Human resource development for solid minerals enterprises

By John B Wallace

This paper, for senior officials from state-owned enterprises in the solid minerals industry, demonstrates the attractiveness of investments in human resources. Research indicates that investments in well-managed *Human Resource Development* (HRD) programmes are often much more attractive than comparable investments in physical resources (such as factories and vehicles) or financial resources (such as shares and bonds). However, while investments in people often pay high dividends, such investments are often quite difficult to manage. Consequently, we will discuss how to manage them.

Little in this paper is new. It has long been recognised that well-managed HRD is a powerful and valuable instrument. But this knowledge seems too rarely applied, especially in industries with poor industrial relations traditions. Also, many examples in this paper depart from the conventional wisdom of the past few decades which advocated the use of specialist, centralised training departments.

In contrast, well-managed HRD programmes that generate high, quantifiable returns require the close involvement of management at all levels. These managers need to be able to identify training needs among their subordinates and to make sure that the training is appropriate and that new practices are applied on the job.

We propose that such "results-oriented" HRD programmes can solve some of the long-term problems of the solid minerals industry. The paper then concludes with suggesting actions to help the leaders of the solid minerals industry apply good HRD to solve these long-term problems.

1. Effective HRD is important to the solid minerals industry

When discussing economic and social strengthening manufacturing, agriculture or mining may bring short-term economic results, in the long run only those societies which place human resources development first can hope to prosper. For example, Basil Davidson, a leading historian of Africa, once observed that the development of Zambia's copper industry benefited the country, "like an avalanche of bowler hats" (p 15). His point was that while Zambia's economic indicators may have improved and the streets of Lusaka may have shone brightly, behind such superficial statistics the great mass of the Zambian population was little better off. Too little of the net surplus of the copper boom had been reinvested in the people themselves.

Education, training and discipline are the keys to progress. Japan is a current example of good human resource development. This country, with few resources other than its people, is a leading post-industrial society. Close behind come the *Newly Industrialising Countries* (NICs) of Asia; building prosperity with well-educated, trained and disciplined human resources. The key to progress seems to be educated, trained and disciplined human resources at all levels of a society to manage physical and financial capital.

Since the 1960s many developing countries have sought prosperity mainly by striving for sovereign control over their natural resources. Extraction industries were nationalised right and left; today many of these industries are in trouble. National control of one's natural resources may be an early step, but certainly it is not the last step to prosperity.

After national sovereignty comes technology transfer. The oil-rich nations of the Middle East, for example, used various strategies to build and maintain prosperity. Iraq, with a relatively larger population than many other oil states, concentrated on building an industrial workforce. "We have 20 years, one generation to educate and train our people before our oil is more or less gone," said one Iraqi policy maker. The country's

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The views expressed in this paper are those of the author and do not necessarily reflect those of the ILO.

schools and colleges doubled their intakes from one year to another in the 1970s. Other oil-rich countries with smaller populations relied more on expatriates to manage the technology. In the long run this is a riskier course. Legal ownership without technological mastery leads nowhere. Well-managed investments in people, not things, is the key.

1.1 Caretaking or results-oriented HRD?

Good management of a country's investments in its human resources is neither easy nor common. It requires a philosophy, a policy and a properly implemented strategy. Symptoms of poorly-managed HRD include brain-drains and the curse of the educated unemployed. The first step toward a philosophy of good HRD management is to distinguish between two types of HRD: *caretaking and results-oriented*. Both are necessary, but quite different.

Caretaking HRD primarily builds necessary skills and attitudes in a workforce in order to keep enterprises growing and healthy. Well-integrated apprenticeship programmes, induction training that introduces new employees to an enterprise, supervisory development programmes that assure that there are enough first-line supervisors ready and in place, the courses that introduce new technologies into an enterprise; these are examples of caretaking HRD.

Results-oriented HRD is more immediate and complex. It develops employees at all levels while giving them the opportunity to improve the performance of their enterprises. A common example is the quality circle, where work teams are trained in group problem solving techniques and then encouraged to find and implement solutions to problems at work. Where the problems are more complex, cutting across several parts of an organisation, then the HRD programme can incorporate the training of people to work in task forces and on projects. These forms of HRD are designed to assure that what is learned in the classroom is applied on the job to transfer the learning. Of special significance, results-oriented HRD often has a high, measurable return on investment.

Caretaking HRD helps people play new roles in life, whether it be miners, mine foremen, engineers, accountants or doctors. Results-oriented HRD, on the other hand, helps people improve their skills, knowledge and attitudes while improving the performance of their organisations. It requires that HRD professionals work closely with enterprise managers to determine needs, to design training programmes and to support trainees while they apply their new skills to solve actual problems.

To be effective, commitment to either type of HRD must come from the top. Unfortunately, very few senior executives are comfortable giving directions to those who are responsible for HRD. We all carry around feelings about education and training accumulated during our years in school. There, many of us learned that school rarely has much to do with the real world; too few of our teachers had much experience there. We were expected to memorise much useless information because the teachers felt it was important. Schooling often becomes disconnected from the world of work. When this happens, a concerted effort of employers, workers and the government is usually needed to get the system back on the track.

But this is far from easy. In some parts of the world the education establishment is the largest employer. As such it becomes little different from other large bureaucracies whose members tend to look out for their own interests and loose sight of their role in society. In the United States, for example, there is a raging debate on why such a large proportion of the workforce finds it difficult to read, write and do arithmetic after spending so many years in school (see for example Finn 1987 or Kolderie 1987). In the United Kingdom, a similar debate is going on. Throughout Asia there is tremendous concern about the educated unemployed. In these debates there is much finger pointing — educators are blamed for not doing their jobs. They in turn argue that they are neither sufficiently paid nor appreciated enough. Most countries, developed and developing alike, search continually for a philosophy, policy and strategy to correct this situation.

Giving the needed guidance is especially difficult for senior executives, many of whom find HRD a mysterious black box. Engineers who become captains of the mining industry, financial managers who advise on investments, and many other types of professionals who make important policy decisions are never trained in the mechanics of investing in people. They know much more about investing in factories and financial investments than in people. This gap in the background of many senior managers is a major reason why they are so uncomfortable when guiding HRD policy.

Tradition plays a role, too. The solid minerals industry, like the construction industry, has special problems when it comes to investing in people. These industries have long traditions of considering people as a variable cost, to be hired and fired, depending on the state of the market.

In these industries, decision makers often view workers as strong backs and weak minds. Payroll becomes the most visible cost when times get hard. Many policy makers fail to see that the cost of idle equipment and of in-process inventory is often much more significant than the cost of people. Rather than reacting to a crisis by first laying off workers, forward looking senior executives in many countries make it a policy to maintain employment and invest in people so that they can recover their productive capacity quickly when demand rises. Admittedly, traditions die hard. Fortu-

nately, traditional HRD policy in the mining industry is giving way as companies mechanise so that "diggers" are being replaced by "machine minders" and the need to keep expensive machines running implies the need to retain people skilled in mechanical and electrical repair and maintenance.

How can the solid minerals industry make sure that it is investing wisely in its people in these times of increasing mechanisation? The first step is to distinguish between caretaking and results-oriented HRD. Let us start by examining some examples of caretaking HRD, to see where it fits in our strategy and its strengths and weaknesses.

2. Caretaking HRD: examples from the coal industry

Two high-volume types of caretaking HRD:

(a) entry-level training (eg, apprenticeships) and,

(b) the training of first-level supervisors (eg, mine foremen) can increase productivity and safety. Let us consider how they work and how they can be improved.

In regions where the solid minerals industry predominates, the government often plays a significant role in training and certifying the bulk of the industry's employees. Many governments — often through a department of energy — certify apprentice miners and mine foremen. The typical aim of such certification is to assure that miners and mine foremen know how to use equipment properly, understand the mine safety laws and the basics of first aid. A typical certification programme requires an apprentice miner to (a) attend introductory classes for say 40 hours, (b) work under the close supervision of a certified mine foreman for a minimum period (say 100 shifts) and to pass a written examination. Such certification programmes often provide for an annual one-day refresher course on critical issues such as gas leakage and electrical hazards. The characteristics of some typical certification programmes are shown in Table 1.

When governments become involved in foremanship training, they typically specify a certain amount of experience plus classroom training plus some sort of certification examination. In some regions, to become a mine foreman, a miner would need three years of experience or one-year's experience plus a degree in mining engineering. Then he can apply to become certified as a foreman. He might use a self-study guide and sit a half-day examination to get his certificate. Does such knowledge acquisition make better foremen? We do not know.

2.1 How good are such programmes?

Government officials who administer these certification programmes are generally quick to point out that such programmes, while better than nothing, can be greatly improved. First, they contend, when mining enterprises are closely involved the HRD programmes achieve better results. Second, there should be more emphasis on performance-oriented training and less on knowledge-oriented examinations. Enterprise involvement and performance-oriented training, in ILO's experience, go hand in hand.

Enterprise involvement. When a government agency becomes heavily involved in HRD, enterprise managers may feel that they are getting a bargain. However, while they no longer have to pay as much to train their own employees, they risk losing control of investments in their most important resource.

When those who design and administer HRD have working experience in the sector, training is usually relevant. The tendency of teachers to teach what they have learned from books regardless of its relevance can be curbed when enterprises insist that classroom instructors have hands-on mining experience. The involvement of the enterprises helps ensure that the lessons are relevant and that they are applied on the job.

When enterprises become involved and collaborate among themselves, HRD often pays big dividends. Many such enterprises belong to employers associations, whose primary purpose often is to

Table 1
Typical government-supported certification programmes for miners and mine-foremen

Activity	Criteria
For miners	
Basic classroom instructions	40 hours
Supervised on-the-job work	108 shifts on 760 hours of work
Certifying examination	90 questions
For mine foremen	
Experience/education:	(a) degree in mining engineering, plus one year experience; (b) three years' experience
Training:	Self-study guide. Pass an examination

present a common voice on labour relations. An increasing number of such associations have found that it pays to have an HRD specialist on the association's payroll to work with the trainers and training managers from the enterprises. (See, for example, "The role of employers' organisations in promoting management development," ILO, Geneva, 1986.)

For example, several associations of coal mining enterprises that ILO studied recently are working on "performance-oriented mine foreman training" (ILO, 1987). The HRD specialists began by analysing the knowledge, skills and attitudes of foremen. They interviewed the best foremen to find out what distinguishes them from the rest — the average performers. They then concentrate on the foremen who have the best safety records and the most productive crews, and try to find out what these foremen do that generates better performance.

They then incorporate their findings into training programmes. To assure that the lessons learned are applied on the job, the training managers carefully select participants and make sure that they produce individual and group projects. Such HRD programmes represent a complete reversal of what was common only a few years ago when training was considered the sole province of centralised, specialist training centres. Then training was often divorced from work. People went to courses, and little thought was given to how the classroom related to the job. This has changed greatly in the past few years, but such results-oriented HRD programmes take a lot of thought. To understand how they are organised, let us first consider the stages that they must pass through in order to generate significant results.

3. The process of results-oriented HRD

People at all levels of an industry need to understand their role in developing human resources. Government officials, for instance, must realise that while they can exhort the people in an industry to become more competitive, exhortation alone is useless. People at the top of an industry can lead, but the people at lower levels of a productive enterprise do the work. They must see the advantages to themselves of applying new knowledge and skills or they will soon lose interest. So the process must link awareness building through several intermediate steps to recognition of achievement.

We call this five-step process the "business change cycle":

(i) *Awareness-building.* Activities that help individuals, organisations and industries recognise the need to improve.

This is done by feeding back to them information indicating that what is happening is not what they want. For example, the leaders of an industry often get together and compare past performance with present performance, or present performance with future targets. They may also compare the performance of similar enterprises in different regions.

With such comparisons they can begin to think about alternative ways of improving performance.

(ii) *Decision.* This is the building of commitment to do something. Otherwise people usually "rationalise" about the feedback: "We'll get our reward in heaven", "That's the way it has always been", etc. Commitment is built up through pressure, people are "promised carrots and threatened with sticks".

(iii) *Legitimisation.* This step reduces people's perception of the risk of change. It is done by describing how others have succeeded.

(iv) *Action-implementation.* This is where individuals and organisations form task forces, project teams, quality circles and so forth to carry out change. Here, training is used to help people learn how to design and install new systems; how to re-organise flows of materials, information or energy to achieve better results. Within an enterprise, there may be many task forces and quality circles — some working on saving energy, others on improving maintenance and so forth. Those who concentrate on one source of waste may be linked through professional associations and training centres to other enterprises so that there is a pool of experience to draw on and to help find out which type of solution works best.

(v) *Recognition of achievement.* This step completes the business-change cycle and prepares participants for the next cycle. Ceremonies are organised and the media may be involved. These are not the same as ceremonies that take place at the end of a course where everyone gets a certificate of attendance ("for sitting still and staring hard", as one course participant recently put it). Instead, people are given awards for how they have used new knowledge and skill to improve enterprise performance. An industry such as solid minerals mining may give awards to some enterprises while professional associations for energy conservation, maintenance and quality assurance also create their own sources of recognition across several industries.

These are steps in a cycle, like the cycle of the seasons, the water cycle and so forth. A business-change cycle starts with awareness building and ends with recognition of achievement and is then repeated and applied to larger, more difficult challenges. Training consists primarily of teaching people how to use problem-solving tools associated with each step in the cycle. With this results-oriented approach to HRD, people are trained not just to do a job, instead they are trained how to manage, in a sense, physical and financial resources. People who do this best are often the most employable.

4. Examples of results-oriented HRD programmes

Table 2 illustrates the type of analysis that senior officials can use to decide where to start and with whom to collaborate. The solid minerals industry, as we see in the table, might want to concentrate on energy conservation, maintenance savings and safety because those areas seem to promise the most in performance improvements. Having some areas to start with, an industry might seek partners in other sectors who are keen to use HRD to make similar improvements.

To illustrate this process, let us look at a recent HRD programme from Mexico's textile sector that included both public-owned and privately owned enterprises.

4.1 Performance improvement in Mexican textile enterprises

This small project started in July 1986 in response to a unique opportunity: the World Bank was willing to consider a loan to Mexico to update its textile technology. The industry needed the money to improve its position in increasingly competitive world markets, but the government was reluctant to take on yet another loan. An arrangement was worked out whereby the ILO financed a small demonstration project to test results-oriented HRD approaches on productivity with selected textile enterprises.

The project worked through a sponsor, the Textile Chamber, and trained 15 Mexican consultants from the Secretaria del Trabajo and the Textile Chamber. It organised performance improvement schemes in a score of enterprises, inside and outside the textile industry.

The project started with "programme design meetings" with the top managers of participating companies. At these meetings, it emerged that the managers had good strategies and management systems and were keen to identify challenges and seek possible solutions. By the end of July 1986, three companies had organised 11 working groups for 120 supervisors and managers supported by the consultants from the two national institutions.

In October 1986, the ILO consultant helped the Mexican consultants and company teams to make presentations to senior managers to obtain permission to implement recommendations. At this point, because of a change of leadership in the Textile Chamber, several textile companies dropped out of the project and the consultants from the Secretariat invited six other companies from other sectors to join the programme.

By February 1987, the Textile Chamber and the company managers agreed that the project had been worthwhile, despite setbacks. For example, one textile company, Telas, had improved productivity by over 30%, mostly due to improvements in communication resulting from the setting up of working groups inside the company.

4.2 Adapting the Mexican programme for solid minerals enterprises

Whether such an HRD programme would work in the solid minerals industry depends on whether the industry is experiencing sufficient pressure and whether there is sufficient trust among the enterprises to use an association to support it. The level of trust in many industries is too low. For example, the ILO recently carried out a small project for a training centre set up by a group of oil companies. An approach such as we used in Mexico would not work for this centre because of low pressure and trust. The training manager of one of the companies explained why: "We cannot set up results-oriented HRD programmes because of lack of pressure; we are selling for thirty dollars what it costs only a few dollars to produce."

Results-oriented HRD works best where there is significant pressure for change. The Mexican textile enterprises, the government and the World Bank were all interested in more productivity. They provided the pressure.

Focal points are needed in each enterprise and institution involved in the programme. Co-operation and trust among participating enterprises works best when there is a focal point such as an

Table 2
Where to start the business-change cycle?

	Agriculture	Manufacturing	Minerals	Commerce	Transport
Total size* (in %)					
Industrialised	2- 3	20-40	2-8	10-20	5-10
Developing	15-80	5-40	2-8	10-20	5-10
Source of improvement:					
Energy use	medium	high	medium	low	high
Materials consumption	medium	high	low	high	low
Maintenance needs	medium	high	high	low	high
Safety	low	medium	high	low	medium

* Contribution of selected sectors to GNP.

association of enterprises and the institution that provides the HRD services.

Such an institution must be willing to experiment with new ways of providing its services. Far too many training institutions are only willing to run "open" courses in classrooms. They often lack skill in diagnosing real enterprise problems and in facilitating the implementation of solutions. Far too many consulting firms can only help enterprises diagnose problems and write reports telling management what actions they should take. Far too many of their reports gather dust on shelves. Thus results-oriented HRD works best when enterprise managers rely on HRD specialists who have the skills to work with enterprises through complete business-change cycles. If these conditions exist, then the enterprises can get significant benefits.

One such benefit is the retention of learning. People learn more and retain the lessons longer when they have opportunities to apply what they learn. The attitudes, skills and knowledge of employees improve much more when results-oriented HRD is used than when they are merely sent to courses. One government official who administers miner and foremen certification programmes discussed above said: "We need enterprises to be involved in HRD because we can only test for knowledge. When we work closely with enterprises to assure that what is learned is applied, we reduce the risk of becoming irrelevant: of teaching the miners things they can't use and failing to provide them with knowledge they need".

4.3 Cross-sectoral public enterprise programmes

The Mexican programme initially concentrated on only one sector but included both private and public enterprises. It is often a good idea to mix public and private enterprises in an HRD programme because they can learn from each other. Let us consider another example where only public enterprises are involved, but across sectors, and involving many different types of problems.

This programme, organised by *Pakistan's Institute of Management* (PIM) and the Ministry of Production with assistance from ILO, started in 1985. PIM asked for assistance because many of its courses were thought to be too theoretical. At the same time, Pakistan had introduced a new planning and evaluation system for its public enterprises, and managers were eager to carry out improvement projects, but were having difficulty. Public enterprise performance was not improving much even though Pakistan had made great efforts to give managers more autonomy — to take away some of the burdensome red tape that constrains the performance of many public enterprises.

PIM, with ILO help, began introducing results-oriented HRD into several public enterprises, in the form of "Management Development Units". Each MDU consists of four or five managers who volunteer or are selected by top management, along with a general manager from each corporation who is designated as a "training manager". It is assisted by consultants from PIM and ILO who train the participating managers in group problem-solving techniques: identifying important problems, collecting information for analysing a problem, how to prepare persuasive presentations and how to carry out improvement projects. An important part of this training was to help the managers exercise their creativity, especially to help them become more comfortable raising "silly" questions.

This approach to the business-change cycle produced significant results. For example, the MDU at one enterprise, Sind Alkali Ltd., part of the Pakistan Fertilizer and Chemical Corporation, found a way to reduce water pollution and increase profits and revenues by switching to a cleaner technological process. They were also able to give PIM credit for helping to achieve these results.

The MDU at Sind Alkali started by identifying their main problem as a shortage of "sweet" water (which has a low mineral content). Production of its main products was constrained by the fact that the factory got only 60% of the water it needed. They were able to increase production by removing contaminants from the used water and recycling it. But what to do with the contaminants that they removed? The managers in the MDU quickly realised that a major contaminant in the effluent could be used to produce a valuable by-product. This recoverable chemical, essential to the government's campaign to desalinate irrigated lands, enjoys a market price 150% higher than that of the company's existing products. The group then studied alternative methods of extracting the chemical, and only eight meetings after the start of the MDU they made a presentation to the Managing Director on the advantages of establishing a parallel plant. He agreed with their reasoning and submitted their proposal to the government's investment programme. The managers not only have increased production by applying the principle that "pollution prevention pays", but are also poised for a dramatic increase in the revenues, profits and social contribution of the company.

Executives interested in starting results-oriented HRD programmes can draw two lessons from this example: focus on significant challenges and make sure there is a healthy relationship between government and the enterprises. Focusing significant challenges is vital in the opening steps of the business-change cycle — "awareness-building".

In Pakistan the participants were first trained in decision-making and group-process skills and were then asked to find problems to work on. The people in the MDU at Sind Alkali were lucky; they picked a problem — lack of "sweet" water — and as they studied it,

significant opportunities arose. Make sure that people are working on significant, solvable problems. Otherwise, they may soon lose interest in making improvements and go back to routine work, "frying the fish of the day", as one Pakistani manager put it.

Without good relationships between government and the enterprises, trying to start results-oriented HRD programmes can be a waste of time. In Pakistan, the environment had been prepared years in advance so that the enterprise managers were encouraged to improve performance. This happened at the end of the 1970s when Pakistan replaced a rather bureaucratic supervisory agency for public enterprises with a professional advisory organ named the *Expert Advisory Cell*. The EAC collects financial and physical production data from the public enterprises and presents it to the Ministry of Production in formats suitable for analysis and decision making.

In setting up the EAC both the formal organisation structure and the less formal autonomy structure were changed. This was important; many governments change the organisational structure — "Shuffle the boxes on the organisation charts" — from time to time, but leave the public enterprise managers without much authority. They usually lack the autonomy enjoyed by private sector managers to set prices, undertake productivity-enhancing investments, to hire and fire, and so forth. Pakistan changed the government-enterprise relationships so as to provide more autonomy, and, partly as a result, performance quickly improved for a time. Between 1979 and 1981, production increased by a third, sales by a half and net profits by a third. In this case, the change in government-enterprise relations produced immediate results and laid the foundation for the MDU approach to build on.

In summary, executives in the solid minerals industry planning to adopt more results-oriented approaches to HRD should make sure that there is sufficient pressure to improve performance, that participants have significant challenges to tackle and that there will be recognitions and rewards for successful accomplishment. Without these conditions, results-oriented HRD will not work.

4.4 Interfirm Comparison/Performance Clinics (IFC/PC)

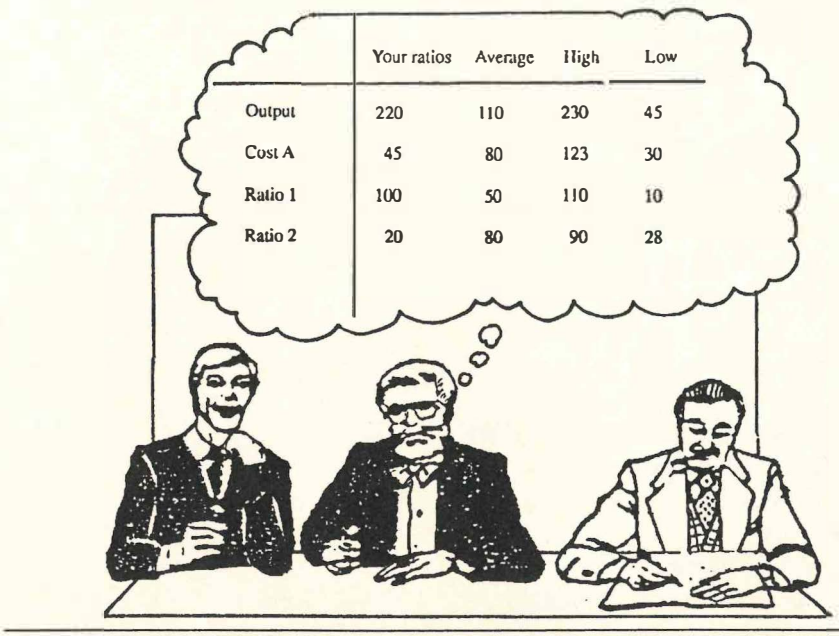
In the Pakistan example, different types of enterprises tackled different types of challenges. Sometimes, however, it is better to design very cost-effective HRD programmes where a group of similar enterprises tackle the same problem. (Corresponding to a single cell in Table 1.) Moreover, the awareness-building step can generate information that can then also be used to monitor the progress of the HRD programme; it becomes a management information system for results-oriented HRD.

To start such a programme, senior managers from similar enterprises get together with an HRD specialist (or group of specialists) whom they trust. Trust is important because these specialists will need to collect company-confidential data.

In the Philippines, for example, the Productivity Development Centre, in co-operation with the Provincial Bus Operators' Association, launched, in 1983-84, an *Interfirm Comparison/Performance Clinic* (IFC/PC) system. The 14 bus companies that took part in the IFC/PC exercise later credited PDC with helping them reduce their costs by over a million dollars in one year, especially their energy and equipment costs (Guthrie, 1985, 1986).

An IFC/PC approach is started by having HRD specialists calculate specific ratios for each enterprise to raise managers' awareness of where opportunities for savings exist. In the Philippines, the top managers of each of the participating bus companies saw their own ratios (ie, tyre cost per 100 km, fuel cost per 100 km, etc.) and where each enterprise stood in comparison to the others (Figure 1). They not only ex-

Fig 1
An interfirm-comparison performance clinic



changed ideas for waste reduction, but more importantly, they undertook joint projects to save money. For instance, they decided to pool their tyre purchases, train their drivers how to cut fuel costs and carry out regular inspections in order to reduce unforeseen, expensive breakdowns.

An IFC/PC programme can train people from the top to the bottom of an enterprise. In the Philippines case, top managers learned how to use ratios to identify problems, middle-managers learned how to carry out improvement projects, and drivers and mechanics learned how to do their jobs better to save money. The content of the training depends on which ratios top management concentrates on. With the Philippines bus operators, most of the technical training concerned maintenance and energy conservation, but it could have just as well involved scheduling, purchasing or customer service.

Regardless of the technical area, IFC/PC programmes involve training in specific types of "man-management" skills because the ratios will only improve if the enterprise undertakes performance improvement projects, and such projects require people skilled in working in groups to improve performance.

4.5 Adapting IFC/PC to the solid minerals sector

To start an IFC/PC programme in the solid minerals sector, a special set of ratios is needed. Physical — not financial — ratios should be used. Many managers know how to analyse financial ratios (return on investment, net profits as a percentage of sales, etc.). These are useful when looking at the macro aspects of a business: what mines to invest in, which mines to close down, etc. But managers learn best how to improve productivity from working with the physical and technical aspects of a business. Besides the accounting records of so many public enterprises are so often out of date that they are useless for decision-making.

In this paper, we can only suggest some guidelines for choosing a set of ratios. A study would be necessary to come up with a definitive set. The ratio set, for example, should compare typical output to the major resources used: labour, materials, energy and capital equipment. The ratios should be chosen so that managerial actions could affect them (see Table 3).

Solid mineral enterprises might consider the IFC/PC approach by first collaborating with enterprises in other sectors that face similar problems. Therefore, let us consider how results-oriented HRD programmes are organised across sectors.

Table 3
Example ratios for an IFC/PC system for the solid minerals industry

1. Labour use
(a) Is there overmanning?
- Labour-hours per unit of output
- Labour-hours at standard rate

(b) Are working conditions adequate? Are supervisors handling their workers properly?
- Grievance rate

(c) Is there adequate concern for safety?
- Man-hours lost due to injury

(d) Are there too many administrators?
- Administration as a per cent of sales

2. Equipment usage
(e) Is equipment properly maintained?
- Percentage availability of machines
- Production stoppages

3. Energy use
(f) Are we wasting energy?
- Energy cost per unit of output.

5. Results-oriented HRD campaigns across sectors

The previous examples from Mexico, Pakistan and the Philippines demonstrated how results-oriented HRD programmes help enterprises reduce waste. When people become aware that waste is an enemy, their commitment and concern can be mobilised, as in time of war. Promotional information can show them the good that will come from defeating a common enemy and the bad that will ensue if they do not. Monitoring systems must be put in place to inform them of their progress and they must be trained how to fight waste.

(INSERT FIGURE 1 HERE)

When the economic environment changes — as when energy prices rose in the 1970s — people's concern can be mobilised by comparing yesterday with today and projecting into the future. If the enemy is something people have learned to live with — bad maintenance, low quality production, low productivity, etc. — then the information to mobilise the population would compare the lives

Table 4
Potential for energy and materials savings for 1979-80

	Energy used per kUSD of GDP (in kg of coal equivalent)	Steel used per kUSD of GDP (in kg)
Eastern Europe		
Poland	1 515	135
Soviet Union	1 490	135
East Germany	1 356	88
Hungary	1 058	88
Western Europe		
France	502	42
West Germany	565	52
Britain	820	38

Source:
Jan Winiecki, "Economic Prospects, East and West", *The Economist*, May 30, 1987, p 72.

Table 5
Science and engineering talent (as percentage of labour force*)

	Scientists and engineers	R & D workers
Communist countries		
Soviet Union	11.6	n.a.
Hungary	9.3	1.4
East Germany	6.3	2.2
Czechoslovakia	5.4	1.8
Capitalist countries		
Japan	11.5	1.4
West Germany	5.3	1.0
USA	3.2	0.8

* Labour force excludes agriculture. Figures for various dates at end of 1970s.
Source:
As in Table 4.

of those who have solved the problem with those who have not.

Such is the nature of advertising: first attract *Attention* and arouse *Interest*, then show people how to make a *Decision*, and take *Action* (AIDA). The type of information needed to arouse interest across sectors was recently developed by the Polish economist Jan Winiecki (Tables 4 and 5). His aim was to galvanise debate within Eastern Europe on ways to improve productivity by reducing waste and reallocating scarce resources.

Figures such as those developed by Winiecki can be used to drive results-oriented HRD. For example, in tables, Eastern Europeans can easily see that they have a higher proportion of trained scientists, engineers and R&D workers than many other countries. Yet they seem more wasteful of energy and materials. Such waste lowers living standards. Based on such information, a society can reorient its HRD programmes so that its people reduce waste and make better use of scarce physical and financial resources.

One driving force behind such programmes are professional associations dedicated to reducing particular types of waste. In maintenance, for example, one would work through maintenance associations linked to enterprises that specialise in maintenance services. For energy conservation, one would collaborate with "energy management" associations, perhaps linked to those electric power companies that promote the wise use of electricity. In other words, sectoral programmes can be led by people from the same sector while HRD programmes to reduce particular sources of waste should be led by people who know most about those sources of waste. To see how such programmes operate, consider two sources of waste; poorly used capital equipment and wasted energy.

5.1 Maintenance campaigns

To dramatise the capital equipment issue and to raise commitment and concern,

Table 6
Interfirm comparison table on maintenance results and systems

Company (coded for confidentiality)

Results	Your company	A	B	C	D
Equipment availability	60%	80%	90%	85%	50%
Breakdown frequency (per month)	540	200	280	130	n.a.
Spare parts consumption	5	1	2	n.a.	6

Emulation table

Systems	A	B	C	D
Maintenance records	yes	yes	yes	
Maintenance planning	yes	yes	yes	yes
Spares scheduling	yes			
Maintenance scheduling		yes	yes	
Work order preparation	yes	yes		
Maintenance cost control		yes	yes	

we need numbers and examples of incidents. Globally, it is almost impossible to precisely measure the cost of inadequate maintenance. One can start with the observation that wealthy societies are well-maintained and that poor ones are usually littered with unrepaired equipment, telephones that do not work, potholed roads and crumbling buildings. But which is cause, which effect? Does poverty cause poor maintenance, or vice versa, or neither?

One widely accepted estimate is that, in 1973, inadequate maintenance cost the developing countries between 4-6 GUSD annually in reduced capital equipment life alone. But this — on a dollar per year per person basis — is only the tip of the iceberg. To this, we must add the loss of production due to plant breakdowns and plants operating below rated capacity. In every sector, poor maintenance costs developing countries huge sums every year. It is also life-threatening (witness Bhopal and Three-Mile Island; disasters largely attributable to faulty maintenance).

Most maintenance campaigns begin with surveys to find out which enterprises would be attracted to an initial round of the "business change" cycle. Data are collected on problems in order to generate awareness. Information includes figures on breakdown frequency, availability of equipment, spare parts consumption and so forth (see the performance indicators, top half of Table 6). Information on maintenance systems and procedures (bottom half of table) is then used to indicate who has the best maintenance systems and who, therefore, the other enterprises can learn from. For example, "Your company" and Company D have low equipment availabilities and high breakdown rates. They also have a lot of working capital tied up in spare parts. This may be due to their lack of systems and procedures (Emulation Table). They can probably learn much from companies A, B, and C which have better systems.

Having collected the data, the campaign organiser builds awareness through seminars and workshops. From the most interested enterprises, he recruits maintenance managers to train as consultants. These people form the core of an eventual "professional maintenance association" that will be the driving force behind the campaign. The following example from Ethiopia illustrates this process.

5.2 The Ethiopian maintenance campaign

In the past few years, hundreds of public enterprises in Ethiopia have participated in a successful maintenance campaign. In 1979, to raise awareness, the National Productivity Centre (now the *Ethiopian Management Institute* or EMI) sent a questionnaire to maintenance managers in 60 state-owned factories. First they were asked to assess how severe the maintenance problems were in their own factories. Then they were invited to a one-day workshop to discuss the results.

The workshop was attended by 43 maintenance managers. By the end of the day, they had agreed on 15 important problem areas. EMI next developed a problem-solving course around these 15 items. An attractive leaflet describing this course was prepared and circulated to the top managers of the factories represented by the 43 participants, requesting them to release their maintenance managers to attend the course. All the top managers agreed.

The course was highly participative and well received by the participants. In order to transfer what was learned to the job, the participants were formed into six groups. Each group was assigned a maintenance consultancy in one factory. During these assignments, which lasted six weeks, the group leaders met weekly

with the EMI team, who acted as coaches rather than trainers. Whenever a participant asked for information or for help, the EMI team refused to answer directly. Rather, they urged the participant to find out for himself, by self-study, or more usually from other participants. (This technique increases each participant's responsibility for his own learning.)

The end of each of the six consulting assignments was signified by an endorsement by the manager of the client factory that the group's recommendations were ready for implementation. Then formal presentations were made by each group to top management. Representatives of the factory's parent corporation and of the Ministry of Industry were also present. These presentations helped to link what was learned in the classroom back to the job. The participants got recognition from other managers — not just from the EMI team — for what they could do as maintenance managers.

The EMI team was next asked to repeat the programme (with some adjustments) for the maintenance foremen and the production managers of the 43 factories. This was done at the request of the original set of participants, who had quickly found that they could only make significant improvements in their factories if they had support inside and outside each factory.

The classroom work and consultancy was a success, but its practical results were disappointing. Very few of the improvement projects developed by the participants were implemented. When the EMI support was cut off as the participants returned to their jobs, the impetus that had been generated slipped away. EMI learned from this that they had to help the managers get recognition for implementing solutions, not just making recommendations.

To remedy this, EMI added internal consultancy to their maintenance campaign. In the next two programmes, for maintenance foremen and production staff clerks, the participants were required to implement a maintenance improvement project within four weeks of the end of the programme in order to get a certificate of achievement (not attendance). With follow-up from EMI, almost 9% of the participants produced and implemented projects by the end of four weeks. These involved 26 factories.

Thus far, the results, although considerably better than would be expected from the original consultancy-plus-classroom-training approach, were still disappointing. Out of a target population of 140 state-owned factories, only 43 had shown any interest in maintenance improvement and of these only 26 had actually done anything about it. The programme still lacked pressure for change and top management commitment. The fact finding part had been done well, but only in the last two programmes were the participants made to feel personally responsible for actually implementing a needed improvement. The training still emphasised solving problems rather than actually implementing solutions.

However, EMI had learned a good deal from these exercises, and decided to introduce a "results orientation", which transformed the approach. The start was to evaluate the results obtained in the programmes to date. In six of the factories, it was found possible to evaluate in money terms the worth of the actions implemented. These generated annual contributions of 1.3 MUSD, made up of increased production, expected extension of machine life, decreases in rejects, and reduced spare parts consumption.

This was encouraging; it showed EMI that they were on the right track. It aroused, somewhat to EMI's surprise, great enthusiasm among the personnel of the six factories, who became very proud of their achievements. It also attracted the interest of the Minister of Industry, who was to profoundly affect the programme.

In February 1982, the Ministry of Industry issued a set of Production and Management Guidelines to be followed by all the state-owned factories. These were essentially standard procedures, governing production scheduling, work ordering, capital budgeting, and so on, that one would expect in any well-run factory. Most of the 140 state-owned factories found it difficult to implement the procedures, however, so in November 1982 the Minister of Industry asked EMI to help get the guidelines installed and operating.

For EMI the task was clearly defined, but massive. The four members of the EMI team could not deal with 140 factories by themselves. Previous programmes had aimed at identifying and solving individual problems. Here the problem was common failure to implement the guidelines. So the problem-solving training was by implementation training. Evaluation was done in two stages: (a) the degree to which implementation of the guidelines was achieved, and (b) the results obtained in monetary terms (see Table 7).

By implementing the solutions that they came up with in the EMI campaign, these managers saved Ethiopia over 20 MUSD per year — saving that will continue into the future. In addition, thousands of people, at all levels, were trained; and they were able to demonstrate their increased skills in concrete ways.

Many evaluation specialists argue that results of HRD only show up over a long period of time and therefore get mixed up with other factors such as price changes, economic cycles, and so forth. EMI did not try to deal with the almost philosophical issue of long-term impact of an HRD programme; instead they emphasised setting up the conditions where management teams would present their achievements. The evaluation data was collected from the presentations.

EMI followed the philosophy of results-oriented HRD. Their aim was to get employees to apply on the job what they learned from the programme. This way the investment in people is managed and not left to chance. In the EMI campaign, each factory team that wanted to compete for recognition was given a self-evaluation form to complete. Each team completed the form by describing what it had done to improve maintenance in its plant. In another part of the form, they were asked to compare actual production at present with the same quarter a year before (summarised in Table 7). Each factory team that completed this form then gave a presentation to EMI (and interested managers from other factories). This included a tour of their plant. EMI then critiqued and audited the self-evaluation and presentations. It took a month for all the factories to make their presentations. EMI organised a closing ceremony where the Minister of Industry presented awards to the best factory teams.

EMI's maintenance campaign is similar to a sports league; each factory that wants to compete sends "players" to EMI for training. Then EMI organises annual competitions to select the top 5 and top 15 factory teams. The "final round" consists of factory presentations, followed by an awards ceremony.

The other results-oriented HRD programmes we discussed differed in minor ways from the EMI model. The IFC/PC programme in the Philippines involved 14 enterprises all in the same business, working on similar projects in each enterprise. The Pakistan programme involves different types of public enterprises working on a wide variety of projects, but using the same HRD scheme. The Mexican textile example involved public and private enterprises in the same sector organising task forces to work on a wide variety of issues. The EMI model concentrated on one type of project — maintenance management — in many different types of public enterprises.

5.3 Energy conservation campaigns

Results-oriented HRD programmes to save energy in the solid minerals industry are promising. In a sense, energy conservation is both a curse and a promise for the sector. For some of its products, such as bauxite, the recycling practices of many industrialised countries have reduced demand for the primary products of the sector. On the other hand, it is the energy carrying capacity of products such as aluminium and copper that creates and limits demand. Energy not only conditions demand for the industry, it also accounts for a significant portion of production and distribution costs. For these reasons energy conservation campaigns should be attractive to the solid minerals sector.

Energy campaigns are similar to maintenance campaigns. Surveys and "audits" are used to build awareness. Cross-sector associations of "energy managers" are formed. While many of the analytical tools are similar to those in maintenance campaigns, the ways of organising energy conservation campaigns and the knowledge and skills required are different. For example, the government and the general population play a bigger role. The key facilitator in an energy campaign (a management institution or productivity centre) links the enterprises (the prime sources of energy conservation) and the government agencies that analyse the use of energy and exhort the population to conserve it.

The center pin for an energy campaign can be a government decree which makes energy prices more visible. It may promulgate measures for conserving energy. In the Philippines in 1980, for example, the government issued decrees passing on rises in energy costs to consumers and enterprises. At the same time it encouraged the use of fuel-efficient vehicles, reduced the use of unnecessary lighting, restricted unnecessary travel and so forth.

Such action focuses attention and raises interest that can be used by productivity centres to attract people to courses on how to better manage energy consumption. These courses can only show enterprises how to make decisions and take action. The productivity centre must then support committed enterprises while they implement their own programmes. The first step in such a programme is an energy audit to make the impact of energy costs more visible on the profit and loss statements of enterprises (and in the budgets of households

Table 7
Estimated impact of the results-oriented HRD programme in Ethiopia

	1982-83	1984-85	1986-87
Number of factories evaluated	26	12	13
Results (in kUSD):			
1. Increased production due to maintenance improvements	5 000	8 000	3 450
2. Reduced drain on foreign exchange	3 800	500	1 450
3. Waste reduction	600	500	100
Total savings from campaign	**9 400**	**9 000**	**5 000**

and government agencies as well). At this stage, education campaigns can make people aware that smoke from industrial smoke stacks, the unnecessary use of vehicles and lights left carelessly on are sources of lost productivity. The productivity centre can then bring together managers from various enterprises to share ideas on how to conserve energy.

While some training in energy conservation is quite specific and technical, other is more general and applies to other types of waste-reduction campaigns as well. In Nigeria, for example, the National Productivity Centre helped scores of enterprises set up work improvement teams and quality circles. Some of the most significant gains were made by energy-intensive enterprises such as cement plants, which cut fuel costs by 20 to 40% by reducing energy losses due to poor maintenance of kilns. Specific, technical training concerns the basic principles of energy measurement, the operation of boilers, alternative insulation techniques and the design of energy-efficient equipment.

Technical training for energy conservation concerns topics such as energy accounting, energy management and capital budgeting. Training "energy managers" is important. Because some energy-saving proposals require investments (installing new boilers and insulation, etc.) training should include capital budgeting and project management.

In an energy conservation campaign a productivity centre plays several roles. First it markets the campaign to enterprises and associations by showing where they can improve productivity; next it trains people in how to save energy; finally it sets up energy management associations among those it trains and provides opportunities for them to get recognition for applying their skills back on the job to help cut energy costs.

6. How can the solid minerals industry use HRD to solve critical problems?

How can results-oriented HRD programmes become more common in the solid minerals industry? Let us first describe a policy to work toward and then suggest how to implement it. The policy should at least give guidance on who should be trained, where and when training should take place, and how it will be applied on the job.

6.1 Policies for results-oriented HRD

The examples we have discussed indicate that, as far as possible, training should be carried out near the workplace. This gives participants an opportunity to apply what they have learned and to get recognition for applying it. Any training provided would be done in response to clearly defined training needs. Performance problems that cannot be tackled by training alone would be identified and tackled so that trainees do not run into too many barriers in trying to apply what they have learned.

Second, only people with specific training needs should be selected for training. Over 90% of the money currently invested in training is spent ineffectively because of poor participant selection. In developing countries, training money spent by donor agencies, specialised UN agencies and development banks, often goes for overseas short courses and degree programmes that have little impact on organisational performance. The needs analyses of even the best designed training programmes are often faulty. The participant selection procedures are usually very weak. People are often sent for training because they are somebody's

Table 8
The classification of recommendations resulting from a typical needs analysis

Issues	Comments per issue
A. Organisational problems: non-training needs	
1. Reorganise maintenance function to cope with increasing volume of work	32
2. Improve co-operation between different divisions, especially on safety issues	15
3. Increase credibility of personnel department within the organisation	12
B. Training needs and requests	
1. Training on safe working methods	43
2. Maintenance management	32
3. Literacy training	24
4. Team building	24
5. Problem-solving and decision-making	21
6. Stock control	18
7. Degree sponsorship	15

friend, they are in the way, it is their turn, or because they are "professional course attendees".

Robert Youker, for many years a leading training specialist with the World Bank, recently concluded: "The problem can be summarised by saying that too often the wrong person gets the wrong training at the wrong time and in the wrong place" (Youker, p 15).

Many HRD specialists are aware of these problems, but there is little they can do without the support and understanding of senior executives who make the financial decisions that condition the design of HRD programmes. These decision makers must first be convinced that results-oriented HRD is possible. Having been convinced, they should set an HRD policy. One good policy statement goes:

In order for us to invest in an HRD programme or project, it should have:

An analysis that distinguishes between training needs and non-training needs; Suitable training materials;

Planned arrangements to ensure that skills acquired and lessons learned during training are carried into practice;

Arrangements for evaluating the effects of the HRD programme on the overall performance of the enterprise.

Let us first explain some of the terms used in such a policy statement and then discuss some problems likely to be encountered in implementing it.

Table 8 illustrates the results of a needs analysis from a solid minerals enterprise. The data were collected through interviews with senior management and questionnaires given to a sample of employees at all levels. The HRD specialist presents the analysis and attempts to persuade management to (a) set up task forces or project teams to tackle some of the organisational problems and, at the same time, (b) authorise trainers to design programmes to tackle some of the training needs. These two parallel efforts should be monitored by top management, based on aims. For example, the reorganisation of the maintenance function (item A.1) should be co-ordinated with maintenance management training (B.2), and monitored against measured aims such as maintenance costs, spare parts usage, down time and lost production. A task force to co-ordinate safety issues (A.2) should be involved in making sure that training on safe working methods (B.1) is having some impact, say on man-days lost. Without this type of monitoring and co-ordination, it is difficult for those who attend the training courses to apply what they were taught. When they return from a course, they would typically be told: "You know what they taught you? Forget it, around here we do things differently".

The policy on "suitable training materials" also needs some explanation. The cost of training materials can escalate. When embarking on a new training programme, HRD specialists can spend a lot of time and money creating training materials suited to the language, the level of the participants and the technology being used. Fifty hours of design, development, testing and retesting are typically needed to produce one hour of good training material. Many HRD programmes are ineffective because too many resources are devoted to materials development; the training often ends up being enjoyable but no resources were left over to support the trainees' actions back on the job. Therefore, top management should encourage trainers to find and adapt training materials from other organisations — to balance the cost of materials development with the cost of completing the whole business-change cycle.

To assure that skills acquired and lessons learned are carried into practice, top management needs to be seen as interested in getting results before people are sent for training and after they return. In the Philippines, for example, the top managers themselves analysed business ratios and then set up task forces and requested specific training for employees at all levels. In the Ethiopian example, the Minister of Industry became personally involved in setting up competitions and handing out awards to the best factory teams.

There are many other techniques that top management can use before and after the classroom portion of a results-oriented HRD programme. They can sign letters sent to participants before a course saying that they expect the trainees to apply their skills on the job. They can also serve as "clients" who listen to participants' presentations and support the implementation of new ideas. They can insist that managers at all levels brief their subordinates who are being selected for training and arrange for those participants to make presentations to their colleagues after the classroom portion is over.

Implementing a results-oriented HRD policy requires leadership and a good organisational climate. How do organisations provide these?

6.2 Overcoming barriers to results-oriented HRD

One significant barrier to results-oriented HRD approaches is the lack of skills and knowledge on the part of the staff of the personnel function. Another barrier is a long history of poor employee relations.

The personnel function in many enterprises, public and private, is staffed by administrators who are good at the traditional functions of personnel: classification, compensation, union affairs and so forth, but who lack skill and confidence to organise the types of programmes described in this paper. The training officer, if there is one, often does little more than organise occasional induction courses and supervisory training courses, and process requests for people to attend short courses offered by training institutions. He or she rarely has enough influence with senior and middle managers when it comes to supporting the actions of participants when they re-

turn from training and are keen to apply their new knowledge and skills.

Today most countries have at least a few HRD professionals with some experience in results-oriented HRD. A top manager seeking to attract such a person should look for someone whose curriculum vitae indicates that he or she "... organised HRD programmes to help company X increase productivity by Y%, or helped an organisation cut energy costs by Z%, etc.".

Such HRD professionals are increasingly available. Mexico, the Philippines, Pakistan and Ethiopia all benefited from results-oriented HRD programmes organised largely by local HRD professionals. One of the most crucial skills of such HRD professionals is their ability to create and sustain a sense of urgency among the participants. As a trainer, he or she often needs to create a feeling of crisis. One trainer who is especially successful at this makes the participants imagine that there are many people just outside the classroom, looking in, seeking their jobs. If the participants are unable or unwilling to implement solutions that reduce costs, other companies will put them out of business.

Finding and hiring such specialists is one thing, but setting up the conditions where they can be effective is another, especially if the industry has a long tradition of poor employee relations. However, even this is not impossible to overcome.

HRD professionals who can create a sense of crisis in the classroom are usually very aware of the importance of top management creating the conditions for success. "If I am working in a company where the employees just want to be entertained," said one such HRD professional, "I go to senior management and tell them frankly that I will be unable to help them get results. I usually suggest to senior management to communicate the fact that organisational survival depends on improved performance."

The key to starting results-oriented HRD where poor industrial relations has been the tradition is to start with an issue that management and labour can agree on. This is likely to be safety and health. Safe working conditions are obviously in the workers' interest. If management needs convincing, the cost of low productivity, lost time due to accidents and so forth can illustrate the economic loss associated with poor safety practices. Furthermore, it is unlikely that results-oriented HRD can be started on other productivity-enhancing issues unless the basic concerns of the workers are first addressed.

Summary and suggestions

The development of human resources is the key to economic and social development. Societies which concentrate only on the short-term exploitation of natural resources may enjoy brief boom times — gold rushes — but unless they reinvest their surpluses in their human resources, the booms are likely to be followed quickly by busts. On the other hand, some societies poor in natural resources have risen to international preeminence by investing wisely and utilising fully their human resources.

However, some investments in HRD are much better than others. Too much of the wrong kind produces educated but unemployable people (unless, of course, a society artificially guarantees full employment, usually at the cost of a low standard of living). The right kind of HRD investments is guided by the philosophy that human resources should be developed so they can master physical and financial resources. That, however, seems easier said than done.

This can be done in the solid materials industry by dividing HRD programmes into two groups: "caretaking" HRD that prepares people to enter and supervise others in an industry, while "business-change" HRD provides them with opportunities to further develop themselves by improving their industry's performance.

Caretaking HRD is concerned with large volumes of entry-level employees and first line supervisors. Consequently it is often delegated to the educational establishment. Problems often crop up when this bureaucracy comes unlinked from the world of work. The role of the captains of industry is to keep this linkage tight.

The realm of results-oriented business-change HRD is poorly understood, but the rewards and risks are high. These HRD programmes must be managed just like any other investment, from awareness-building through results-implementation to achievement-recognition. In so doing individual enterprises should collaborate; enterprises in a sector can learn a great deal by cooperating to solve similar problems. We discussed how textile firms in Mexico and bus companies in the Philippines did so. Enterprises from different sectors can set up results-oriented HRD as well. These designs were illustrated by a maintenance campaign in Ethiopia and by group problem-solving approaches in the public enterprises in Pakistan.

To organise such HRD programmes in the solid minerals industry, top management must play new roles, both in selecting the HRD specialists to carry out such programmes and in making sure that the conditions are right so that the programmes can succeed.

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