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IFC SmartLessons

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Energy-Efficient Technologies Are Saving a Vital Industry in Bangladesh

The Bangladesh foundry industry is a crucial element of the country's light engineering sector, but it suffers from reliance on outdated technologies, inefficient production processes, and an inability to diversify products. This SmartLesson describes the challenges and lessons learned from IFC's efforts to revitalize the industry in the Bogra region by introducing new technologies.



Figure 1: Simplified Supply Chain for Foundry Business in Bangladesh

metric tons of cast iron pipes, well heads, engine parts, pump components, etc., per annum². Thirty of these foundries are in the north of Bangladesh at Bogra, the only foundry cluster in the country. (The foundry industry supply chain is shown in Figure 1.)

As indicated in Figure 2, the local foundry industry suffers heavily from low productivity use and high product rejection, in comparison with regional counterparts. Our study indicated that the main culprit is the furnace, which is the most important part of a foundry and is used for melting raw material. A furnace is expected to operate for 20 to 30 years; however, the furnace technology used in the Bogra foundry was around 100 years old³. Melting pig iron and scrap metal using such older furnaces resulted in inappropriate coke combustion, lower melting rates, higher pollution, and overall higher production costs.

IFC Advisory Services' Approach

SEDF's objective was to improve the local foundry industry's competitiveness by

Background

IFC Advisory Services in the South Asia Enterprise Development Facility (SEDF) started working with the foundry¹ industry in Bangladesh in 2003 as part of its broader efforts to support the light engineering sector. That sector includes machine shops, re-rolling mills, and foundries where the shops and mills depend on the foundries for their input and raw material. The sector plays a critical role in supplying local industries with machinery, parts, and repair services.

There are roughly 200 commercial foundries in Bangladesh producing an estimated 245,000

Figure 2: Industry Benchmarks⁴

Foundry benchmarks	Bangladesh	India	China
Productivity utilization	40%	90%	95%
Production rejection	20%	5%	2%
Fuel efficiency	60%	87%	95%
Coal-iron ratio	1:8	1:15	1:18

¹ A foundry is a factory that produces metal castings from either ferrous or nonferrous alloys.

² Statistics from Bangladesh Foundry Owners Association, 2008.
³ Internal IFC study.

improving energy efficiency. SEDF's activity was classified as non-investment-linked value chain work.



Traditional Cupola Furnace

Divided Blast Cupola Furnace

We leveraged the expertise of the Energy and Resources Institute (TERI) of India as technology provider and implementation partner. SEDF and TERI jointly identified two local potential service providers to introduce new furnace technologies in Bogra. SEDF also partnered with the Foundry Owners Association of Bogra (FOAB) to find two foundries that would be interested in hosting a divided blast cupola (DBC) furnace as a pilot, out of offered options. Compared to the older technologies, DBC greatly reduces energy consumption, including temperature and air losses.

Installation of each DBC furnace costs \$115,000, while building an old-style furnace costs around \$30,000. FOAB paid about 87 percent of the project's cost in cash, and SEDF financed the remaining 13 percent.

According to pilot study findings, one of the pilot foundries, in producing 1,600 tons of cast iron, saved more than \$76,000 in overhead and raw material costs from February to April 2009. The other foundry generated almost similar results. If the trend continues, the first foundry will be able to save around \$300,000 per year (Figure 3) and reach the projected break-even point in just six months.

Figure 3: Private Sector Savings Observed in One Foundry due to DBC Implementation

Savings element	Savings in 3 months (\$)	Projected savings in next 9 months (\$)	Total savings in 1 year (\$)
Fuel (coke)	75,007	225,021	300,028
Utility	687	2,149	2,836
Total	75,694	227,170	302,864

Using DBC, Milton Metal Works, one of our clients and a leading manufacturer in Bogra, not only enhanced product quality and reduced product rejection but became the first Bangladesh foundry to start exporting to India. Seeing the

⁴ China International Foundry Bulletin, 2008.

market demand and business potential, one of the local service providers decided to become an entrepreneur himself. He built his own shop that hosts one DBC and plans to go in production in a few months. "We survived because of the introduction of this new technology. SEDF handed it to us. We feel less vulnerable these days," said Abdul Malek, vice president of FOAB, on June 24, 2009 during an in-person interview.

SEDF draws the following lessons from Bogra's intervention in the foundry industry:

Lessons Learned

1) IFC ensures a meeting but not client buy-in.

While the final results of our intervention were impressive, it took SEDF more than two years (2003–05) to earn FOAB's buy-in. Communication and commitment were issues, and continuous and effective dialogue had to take place with FOAB and its key members before agreement could be reached.

IFC's globally acknowledged business reputation did little to get buy-in from small and medium enterprises (SMEs). The local foundry industry has found dealing with donors to be a sore point, as unfulfilled promises made by other donors in the past fostered resentment. On top of that, our initial interventions, such as standard training (i.e., introducing best practices) were sporadic, did not necessarily provide an appropriate solution to industry issues, and thus failed to generate industry interest. Clients perceived SEDF's training follow-up activity merely as data collection events and developed a strong resistance against mutual cooperation. The local SME mind-set is such that they believe that revealing their real situation or even their strengths can put them at a disadvantage. Sometimes they provided us with inconsistent market information, intentionally or unintentionally. This skewed the program design drastically in the first phase.

Understanding industry sensitivity and offering tailor-made solutions finally helped to get the association's buy-in. Because foundry SMEs lack liquidity, they tend to go for quick returns if they make any investment. We further learned that interventions with a business angle were more likely to appeal to these SMEs than any environmental compliance issues. Thus we offered a variety of solutions and taught cost-benefit analysis to FOAB so that its members are able to pick up a solution they can stick to. Foreseeing tangible savings this time, FOAB became interested in going ahead with the DBC furnace, which promised less pollution and lower production costs. In addition, the DBC is designed to handle poor quality, low-priced fuel, a key criterion for Bangladesh, where fuel prices are of greater concern than any environmental issues.

2) In hiring a project manager, pay attention to his or her personal skills, in addition to academic credentials.

Bogra, like all of Bangladesh, has a strong, deep-rooted oral tradition-based culture, where the local industry luminary wants to know someone first and establish trust *before*

making a deal. Once trust has been established, it is believed, doing business becomes easier. Otherwise, the local community is unlikely to get involved with an outsider.

Initially, SEDF hired a non-Bangladeshi consultant, but he did not have much success, because he put a premium on getting things done instead of getting to know the key industry players personally. Such “lack of warmth” led the industry to develop a skepticism regarding SEDF.

We blindly believed what the consultant produced, when we should have been engaging with clients in the field. We started going to the field regularly to establish a relationship with the clients and verify the deliverables ourselves. To further deal with these issues, SEDF hired a dedicated Bangladeshi task manager, who spoke the industry language and constantly engaged with FOAB and its key member SMEs

3) In business, seeing is believing.

Energy efficiency and clean technology are new concepts in Bangladesh. Awareness raising, best-practice demonstration, and knowledge dissemination have limited or no familiarity among the key local foundry industry players. Therefore, it was both risky and expensive to identify the right project to showcase to FOAB. Calculating the cost-benefit ratio, IFC decided to showcase what had been achieved elsewhere in the region.

FOAB representatives agreed to visit the Rajkot and Ahmedabad foundry clusters in Gujarat, India, to see existing industries that were doing well. In addition, FOAB members spoke to the Rajkot Engineering association and the local industry luminary about environmental issues, energy efficiency, and cost savings. The “seeing is believing” concept worked and helped us to persuade two local service providers to receive training in DBC technology and its implementation and commissioning aspects. Upon returning to Bangladesh, they implemented DBC technology in two foundries in Bogra.

4) Delays at the beginning can produce headaches at the end.

Being a facility, SEDF had a five-year life cycle (2002–08). There was internal pressure to complete all contractual work before December 31, 2008. Unfortunately, commissioning (commercial testing) of the first DBC furnace in Bogra did not materialize until the last week of December 2008, around the same time that SEDF was pulling out of the market.

We learned that local SMEs require more hand-holding and long-term assistance to be sustainable, because assistance in disseminating knowledge is crucial for market expansion, given the technical nature of the intervention and industry's lack of expertise to transform information into knowledge.

“We have done the hard bit of putting something on the ground in Bogra.... Now is the time to cash in on the hard work put in the last two years.... SEDF (is) to move forward from here so the next steps are relatively “soft” work like dissemination workshops at Bogra/Dhaka/other foundry clusters, and activities like capacity building/training of other local service providers like fabricators/consultants.”—Prosanto Pal, senior fellow, Energy Environment Technology Division, The Energy and Resources Institute (TERI), e-mail correspondence, July 30, 2009.

When IFC cannot monitor its clients and document their initial success, it is difficult to show post-completion results. Theoretically, SEDF's Phase Two is ongoing; yet we are still uncertain when there will be a sign-off on all IFC project approvals. The delays we encountered at the outset taught us that a three- to five-year-long, *unchanged* project strategy might be a better way to achieve private-sector savings, job growth, and potential linkages to energy-efficiency financing.

Conclusion

Bangladesh is an SME-based economy where large investments in environmental compliance are beyond the means of most entrepreneurs, but at the same time they need to reduce inefficiencies. They still struggle to manage their day-to-day transactions, where it is a challenge to adapt even the most available information on the Web to their business. Due to the down-to-earth profile of the foundry sector, donor-funded sophisticated operations are less interested in working with them in a systematic fashion. Sporadic training and workshops usually do not excite these businesses. In this situation, a small initiative that generates significant savings surely encourages other SMEs to follow. That's where SEDF has set the milestone. SEDF also needs to leverage IFC experiences in other regions or in sectors with local customs to help this economy grow. That's how the IFC “additionality” can transform barren industries into luxuriant SMEs.



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