

# A Case Study: Global Engineering Consultancy Training Young Engineers in Sustainable Development using a Charity Project in Rural India

Del Redvers, Head of Sustainability

BMT Group Ltd, Goodrich House, 1 Waldegrave Road, Teddington, TW11 8LZ, UK

[dredvers@bmtmail.com](mailto:dredvers@bmtmail.com)

## 1. Introduction to BMT

BMT is a global science and engineering consultancy serving the defence, transportation and energy industries. With offices in 15 countries BMT's activities range from flood modelling to aircraft carrier design, from port masterplanning to oil platform monitoring. Most of the company's work is focused on the maritime environment.

BMT has an Employee Benefit Trust structure. It is owned and run for the benefit of the staff with profits distributed between its 1300 employees.

Engineering consultancies are knowledge businesses. Their success is strongly tied to the ability to recruit, develop and retain the brightest talent who are able to provide clients with high value technical skills and experience.

### *1.1 The role of sustainability in an engineering consultancy*

BMT and its competitors provide customers with solutions to their engineering problems. As the world changes so does the nature of the challenges customers face. There is growing recognition that the ability to help customers understand and address sustainability issues provides them with real value. Recently BMT has been involved in ascertaining climate change impacts on coastal infrastructure, designing low carbon ships, integrating human factors engineering into developing-world designs, and sustainability assessments for oil rig decommissioning to name but a few.

Beyond this, an ethos of sustainability presents any company with the opportunity to find new and better solutions to everyday problems.

Recognising the benefit of instilling a perspective of sustainability in traditionally trained engineers, BMT has sought to develop a number of approaches including running internal sustainability courses, creating sustainable engineering practice communities and integrating sustainability driven scenario planning into the central strategy development of the business. However a more practical, experiential intervention was sought.

### *1.2 Interventions to develop young engineers*

In a skills and knowledge based business, people are everything. As with many engineering consultancies we invest in the development of young engineers. This might be through leadership development centres, training courses, chartership, secondments, mentoring and other such initiatives. Corporate social responsibility presents further opportunities, through the ability to engage with philanthropic projects and participation in voluntary work.

Each year the company undertakes a staff survey which provides comprehensive insight into the motivations and satisfaction of employees. This has highlighted the value that younger staff in

particular place on being involved in projects which are meaningful and responsible as well as technically interesting.

This is strongly supported by analysis of the feedback from those who apply to work for BMT.

## **2.0 Identifying a Charitable Project**

An idea was conceived to create a significant philanthropic project in the business, which has been branded BMT Giveback. Its success would be measured against the following criteria:

- Achieve a demonstrable social and/or environmental benefit
- Develop a sustainable economic model able to survive independently after the project
- Create opportunities for skills and talent development of young engineers
- Engage and inspire BMT's engineers around the world

From a corporate sustainability perspective it was important that the project could take place in a country of commercial relevance to the business.

The project evolved in two parts. The first is only mentioned to provide context as it did not specifically target young engineers.

### *2.1 Idea Competition and vote*

All staff were invited to submit ideas for a project which met these criteria. Over 100 were received with ideas from a rice planting machine to a new type of solar still. Five ideas were shortlisted and following feasibility studies were put to an internal staff ballot in which over 85% of all staff participated. The clear winner was to design and build a low cost, low flow sewerage network and sewage treatment facility for the rural Indian village of Khintla in the Surendranagar district of Gujarat.

The project was conceived by staff in BMT's Ahmedabad office, situated approximately 2 hours drive from the village in question. They had become aware of the need through dialogue with a development NGO active in the area. The partnership with this NGO, the Aga Khan Rural Support Programme India (AKRSPI) was central to the success of the project.

### *2.2 Project Development & Implementation*

The village had recently benefited from a project to install water pumps and storage tanks. Previously residents had to travel for up to two hours to collect water and now for the first time they had a reliable source of it in the village. This was clearly beneficial, but it brought with it certain challenges.

Without infrastructure to deal with significantly increased volumes of wastewater, dirty water flowed out of homes into the muddy streets which became swamp-like breeding grounds for disease.

The plan was simple, to create a drain in each home connected to a central underground network. This would also allow for toilets to be constructed in each home linked to the same network. In a village of 2000 people the introduction of toilets would make an enormous difference to quality of life.

Prior to this project the woodlands and field margins were used as toilets. Not only did this have health implications, but each year for the past 10 years (and probably longer) between 1 and 3 women have been raped whilst going to the toilet in the woods at night. In fear of this, many women would refrain from eating and drinking in the evening to ensure they would not have to go outside.

So the engineering challenge was to design and build a low cost, easy to maintain system which could handle low flow volumes, be built using locally available materials and labour and treat the sewage to create useful products of reusable water and/or agricultural fertiliser.

A virtual, global project team was developed drawing on young engineers under the guidance of an experienced project manager, who was based in BMT's Ahmedabad office. Potential team members were identified through a leadership development centre and selected by a panel of senior staff.

A formal agreement was defined with AKRSPI, which brought together BMT's funding and engineering expertise with their deeply embedded knowledge of community development.

### **3.0 Sustainability Challenges**

Several sustainability challenges were encountered during this initiative.

#### *3.1 Community Ownership*

To create a lasting solution a socio-economic model was required which would enable community ownership. Under the guidance of AKRSPI a village committee was elected to oversee the project.

The villagers decided some form of annual contribution to the sanitation system would be required from each home, to create a sense of ownership and value. Labour could be offered in lieu of a small financial donation, using a "sweat-equity" model. The money raised is held by the committee and will be used to pay for repairs when they become necessary.

This was a useful lesson for some of our engineers who were very eager to get on with the design and build but had to understand that a sustainable solution ran much deeper than technical competence.

#### *3.2 Engineering a Sustainable Solution*

A gravity fed design was developed using a variation on the DEWATS (DEcentralised WAstewater Treatment System) approach. Most of the materials were sourced from suppliers in the nearest town and all were tested against a sustainable procurement checklist.

One piece of heavy plant was required for excavation of the small anaerobic treatment facility. All other labour was sourced in the village. Members of the engineering team visited the site regularly during the construction phase. There was also a team site visit (see 4.0)

The project took the team through a number of other lessons in sustainability, introducing them to new concepts. During the project team members kept blogs which highlighted lessons and ideas they wanted to share with colleagues across the business. From these blogs we were able to track the development of their ideas in issues such as:

- Cradle to cradle design
- Enhancing people's capacity to meet their basic human needs
- Empowering people and encouraging participation
- Using resources in a highly efficient manner, including energy resources.
- Interdependency in complex systems
- The importance of and right to a reasonable quality of life
- The complex interactions between population, resource, lifestyle and design
- Concepts of a just society
- The responsible use of science and engineering
- Sustainable procurement

### *3.3 Exit Strategy*

Throughout the project BMT presented itself to the community as a supporter of AKRSPI rather than a separate entity. Hence all communications with the community were managed through AKRSPI who were there before we turned up and will be there for a long time to come. At no point did BMT become a direct point of contact for the community.

From the outset there was a well-conceived plan to hand the system over to the community and train local people, in its maintenance.

As the project progressed and generated publicity, the local government Water and Sanitation Management Organisation became involved bringing further funds and resources. By the time the project was completed there were six funding partners and a plan to develop a government funded renewable energy project in the village with several other initiatives in the pipeline.

## **4.0 Site Visit**

A particular highlight of the project was a site visit undertaken by 8 young engineers working for BMT around the world. They were individuals with real potential in the business who had no experience of working in such an environment.

### *4.1 Purpose*

The purpose of the week onsite was to bring together a group of promising young employees and give them the opportunity to learn about sustainability concepts whilst developing soft skills. It sought to take them out of their comfort zone and give them exposure to ideas and a way of life which might help them to reframe or rethink some of the ways in which they solve problems back at work.

### *4.2 Activities*

For a week they lived in the village. As well as overseeing construction of the sanitation project they undertook simple tasks identified by the community to improve quality of life in the village. These included

- Creating a rainwater harvesting system
- Repairing a broken hand pump in the school
- Teaching English and maths to children in the school
- Designing and constructing a clean and safe place for women to gather, wash and socialise
- Tree planting
- Designing a solid waste management and recycling system

It was through these activities that many of the sustainability concepts in section 3.2 were further developed.

Each evening the young engineers gathered over dinner to discuss their learning from the day. These discussions often involved very complex issues such as the role of a foreign company contributing to a healthy and just society in a traditional community heavily founded in the caste system.

### *4.2 Impacts of the Site Visit*

The practical outputs of the site visit projects quickly led to social outcomes in the village. The most significant of which related to the women of the village. Each day they would gather together to wash themselves and their families' clothes. Previously this had happened at a tank at the edge of the village

where there was little privacy and the women were often standing ankle deep in mud whilst they washed. The team of young engineers designed and built a concrete floor, draining into the sanitation system with a shielding wall for privacy and raised surfaces for sitting and washing clothes.

This facility is the hub of female life in the village. It has clearly directly improved their quality of life. Perhaps more significantly, this investment in their wellbeing gave them the confidence to create a women’s committee for the village which is supported by AKRSPI and argues for women’s rights.

For the village as a whole the trip created a sense of pride. This was the first time westerners had ever come to the village and lived and worked alongside the community. Hundreds of people turned out to work with them and have continued to work together on similar projects since the team’s departure.

For the BMT engineers involved it was a life-changing experience. Each was interviewed before and after their trip. Quotes such as “it completely changed my perspective of the world” were common. But pleasingly the level of understanding of sustainability concepts evolved significantly during their time there. This was measured qualitatively through the interview process.

## 5.0 Metrics

Metrics were defined against each of the objectives outlined in section 2.0

### 5.1 Social Baseline

During the design phase a social baseline study was commissioned using AKRSPI staff. They visited 75% of households in the village and also acquired government records relating to health and economy. A repeat study has been commissioned to take place at one and five years after the completion of the project. A comparative analysis against the baseline will be undertaken when this data is available.

A “quick and dirty” snapshot was taken 3 months after completion of the project which involved surveying just 10% of households (approx. 20). They were asked to identify the top 5 concerns for their household. These were aggregated and ranked for comparison.

Table 1: Villagers’ top concerns before and after the project

<b>Ranking</b>	<b>Before the project</b>	<b>3 months after the project</b>
1	Reliable income	Reliable income
2	Child health	Child education
3	Toilet & Ablution facilities	Unreliable electricity supply
4	Adult health	Adult education
5	Child education	Local transportation

In the 6 months since construction of toilets there have been no reported rapes in the village. However it is far too early to draw any conclusions.

### 5.2 Developing Skills and Knowledge Young Engineers

Learning objectives were set for each participant. These were defined in conjunction with their line managers to be specific to the individuals concerned. In addition to sustainability issues they related to project management, leadership, communication, team working as well as specific engineering skills.

Progress against the targets was evaluated through interviews with the participants and integrated into the normal appraisal process.

### *5.3 Global Staff Engagement*

The annual BMT global staff survey is a key tool for measuring levels of staff satisfaction and depth of engagement with the business. The timing of this meant that the latest version was undertaken as the project was nearing completion.

The BMT Giveback project received 90% approval as something the company should be doing. 80% of staff felt that it made them more proud to work for the company. 50% had told their friends or family about it (used as an indicator of pride). 54% would like to be involved in a future initiative.

## **6.0 Future**

Over 200 toilets have been constructed and the streets are no longer swamps of dirty water. The model is being replicated by the NGO partner in other villages in India using the intellectual property which has been developed by BMT and donated in perpetuity to AKRSPI.

The success of the project has led to a high level of support for such initiatives in the business. A similar project will now be undertaken every year. The next two identified projects are:

- The education of engineers in Africa
- Infrastructure development for a community in Papua New Guinea.

## **7.0 Conclusions**

Charitable projects are an effective way to develop an understanding of sustainability in young engineers whilst making a significant beneficial impact on society.

The sustainability concepts explored by engineers during the project would be slow to teach in a classroom setting and much less engaging than through personal discovery and experiential learning.

Collaborating with an established community partner (such as an NGO) is critical for the successful delivery of projects of this nature.

This method of developing young engineers provides the business with real benefits in terms of both staff development and staff loyalty.