Techno-Social Integration in Foundry Industry: Insights from pilot action work among small-scale foundry units in Howrah

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Abstract

Howrah, in the state of West Bengal, is one of the largest foundry clusters in India. Ironically, it is probably one of the most technologically backward foundry clusters as well. Hence, when the foundry sector was selected by SDC (the Swiss Agency for Development and Cooperation) for technology upgradation, it was decided to install the demonstration plant at a foundry unit in Howrah. Energy efficiency improvement through improved cupola furnace design and pollution reduction by installation of appropriate pollution control system was first demonstrated at Howrah in 1998. Over the years, the intervention has become more holistic in nature, and social dimensions have been integrated with the technological dimension. A baseline survey of foundry units at Howrah was conducted for developing a better understanding of their social status. Subsequently, TERI, along with IMSE, a local NGO, undertook a number of activities among foundry units such as awareness generation camps and health check-up camps for workers, and training programmes for selected 'animators' among workers. The militant trade-unionism movement of the seventies had led to a dismal industrial relation scenario in the state, resulting in a deep sense of mistrust between the foundry owners and workers in the cluster. Hence, the social action programme aims at building bridges between the two groups. A collaborative platform, bringing together foundry owners and workers, for a discussion on mutually beneficial issues like health, safety, work environment and sanitation has been formed. This has been made possible with active support of the industry associations, namely the IFA, IIF and the HFA. The pilot action work has set the stage for launching of a sustainable social campaign among foundries at Howrah.

This paper provides an outline of the foundry cluster at Howrah, the technology demonstration, the rationale for techno-social integration and the subsequent activities at Howrah. The paper briefly mentions some of the challenges encountered during the work, lessons learnt and the way forward.

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1. Background of the Howrah foundry cluster

The Howrah foundry cluster was the first organized modern industrial cluster in India. It was set up in British days, when Kolkata became the political and commercial capital of British India and the Indian Railway system was established by the Britishers. The history of the foundry cluster, along with the jute industry, is synonymous with the rise of British mercantile colonialism in India. The cluster used to be considered the Manchester of India. During the post independence period, the medium sized firms owned by the British were sold to the new entrepreneurial community of Marwaris. The smaller firms continued to remain with the second generation of Bengali entrepreneurs. Continued availability of cheap pig iron and coal and a large pool of skilled labour ensured a competitive advantage to the cluster. In the seventies, the Communist movement in the State led to major labour unrest that resulted in the sale or closure of a large number of industrial units in West Bengal. Many non-Bengali industrialists moved out of the state and a large number of the Bengali owned small foundries were closed down. Subsequently, one also noticed a migration of skilled labour to other upcoming foundry clusters in other states. Eventually the Howrah cluster lost all it's traditionally built up competitive advantage. Technology remained stagnant with little or no re-investment. Markets declined to low value added products of the simplest kind and owners lost interest in their business. Since liberalization, in the early nineties, the situation has shown signs of improvement. However, obsolete asset base/production facilities, pressure on land-use due to high levels of urbanization, poor infrastructure facilities, and stringent enforcement of environmental norms continue to haunt the foundry units located at Howrah. Selected statistics of the cluster, as gathered through interactions with various stakeholders, is summarised in table 1.

From a sociological point of view, the foundries in the Howrah cluster are the manifestation of an urban mode of production coupled with an unorganized labour force. The cluster is characterized by informality, smallness, technical and structural limitations, use of contract labour, low levels of production and a status quo orientation. The cluster has earned a bad reputation for its dismal scenario in industrial relations in the seventies of the last century owing to militant trade-unionism. This has resulted in erosion in employer-employee relationship. Social experts feel that the main cause for the erosion of faith is a communication gap between the sides, a gap that has been instrumental in destroying many industrial units in the state.

Table 1 : Selected details about the Howrah foundry cluster

	Particulars	Cluster details
A	***General information on cluster***	
1.	Total number of foundries	400
2.	Total production of castings	0.5 million tpa
3.	Major markets/customers	Export, railways, water works, post & telegraph, steel plants, defence, local industry
4.	Total castings exported	0.15 million tpa
5.	Type of castings exported	Low value sanitary castings
6.	Vintage of foundries	Usually more than 20 years. No unit less than 5 years old
7.	Management	Family owned, no professional management
8.	Selling price of castings	Rs 12,000 to 20,000 per ton depending on the type of product
9.	Trade associations	Two (Indian Foundry Association & Howrah Foundry Association)
B.	*Raw materials*	
1.	Major raw materials	Pig iron, scrap iron, coke, limestone
2.	Major suppliers of pig iron	TISCO, IISCO, DSP, BSP, Usha
3.	Price of pig iron	Rs 7800-8700 per tonne depending on grade
4.	Major sources of coke	Dhanbad & Chirkunda (CIL)
5.	Price of coke	Rs 3000--3500 per tonne depending on grade (open market)
6.	Percentage ash in coke	20 - 34%
7.	Major sources of limestone	Akaltara (Madhya Pradesh)
8.	Price of limestone	Rs 800 per tonne
C.	***Production furnaces***	
1.	Original cupola size (many downsized to below 3 tph now)	
	< 3 tph	100 foundries
	3 to 5 tph	200 foundries
	> 5 tph	Rest
2.	Percentage units having conventional cupola	70%
3.	Percentage units having divided blast cupola	30%

Since technology up-gradation and compliance to environmental norms were the twin challenges facing the small foundry units at Howrah, TERI (The Energy and Resources Institute), with the support of SDC (the Swiss Agency for Development and Cooperation) decided to initiate a programme aimed at promoting energy-efficient and environment friendly technologies in the foundry sector.

2. Technology intervention at Howrah

Cupola is the most common type of melting furnace used for the production of grey iron castings at Howrah. The majority of cupolas in operation were designed at a time when melting rate, rather than energy efficiency and pollution control, was the primary consideration. Rising cost of energy inputs, increasing market competition, and stricter enforcement of environmental standards, was forcing the foundry units in the mid-1990s to become more energy and environment conscious in their operations.

The foundry industry was one of the small scale industries, selected by SDC for technology up-gradation. The primary objective of the technology programme initiated by SDC and TERI, was to save energy and reduce pollution in the foundry industry. The programme had two phases : Phase I involved undertaking energy audits of representative foundry units with a view to identify implementable energy conservation measures and Phase -II involved demonstration of appropriate technologies for energy efficiency improvement and pollution reduction.

Initially, energy audits of several cupolas were conducted at Howrah. The charge coke percentage, which is a measure of energy efficiency of a cupola, was found to vary over a wide range. The most energy-efficient cupola was found to be using 13.6% charge coke (coke:metal :: 1:7.5) and the least energy-efficient cupola was operating at a charge coke percentage of 26.5 (coke:metal :: 1:4).

Some of the factors that contributed to the poor energy performance of operating cupolas were found to be the following.

- Incorrect blast rate
- Lower blast air pressure
- Incorrect distribution of air between the top and lower tuyeres
- Turbulent (non-uniform) entry of air into the cupola
- Incorrect sizing of cupola parameters such as tuyere area, well depth, and stack height among others
- Poor operating and maintenance practices
- Poor control of feed materials (shape, size, weight, sequence)

While finalising the action plan for the demonstration activities, detailed discussions were carried out with the industry associations at Howrah. During such discussions, it was learnt that the cluster was facing the stiff challenge of meeting the stipulated emission norms within a given time period. Keeping the concern in mind and in order to make the programme more tuned to the needs of the local entrepreneurs, the scope of the work was modified, to include setting-up of a demonstration plant for both: (1) energy

efficiency improvement through improved cupola furnace design and (2) pollution reduction by installation of appropriate pollution control system.

A demonstration plant, consisting of a divided blast cupola and pollution control system, was installed at Bharat Engineering Works, Howrah, a unit nominated by the IFA (Indian Foundry Association). The foundry, manufacturing ingot moulds, had a charge coke percentage of 13.6% (coke:metal :: 1:7.5) which was brought down to 8% (coke:metal :: 1:12.5). Hence, the energy saving achieved in the new plant was about 35% compared to their earlier cupola. On an average monthly melting of 430 tons, the yearly saving in coke is 270 tons which is equivalent to Rs 8 lakh. Additionally there was an increase in metal tapping temperature and reduction in silicon and manganese losses.

Since cupola stack gases contain a significant percentage of fine particulates, it was found that a venturi-scrubber is the most effective device to bring down the emissions below the more stringent particulate emission limit of 150 mg/Nm^3. The SPM (suspended particulate matter) emissions from the plant were found to be 50 mg/Nm^3.

The demonstrated technologies have been replicated subsequently in other foundry units located at Hoogly, Nagpur, Rajkot, Coimbatore, Vijayawada and Alwar.

3. The rationale for techno-social integration

Holistic development of small-scale units calls for an integrated approach which includes technology up-gradation along with development of the workforce. The rationale that a healthy and skilled workforce ultimately contributes to improving the productivity and product quality has yet to sink into the minds of small-scale industries, the foundry industry being no exception. The social intervention at Howrah thus has its genesis in the endeavor to inculcate socially responsible corporate behavior patterns among the small-scale foundry entrepreneurs and to upgrade the skill-sets of foundry workers as well as owners.

The level of credibility attained through the technology intervention, allowed TERI and SDC to broaden the scope of its approach beyond energy and environment issues, to a more holistic approach which included the socio-economic dimension in the sector. This was felt to be important to achieve an impact on the way industrialists visualize the development of their units. TERI and SDC were able to initiate discussions on sensitive social issues such as work environment, labor compensation and medical benefits to the workforce, probably because the industry now viewed them as a credible partner with whom they can work without fear. Unlike many NGOs that adopt an activist mode of social intervention, TERI and SDC consciously chose a middle path that strikes a

balance between technological and social dimensions. This was the guiding principle of the techno-social activities initiated in Howrah, albeit on a pilot scale at present.

4. Baseline socio-economic survey of Howrah foundry cluster

A baseline survey of the socio-economic status of Howrah foundry cluster was first conducted by TERI in 1999 to understand the present socio-economic status and possible areas of intervention in this area [1]. Some of the major findings of the study are summarized below.

- Twenty to thirty years ago, when Howrah cluster was prospering, the demand for cheap labour brought in workers from the neighboring states, such as Bihar, Orissa and Eastern UP.
- The level of indebtedness is high among the workers. However, labourers from other states are more savings conscious.
- Poor quality and inadequate availability of raw material, obsolete technology, and industrial stagnation in West Bengal for the last twenty years, coupled with poor infrastructural facilities and shortage of power, have contributed to the present state of affairs in Howrah.
- Most of the workers are employed by contractors and only a small fraction of the total workforce is directly employed by the units.
- The contract workers are usually paid on piece-meal basis, e.g., number of good castings produced, quantity of raw material charged in cupola etc.
- The labourers usually perceive the relationship with employees as exploitative. The trade-unions play a limited role, mainly during wages/bonus negotiations. The unions are usually not concerned about other things such as training, working conditions, medical benefits etc.
- Most of the workers feel that skill enhancement is useful particularly in areas such as improved moulding practices. They are also interested in skill enhancement in other areas apart from foundry operations.
- In general, there is a lack of proper sanitation, drinking water, drainage, ventilation and lighting in these units.
- The workers are usually reluctant to use safety equipments such as goggles, boots and gloves even if these are provided by the foundry, since they feel they affect their productivity and comfort.

5. Seeding of social action

The baseline study conducted by TERI formed the basis for initiating dialogue with stakeholders and social experts on developing a framework for pilot social action for Howrah foundry cluster. A brainstorming with eminent social scientists was organized in June 2002, following which a logical framework for social action was developed. The

framework was presented to representatives of industry associations, foundry owners, supervisors and workers in December 2002. It was probably the first time in the history of Howrah cluster that socio-economic issues were discussed and debated in a common owner-worker platform. Subsequently, short pilot field studies, were assigned to two local NGOs, IMSE (the Institute for Motivating Self-Employment) and SAVE (Society for Advancement of Village Environment), more for familiarization and rapport-building with foundry units and for developing a concrete Social Action Plan (SAP) for the cluster.

After dialoguing with the workers and owners of different foundry units, the NGOs (IMSE and SAVE) identified the following priority areas for further work:

(a) Education/Awareness package for workers
(b) Health camps for workers and supervisors,
(c) Liaisoning and policy dialoguing with state institutions related to workers like ESI, District Industries Centre etc.
(d) Need assessment camps at community level to assess the needs of workers and their family, and
(e) Skill up-gradation programmes for workers and supervisors.

The action areas proposed by the two NGOs were discussed in a joint interaction with foundry owners and workers in April 2003. The meeting helped to narrow down the focus of intervention and plan the subsequent steps. A steering group, comprising of representatives from all the three industry associations, IFA (Indian Foundry Association), IIF (the Institute of Indian Foundrymen) and the HFA (Howrah Foundry Association), foundry workers/supervisors, the Howrah Chamber of Commerce and Industry was constituted to drive the pilot social action activities. Subsequently, a short ameliorative action project was assigned to IMSE which primarily focused on two of the issues, viz., health and education/awareness generation, concerning the foundry workers. It was felt that these ameliorative actions would help in gaining the confidence of foundry owners and workers and would set the stage for initiating a more holistic action plan in the future.

In short, the planning process for social intervention was a long one involving piloting and evolution of the strategy from small successes. This planning methodology is felt to be quite effective for initiating a grass-root level social action in sensitive areas. The complex planning process is summed-up appropriately in the words of a veteran foundryman, Mr A Guha, who said in one of the steering group meetings, “There are likely to be many hindrances in the proposed social action endeavours. Hence proper planning of the work process is crucial for its success.”

6. Field activities undertaken to integrate social dimensions in foundry operations

The initial confidence-building activities undertaken among selected foundry units at Howrah, helped in initiating a process of dialogue between the workers and owners of foundry units on sensitive social issues. In the process, several constraints being faced by local owners and workers, came to light. Some of these constrains are summarized in box 1.

Box 1. Constrains being faced by foundry owners and workers at Howrah

Constraints faced by foundry owners

- Frequent price hikes, coupled with non-availability of raw materials like pig iron and coke, hit the profitability of foundry industry during 2003, all over India and Howrah is no exception
- Stringent enforcement of pollution control norms by the state pollution control authorities have put additional burden on the local industry.
- The foundry units, particularly, the export-oriented foundry units, are facing an intense competition in the international markets.
- Outdated technology and lack of modernization are plaguing the foundry units in Howrah.
- The proposed move to shift foundry units from Howrah to a new location (Foundry Park) has created a state of uncertainty on long-term vision among the foundry circles at Howrah.
- A long period of recession in the industry has led to an acute resource crunch.
- High level of corruption among various state authorities is also depriving the entrepreneurs from the scope of fair and level-playing ground.
- The sector is facing shortage of skilled workers/supervisors for various reasons including lack of adequate training institutes on foundry practices.

Constraints faced by foundry workers

- The workers are suffering from a deep sense of insecurity owing to the decaying state of local foundry units and absence of any social security measures.
- Close of many foundry units and introduction of contract system have put workers under enormous economic pressures.
- Most workers are not availing state healthcare facilities, since it has almost collapsed. Even if the workers are eligible for state medical insurance scheme (ESI), they cannot expect to benefit from it, owning to lack of medicines and treatment facilities in ESI hospitals.
- Workers are deprived of any form of training and platforms for sharing knowledge/information is absent amongst them.
- Respiratory problems are common among foundry workers. This is probably because of poor indoor air indoor quality (high dust levels) at the workplace.
- Joint pains, especially lower back pain, are very common symptom among the workers. This is probably caused by high degree of physical labour the workers have to do since most small-scale foundry units have no mechanization in areas like lifting loads and movement of materials within the factory.

Based on the initial scoping visits, twelve units were short-listed for initial pilot-scale intervention. The selected foundry units are spread over Liluah-Shibpur-Dasnagar areas within Howrah municipal area. A baseline survey in the twelve foundry units was conducted for developing a better understanding of their present status with regard to (a)

housekeeping, (b) availability of open space, (c) owner's attitude to techno-social programme, (d) availability of drinking water, and (d) sanitation facilities.

Several activities, such as general awareness camps and health check-up camps were organized for workers. Twelve health check-up camps were organized in the selected foundry units. In all, about 445 workers out of 551 workers in these units were examined and given medical advice during these health camps. Contract labourers who are deprived of ESI facilities, could avail of the health care by visiting field team. During these activities, a group of thirty workers were selected from the twelve foundry units. These workers were selected so that they can be developed to play the role of 'animators' who in turn can spread the educational among their colleagues. Since the animators required further training, an education curriculum for the animators was prepared after brainstorming with medical practitioners, social workers and experts in community healthcare. The educational curriculum which evolved for animators, include different aspects of the foundry industry, literacy, general health and hygiene issues, occupational hazards and safety measures, first-aid training, introduction to alternative medicines and yoga, employment generation and social security schemes, human rights, environment, family welfare, de-addiction process and saving and credit management. It was decided to conduct the training programme for animators after their normal working hours so that they are not deprived of their daily wages for attending the training.

To find a long-term sustainable solution to the healthcare problems of workers, linkages with existing healthcare systems are being explored. Initial dialogue has been established a few ESI doctors, DIC and local NGOs working in the health sector in order to explore options to strengthen existing systems.

7. Some hurdles encountered

The industrial climate in the state of West Bengal is prejudiced due to a history of militant trade unionism and leftist political movements. This has sown seeds of mistrust between the owners and workers. At the same time, successful unit-level interventions depend largely on the level of cooperation of both these groups. Having realised the need to build bridges between the owners and workers, efforts were made to bring representatives of both these groups on a common platform to discuss socio-economic issues concerning the workforce. The successful establishment of an owner-worker platform, at a place such as Howrah, is probably one of the most significant achievements in the pilot social action programme in the foundry sector.

During 2003-04, when most of the social activities were being undertaken at Howrah, the foundry industry was facing a difficult time on account of steep increase in the cost of raw materials like pig-iron and coke. Beset with economic problems, the foundry owners had little time to proactively participate in the social action work. The economic plight of workers, mainly due to downslide of foundry industry at Howrah, affected a more enthusiastic response from them in the education/training programmes. Hence pilot ameliorative actions such as health check-up camps, though mundane in nature, helped to win cooperation from workers, and have set the stage for a larger social campaign.

8. Conclusions and way forward

The project in a nutshell, has adopted an integrated approach to address both technological and social concerns. In doing so it aims at creating a congenial atmosphere in the foundry cluster by taking associations, entrepreneurs, supervisors, workers, civil society institutions and other government bodies along to find common grounds for rejuvenating the industry. The pilot social action work at Howrah has adopted a holistic approach in order to make a difference in the lives of the marginalized through finding solutions that are need-based and people-centered.

Since the ESI scheme is almost defunct in the state and the contract workers are not anyway covered by ESI, alternative healthcare systems need to be developed/strengthened for foundry workers at Howrah. There is a case for policy level intervention to strengthen and complement the state health (ESI) system in West Bengal. It is proposed to invite policy makers at the state level, representatives from ESI, health department, welfare department, DIC, PCB, Howrah Chamber of Commerce Industry, industry associations, NGOs and experts from other field and will be scheduled in the near future.

From the work done till now, it appears that most of the friction between the foundry owners and workers at Howrah stem from historical developments in the state, traditional labour management styles and a lack of common platform for interaction between the two groups on socio-economic issues apart from wages. The situation can be corrected through sustained efforts aimed at strengthening of the owner-worker platform and through training and capacity building of both the owners and the workers. Hence the role of the owner-worker steering group assumes significance in the collaborative effort.

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[1] Mitra, J. 2000. "The Foundry Cluster in Howrah: Socio-economic Dimensions", Management and Labour Studies Journal, Vol.26, No.1, January 2001, pp 46-57.

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