

A Report on

Rural Technology Action Group (RuTAG), IIT Delhi

Regional Workshop and Field Visit at Bhuj, Gujarat

In Collaboration with Khamir (NGO)

Held at

Khamir, Lakhond Crossroads - Kukma Road | Behind BMCB Social City, Post

Village Kukma, Bhuj 370105, India

On

June 3 and 4, 2019



By

Prof. Subir Kumar Saha (P.I.)

Department of Mechanical Engineering

IIT Delhi, Hauz Khas

New Delhi – 110 016

Tel: 011 2659 1135; Fax: 011 2658 2053

Email: saha@mech.iitd.ac.in

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Preamble

RuTAG IIT Delhi conducted a regional workshop on June 3, 2019, in collaboration with Khamir an NGO at Bhuj. The program was attended by 39 participants, which included **Prof. R. R. Gaur**, Hon. Visiting Professor, NRCVEE, IIT Delhi and Chairman, Core Group, RuTAG IIT Delhi, **Prof. S. K. Saha**, Professor, Dept. of Mechanical Engineering, IIT Delhi, Coordinator, RuTAG IIT Delhi, **Prof. M. R. Ravi**, Professor Dept. of Mechanical Engineering, IIT Delhi, Co-coordinator, RuTAG IIT Delhi, **Mr. Davinder Pal Singh and Mr. Yashwant Prasad**, Project Associates, RuTAG IIT Delhi, **Mr. Ashish**, Project Assistant, RuTAG IIT Delhi, **Mr. Rutvik Solanki**, RuTAG IIT Delhi club member and B. Tech student, Dept. of Mechanical Engineering. **Mr. Ghatit Laheru**, Director, Khamir, Bhuj, Gujarat, **Mr. Harish Hurmade**, Khamir, Bhuj, **Mr. Jigar Vaidya**, Khamir, Bhuj, **Mr. Shoryamoy Das**, Khamir, Bhuj, **Mr. Raviveer Chaudhary**, Assistant District Commissioner, DHC, Bhuj, **Mr. Lal Rambhia**, KNN Abhiyan, Bhuj, and 26 other NGO participants, Institute representatives and delegates.

1. Inauguration Session (June 3, 2019)

Mr. Ghatit Laheru coordinated the workshop and welcomed the delegates and participants. The workshop started with the lighting of the lamp by the dignitaries present on the dais.



Figure 1 Mr. Ghatit Laheru welcoming the delegates and participants

1.1 Welcome by Prof. S. K. Saha

Prof. S. K. Saha welcomed the participants and briefly explained the agenda of the workshop. He explained the mechanism and role of RuTAG IIT Delhi in technology up-gradation for rural India. He offered his sincere thanks for the efforts of Mr. Ghatit Laheru and Khamir team in hosting and coordinating the workshop. He also thanked all the participants. This session was followed by the introduction of the participants.

1.2 Welcome by Prof. R. R. Gaur

Prof. Gaur welcomed everyone and mentioned that impacts of fast and sustainable developments must be ascertained by understanding and choosing correct technological inputs necessary for the growth. He mentioned that it is essential for a scientific institute to provide proper technical solutions which would be environmental and user-friendly. He also emphasized the link between IITs and NGOs for the betterment of rural livelihood. He added the need for sustainable existence of the community. He discussed the role of RuTAG and challenges in rural technology development and dissemination.



Figure 2 Prof. R. R. Gaur welcoming all participants

1.3 Introduction of participants

Participants from various NGOs, institutes, and organizations gave a brief introduction of themselves and their organizations



Figure 3 Introduction of participants

2 Technical session – 1

2.1 Presentation on Rural Technologies developed under RuTAG IIT Delhi by Prof. S. K. Saha

Prof. S. K. Saha outlined several completed and on-going projects of RuTAG IIT Delhi. He gave a brief explanation on Animal Driven Gear Box, Bullock Driven Tractor (old and new), Treadle Pump, Tulsi Mala making Device, Sheep Hair Shearing Device, Groundwater level measuring device and Carpet related machines developed by IIT Delhi. He also mentioned the objectives and mandate of the RuTAG programme.



Figure 4 Prof. S.K. Saha presenting on technologies developed at RuTAG IIT Delhi

2.2 Presentation by participating organizations

2.2.1 Kishor Bhadra, Vivekananda Gramodyog Society, Kachchh

Mr. Kishore Bhadra from Vivekananda Gramodyog Society, Kachchh shared the NGO's contribution to textile processing. He explained pre-bleaching, dyeing, and waxing process of clothes.



Figure 5 Presentation by Vivekananda Gramodyog Society on textile processing

Intervention Required

1. Developing wax removing technology
2. Block making technology.

RuTAG IIT Delhi Remarks:

RuTAG IIT Delhi will contact the NGO for more details and a field visit will be planned. After that RuTAG will look for feasible solution.

2.2.2 Dilip Patel and Sanjay Kumar Shivdas, Suzlon foundation

Mr. Dilip Patel and Mr. Sanjay Kumar Shivdas from Suzlon foundation presented on Suzlon initiative on plastic waste collection, storage, and recycling process. They have come up with an innovative idea which they call as “The hook” where a hook is used to collect and store plastic waste. Mr. Dilip said that around 600 villages in Maharashtra had accepted this technique of collecting plastic waste. The waste plastic is recycled to make pipes. These pipes are used by villagers on rent basis.

Intervention Required:

1. Plastic burning technology from RuTAG IIT Delhi.

RuTAG IIT Delhi Remarks:

1. IIT Delhi will check with its polymer experts in the Dept. of Material Science to find if any such technology exists or not.



Figure 6 Presentation by Suzlon Foundation on “The Hook”

2.2.3 Barkha Anjariya and Shivam Gajjan, Srujan, LLDC

The Living and Learning Design Centre (LLDC) a Srujan trust is working to preserve, revitalize, and promote the craft heritage of Kachchh and ensuring women empowerment. LLDC has identified around 35 types of handicraft in Kachchh. It is trying to catch the handicraft market both national and international, to open new avenues for the artisans of Kachchh. LLDC requested intervention in the development of new pottery products which can be made using different kinds of clay.

Intervention Required:

1. Require efficient pottery kiln
2. Maintaining temperature

RuTAG IIT Delhi Remarks:

Prof. M. R. Ravi from RuTAG IIT Delhi will be looking in this regard. NGO will be contacted for the further actions.

3 Technical session – 2

3.1 Presentation by Prof. M. R. Ravi on furnaces developed by IIT Delhi

Prof. M. R. Ravi introduced participants with his work on various kinds of furnaces which he improved and implemented in various villages of India. He explained improvisations undertaken in Bangles making Furnace at Bharatpur, which lead to 70% fuel savings. He also mentioned the success of updraft potters kiln made using rat trap bonds in brick masonry introduced to the potter's cluster of Kondagaon in Chattisgarh. This saved around 40% of fuel, and the same technology has been introduced in a project funded by NBCFDC for the construction of potter's kiln in Khurrampur village near Gurugram. He also highlighted Bell Metal Furnace, which was modified using LPG as a fuel instead of coal and wood. The changes saved half of the fuel cost.



Figure 7 Prof. M. R. presenting on furnaces developed at IIT Delhi

3.2 Presentation by Khamir

Mr. Jigar, Mr. Shouryamoy, and Mr. Ghatit presented Khamir's work on various handicrafts of Kachchh region. Mr. Jigar presented on the traditional way of making the copper bell. He explained Khamir's contribution in improving the furnace that is used to coat copper on the bell. Mr. Shouryamoy presented on sheep shearing machine and wool processing. He mentioned that there are around 16 lakhs sheep in Gujrat and Khamir has been working in the development of wool products to upgrade artisan's livelihood. He explained about wool carding process which is done using Ashford hand carding machine and Centralised wool carding machine. Wool carding using these machines is expensive, so he asked for intervention in the development of low-cost carding

machine. At the end, Mr. Ghatit presented on pottery kiln, vegetable tanning of desi leather and problem faced on the spinning of wool and hand loom.



Figure 8 Khamir team presenting on the copper bell and other technologies

Intervention Required:

1. Improving the furnace used in coating copper bell such that multiple bells can be coated at the same time.
2. Development of low-cost miniaturized carding machine.

RuTAG IIT Delhi Remarks:

1. Prof. Ravi will be working on the furnace for baking multiple number of copper bells and improving the efficiency of furnace.
2. Prof. Saha will look in the regard of low-cost miniaturized carding machine. A dialogue regarding these problems will be started by the NGO by providing the details within a month from the preparation of this report. IIT Delhi's Textile Department (Prof. Rabi Chattopadhyay will be contacted in this regard).

3.3 Mr. Mahavir Acharya, Hunnarshala

Mr. Mahavir shared his experience on the contribution of Hunnarshala in building crafts. Hunnarshala offers its knowledge and skills for building designs, settlement planning, social housing, disaster reconstruction, wastewater treatment systems, infrastructure development,

etc. The NGO derives its ideological nourishment for making a positive contribution towards its objectives of promoting and demonstrating people-centric, environment-friendly, artisan-based approaches and technologies.



Figure 9 Mr. Mahavir Acharya presenting on building craft

Intervention Required:

1. Validation of properties of recycled and reused wood, bamboo, etc. which are used for construction purposes.
2. Research on the acoustic property of desi wool so that 80 % of produced wool which remains unused may find its application in building construction.
3. Interventions required in developing technologies for thermal insulation of roof and fire-retardant roof possibly by using waste wool.

RuTAG IIT Delhi Remarks:

1. RuTAG will identify faculties in IIT Delhi to do research and validation on the above requirements. NGO will be contacted by RuTAG to understand the requirements in detail.

3.4 Mr. Punit Soni from Qasab

Mr. Soni presented on the use of mirror in embroidery etc

Intervention Required:

1. Mirror cutting technology
2. Improving the efficiency/technology for the glass furnace etc

RuTAG IIT Delhi Remarks

1. IIT Delhi will try to look for a faculty who may have some experience and interest in it. If found, the NGO will be contacted for the suitable tool development for mirror cutting.
2. Prof. M.R. Ravi will work on improvement of glass furnace.

3.5 Mr. Harish from Khamir

Mr. Harish mentioned that a group of individual NGO professionals joined hands together to help needy communities in the region of Madhya Pradesh. He is one of the members of the society named KARUNAH SOCIETY FOR DEVELOPMENT at MP and working with KHAMIR as Dy. Director (Operations) at Kukma, Bhuj-Kutch. He told that NAHAR COMMUNITY is a needy community at Prabhat Pattan village in Betul district of MP. Women from the community used to break Bhilwa nut (Scientific name: Semecarpus Anacardium) for their livelihood. Various parts of these plants are commonly used in the Ayurvedic system of medicine for the treatment of various ailments. Community women collect raw Bhilwa from trees in the nearby forest, waste-land, and private farms. They also purchase Bhilwa from contractors/traders/middle-man. They break this nut manually (using an iron rod) to get out dry-fruit of Bhilwa, called “Godambi” in Hindi, to be used as dry-fruit. They also burn the waste of nuts after removing Godambi, to extract oil from it. This oil also used in Ayurvedic/medicinal use and also for making tattoos on the body.

This community is very backward and not educated. Most of the adults have the habit of smoking and drinking. Women work on the Bhilwa for livelihood, while very less male goes to work. **Apart from its medicinal properties, Bhilwa is also poisonous without any purification.** And the oil from its nuts can give blisters and painful wounds. These wounds leave marks on the body of the people who work with this nut/plant. These marks are taken as

a sign of “untouchability” due to which many of the children of the community do not go to school.

Intervention Required:

1. Need help to develop a hand tool (not a machine that any outsider even can use) that ladies from the community can use to break Bhilwa and to increase their earnings.
2. Request to develop technology for decortication of Bhilwa.

RuTAG IIT Delhi Remarks:

A visit to Prabhat Pattan village will be planned in collaboration with the NGO for better understanding of the problem and requirement for technology development to decorticate Bhilwa nut.

3.6 Mr. Raviveer Choudhary, ADC DHC, Bhuj

Mr. Raviveer, ADC DHC, Bhuj shared his thoughts in the requirement of material science input in developing any product. He suggested story creation and Unique Selling Point (USP) of rural technology. He talked about The National Institute of Open Schooling and shared his views on education for dropouts, their skill development and awarding degree certificates.



Figure 10 Mr. Raviveer sharing his thoughts on Rural Technology

4. Concluding session by Prof. R. R. Gaur

Prof. R. R. Gaur conducted the concluding session. He invited Prof. S. K. Saha, Prof. M. R. Ravi, Mr. Raviveer and Mr. Ghatit Laheru for their comments. Prof. Gaur thanked Khamir for organizing RuTAG workshop in Bhuj. He also thanked all the participants for their effort in making this workshop a success. Prof. Gaur appreciated participants for enriching RuTAG IIT Delhi through their presentation and group discussion. He said after listening to all the above problems, RuTAG IIT Delhi would analyze all the problems. Selection of the problems will be done according to the mandate of RuTAG. Selected NGOs will be either requested to come to RuTAG IIT Delhi or RuTAG team will visit for a detailed discussion on the problems.

5. Vote of thanks delivered by Mr. Ghatit and Mr. Ashish

After the concluding session by Prof. Gaur, Mr. Ghatit and Mr. Ashish thanked everyone for their participation and contribution in making the workshop successful. They also invited the participants for field visits on June 4, 2019.



Figure 11 Group photograph of participating members in RuTAG regional workshop

6. Field Visit to Nana Reha Village, Cluster for making decorative Knives and swords

Khamir had organized field visits on June 4, 2019, to understand and to have hands-on experience of the manufacturing process of products manufactured around the villages near Bhuj. Nana Reha village is known for the cluster which is making decorative knives & swords craft in Kachchh and is situated 20 Km away from Bhuj city. The village inhabits the traditional artisans who make knives and swords. They use sand casting, forging, buffing and polishing techniques to create beautiful knives and swords. Intervention in design and technology up-gradation is required in manufacturing processes to make it safe and more competitive in the market.



Figure 12 Sword and Knife manufacturing facility at Nana Reha

7. Visit to Zura Village, Copper bell work in Kachchh

Zura village is known for copper bell manufacturing clusters. Lohar Jan Mamad is a community of traditional bell maker from Zura for the past 40 years. The bells are actually used to identify and locate cattle, but today, the use of these traditional bells have expanded as they are also hung in archways, combined to make wind chimes and used as forms of festive decor. The bells are hand made through a new inverse process that requires a lot of skilled crafting. The market of bells have expanded beyond Kachchh, and they are now being exported across the globe. Different sizes of bells are made which are numbered from 0 to 14. During the visit, artisans demonstrated the manufacturing process of the copper bell, which involves sheet metal cutting, bending, copper coating, and tuning. In the coating process, copper chips mixed with borax powder is spread over the bell then the bell is enclosed with clay and put inside the furnace where the copper melts and gets uniformly distributed. The temperature of the furnace reaches around 1400 deg C. Only one bell can be heated at a time. So intervention is required to develop a mechanism to heat the multiple numbers of bells at a time. Also, Khamir suggested intervention in improving the efficiency of the furnace.



Figure 13 Artisans demonstrating the copper bell manufacturing proces

8. Visit to Bhuj, Pottery cluster

Traditionally, different communities in the villages were dependent on the potters to supply the earthenware to not only run the kitchens but also to observe various rituals associated with festivals and related occasions of birth, marriage, and death. The prime concern today is the high dropout rate of potters from their craft. The major factor that leads to this is the absence of appreciation of their role in society as modern life today can do without the potter or his products. The team visited pottery cluster in Bhuj. A person from potter's family who also attended workshop explained the facility available at his place for pottery work. The cluster makes water pot, flower pot, clay water bottles, etc. The community requested intervention in improving the design of Potter's kiln.



Figure 14 Visiting potters community in Bhuj

9. Visit to Hunnarshala

Hunnarshala an NGO was established after the 2001 earthquake in Kutch with an objective to capacitate people for the reconstruction of their habitat. Post-earthquake reconstruction saw large scale implementation of earth construction. During this process, many traditional ideas were applied, and it was realized that the emerging ideas were important not only for the reconstruction process but are invaluable for long term sustainable development in many contexts. Interaction between scientific and modern building science and traditional knowledge suggested directions for strengthening the engagement of artisans to deliver high-quality buildings, infrastructure, and community spaces. Thus, Hunnarshala was envisaged as an institution to take this up and from projects which demonstrated processes controlled and managed by people themselves. This concept of people managing the processes had already been demonstrated in other sectors like crafts, savings & credits, etc.

Therefore, the visiting team was shown on the Humarshala campus, which has been constructed with traditional, sustainable, and environment-friendly technologies. Mr. Mahavir requested intervention is developing products using waste wool etc. such as thermal/insulating panels, fire retardant blocks, etc

10. Visit to Shrujan, LLDC

The Living and Learning Design Centre (LLDC) is a pioneering new effort of the Shrujan Trust to preserve, revitalize, and promote the glorious craft heritage of Kutch. Dedicated to the craftspeople of Kutch, LLDC is envisioned as a multi-dimensional crafts education and resource centre. It is situated on a three-building, eight-acre campus in Ajrakhpur, Kutch. LLDC aims to train, educate, and support craftspeople to practice their traditional crafts for contemporary markets so that they can earn a dignified and prosperous livelihood. LLDC became operational in January 2016 with the inauguration of the Museum complex. A gallery, a library, and three crafts studios are now functional within the Museum. Two more galleries will be opening shortly. Displays in the galleries will change from time to time, highlighting a variety of crafts – from textiles to pottery to metal, wood and stone craft. A Crafts School is also planned soon. It will have fully equipped

working studios for all the crafts of Kutch. This will make the Living and Learning Design Centre, the single largest living and working crafts environment in Kutch and perhaps in India as well.

11. Visit to Bhuj Haat

Mr. Raviveer Chaudhary, Assistant District Commissioner, DHC, Bhuj invited RuTAG team to visit the exhibition on the crafts of Kachchh were communities who practice and utilize them. In addition to serving as a means of earning and employment, they are also a creative expression of each community's distinct cultural life and identity. The exclusive handworks exhibit the craftsmanship of the people. These works were quite famous all over the world. The craftsmen still follow the conventional method in designing their artwork, and this is what makes their work unique. Some of their craftwork includes metalwork, jewelry, hand, and machine embroidery works, clay items, furniture, handmade durries or carpets, and stone crafts.

Following were the crafts which were on display are leather, Ajrak print, bell metal, embroidery and bandhani. Here, Prof. Saha suggested Mr. Chaudhary to start an internship programme by the office of the DHC for the students of engineering college who can come to Bhuj and stay for a month when they should learn what artisans are doing followed by the implementation of any modification required in those processes. That way the artisans will get help and in parallel the students will have practical exposures for the problem solving attitude of India's rural problems.



Figure 15 Exhibition on crafts of Kachchh at Bhuj Haat

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