting to help the society and the north- eastern region in their mundane activities in a small way. It is hoped that these attempts will enthuse the local unemployed youth to take up entrepreneurial activities, initiate economic activities and reduce the problem of unemployment and social unrest.

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