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Restructuring state–owned major industries: a comparative view

by

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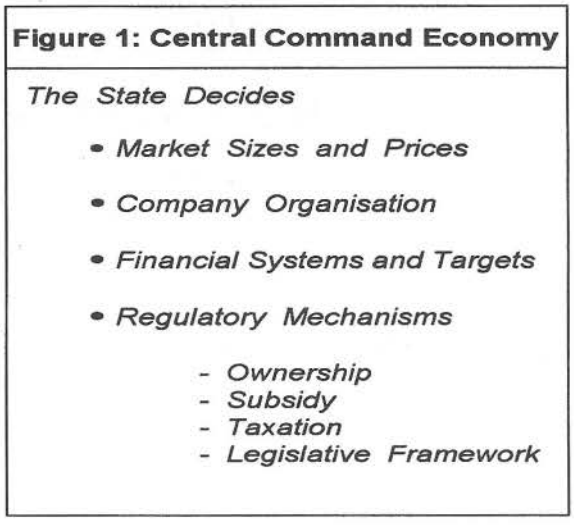
British Coal's Operational Research Executive (ORE), working with a sister company — British Mining Consultants Ltd. — has for some time been involved in the restructuring of state–owned coal industries. Recent studies have contributed to the realignment of the state coal sector in Great Britain, Pakistan and Hungary.

This paper presents a comprehensive and systematic approach to the restructuring of major state industries, which draws on our experience in coal but is applicable across a much broader spectrum of industrial activity. Within this, the paper concentrates on the specific input which OR/SR expertise can provide to the restructuring process, outlining areas where OR/SR input is of proven value. There is a great contribution to be made from our disciplines, and involvement in this field offers a significant challenge to OR/SR practitioners in establishing their role in emergent market economies.

1. Introduction

This paper examines the problem complementary to macroeconomic considerations of economic transformation: the restructuring of individual companies



— especially the large, presently state–owned companies — for success in a market economy.

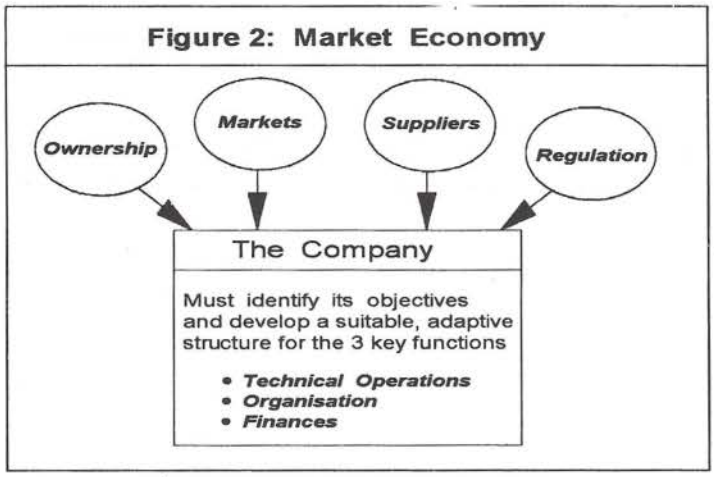
In many Central and Eastern European countries the performance of certain large state–owned industries is no longer seen as satisfactory. Their traditional objectives and modes of operation are inconsistent with new national objectives, particularly the desire for commercial viability within the framework of a market economy. The solution is an appropriate restructuring of company operations.

This paper examines the nature of such a restructuring process, and presents a broad introduction to the proven areas of success for OR and SR involvement in restructuring.

To begine with a question: why should a company under a regime of market economy be any different from a company under Central command?

There are textbook answers, which we all know: they are based on the idea of economic signals. A large, state–owned company in a centrally planned economy receives all of its signals in the form of direct instructions from the state.

It will produce a certain amount at a certain cost; it will sell into certain guaranteed markets at certain prices. The State dictates the major organisational structure of the company and its financial systems and targets. The State also provides the regulatory environment in which the company exists. This system is shown in Figure 1.



The major difference in moving to a market economy is this: the single role of the State is replaced by four sources of economic signals, which frequently suggest different patterns of development for the company. In Figure 2, these replace the previous role of the State.

Owners, suppliers and regulatory bodies affect the input costs of the company. The demands of consumers in the market place influence the price it will charge. All of these groups affect the company's potential range of profitable operations. Also, new factors appear: uncertainty in the external parameters (as opposed to fixed State budgets) and, in many industries, the introduction of international competition.

The key factor in the transition, then, is that within a market economy a company is subject to variable and conflicting influences. There is no single, fixed solution to restructuring. To survive, a company must develop a structure which not only allows it to meet its objectives at the moment when it is formed, but also is capable of adaptation to continuous change in the external groups which influence the company's behaviour and results. This is the true essence of restructuring. It is not a one–off process — although for many of the largest State–owned companies in Central and Eastern Europe, the first step of restructuring to meet their Governments' declared aims will be radical and painful. Within a market economy, individual companies evolve continuously. They expand and contract (vertically or horizontally); they reorganise; they change their financial base; sometimes, sadly, they go into liquidation. Adapt-

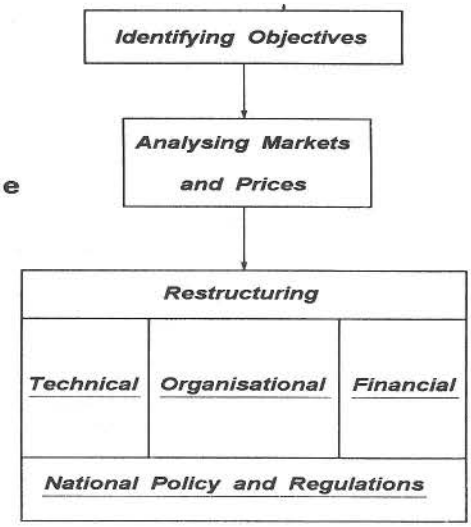


Figure 3:
Restructuring: An Outline

ability is the key to avoiding this last, and most extreme, form of restructuring.

2. Restructuring in outline

Figure 3 presents an outline of the major components of a restructuring programme.

There are six facets which need consideration in drawing up a programme: all of them offer scope for OR/SR skills. This section describes each briefly; subsequent sections go through the list again in more detail with examples of proven areas of OR/SR success. Because time and space are limited, the paper will generally do no more than suggest subject headings for OR/SR contributions. However, two of these headings — international trade modelling and planning under uncertainty — are so important to the specific nature of company operation in the market environment that some relevant ORE project work will be described.

The six main facets of restructuring are:

(i) Identifying Objectives: a clear, explicit statement of the new objectives for the restructured industry is the key foundation for the development of a successful restructuring programme.

(ii) Analysing Markets and Prices: free markets and prices are the essential features of a market economy. A precondition for restructuring any industry is a programme of economic modelling to understand:

- how markets would develop without any distortions currently present in the system;
- what prices would be available at different levels of production.

(iii) Technical Restructuring is the process of adjusting productive capacity to an economically efficient level consistent with market demand. It includes the development of optimal plans, viability assessment and capacity/investment planning.

(iv) Organisational Restructuring defines organisational forms which best support sustained operation in a market economy. It will:

- introduce competition to promote efficiency but maintain a viable size;
- determine ownership, relationships with workforce and customers, and internal organisation.

(v) Financial Restructuring provides a capital base suitable for the operation of a restructured industry in a market economy free from any burden of debts and unviable assets created by earlier uneconomic investments.

(vi) National Policy and Regulation establish the framework for the industry's operation and can affect all aspects of the restructuring programme.

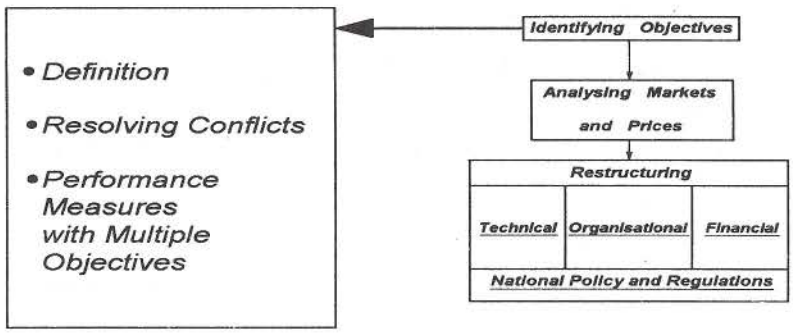
All these factors interact and a successful restructuring will address each in a balanced way to create an industry which can operate with economic efficiency and continue to evolve as market forces dictate.

3. Objectives

A clear statement of the new objectives for the restructured industry is the key foundation for the development of a successful restructuring programme. Some successful contributions from OR/SR are listed in Figure 4.

Companies operating under market conditions often state publicly astonishingly naive objectives — profit maximisation for example, or dividend return to shareholders. Survival, which is generally the paramount consideration, is rarely mentioned. OR/SR professionals have a clear contribution to offer: identification

Figure 4: Restructuring: OR/SR and Objectives



of the true underlying objectives, development of performance measures based on the true (as opposed to the publicly stated) objectives. Our problem is that such work requires access to the highest echelons of management and to their candid thoughts. Such work is rare, but very satisfying.

Once company objectives are clarified, we can consider the environment in which the industry exists and its modes of operation. In a market economy, it is natural to begin with the customer.

4. Markets and prices

Free markets and prices are the essential feature of a market economy. A precondition for restructuring is a programme of economic modelling to understand:

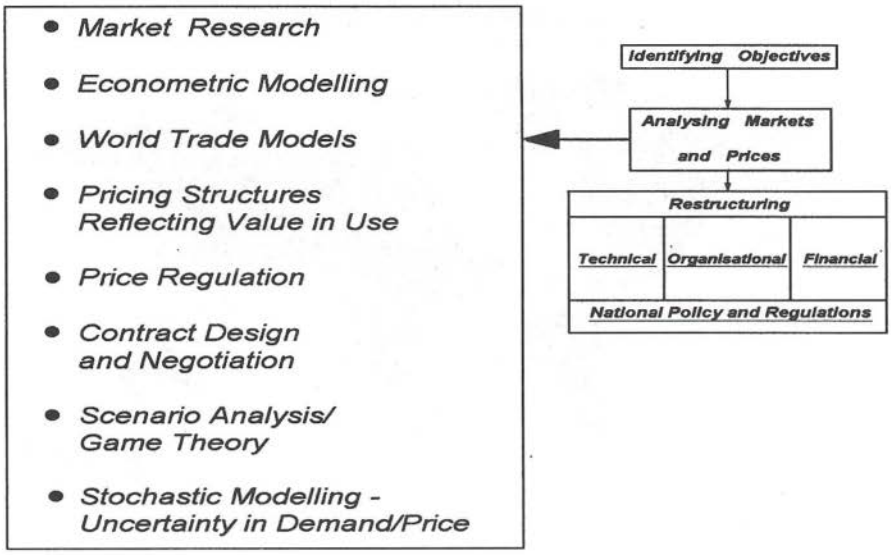
- how markets would develop without any distortions currently present in the system;
- what prices would be available at different levels of production.

This is a very well defined and well explored area of OR/SR involvement. Figure 5 shows fields of proven success.

The general areas covered are the modelling of actual and potential markets and the design and implementation of sound commercially–based pricing systems.

This list includes the first of the two topics which will be described in more detail in this paper: the effect of international competition — to take a specific

Figure 5: Restructuring: OR/SR, Markets and Prices



example, the world trade in steam coal.

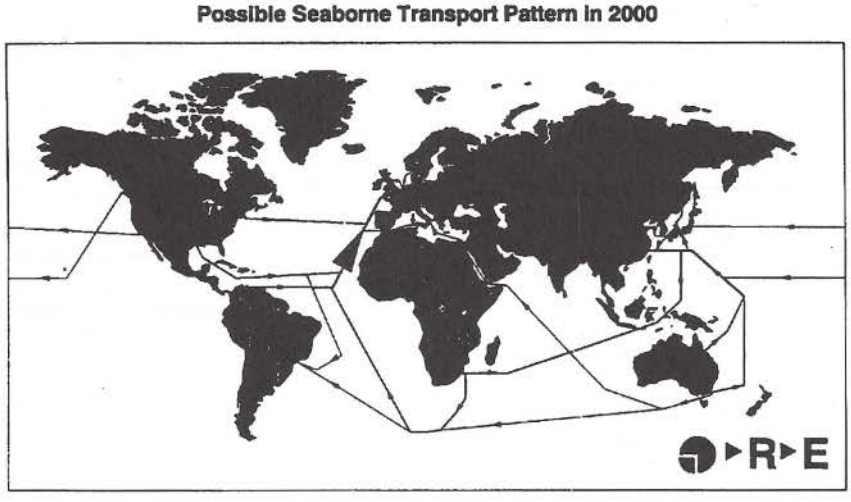
With this, we move immediately from abstract considerations to a very particular problem. Coal is traded internationally. Columbia produces; Japan buys. Closer to home for some of Poland and the Soviet Union may sell to British power stations, potentially displacing some UK coal production in particular areas.

This is not just a feature of coal mining. Moving to a true market economy opens the door to international competition. All sorts of new considerations appear and — for example — the prospects for the traditional Trabant begin to look grim. On the other hand, the prospects for Czechoslovakian beer will remain very strong. Quality and price are the paramount factors.

Our disciplines can make a major contribution to company success through the modelling of international trade. My company is sponsored by British Coal and other clients to model developments in the supply, use and movement of coal across the world.

Figure 6 presents a possible pattern of seaborne coal flows ten years hence (quantities and prices associated with the forecast flows are commercially confidentional). ORE develops such forecasts for a wide spectrum of possible developments in the international energy trade.

Figure 6: The World Trade in Steam Coal



The ORE World Coal Trade Model begins with three data sources.

(i) Supply curves for coal procedures, of which an example is shown in Figure 7. These represent, incrementally, the amount of steam coal that a country or utility can produce and deliver to ports at a particular cost. Low cost mines are at the bottom, highest cost at the top: new mine prospects and expansion schemes may appear at appropriate points on the supply curve. ORE maintains and updates this sort of information on all major coal procedures.

(ii) Demand curves for users around the world, showing the quantities a consumer will be willing to take at different price levels. Figure 8 shows a demand curve for power generation in a particular country — power generation systems are the major users of steam coal. This form of demand curve is typical of countries with a mix of coal and oil or gas fired powr stations under centralised coordination and connected by a national distribution grid. The cost of electricity from a particular station is governed by its fuel price and the efficiency with which it operates. Meeting basic electricity requirements provides a minimal level of coal demand. Beyond that, the balance between coal and hydrocarbon (i.e. oil/gas) use depends on relative prices in a complex manner, as the demand curve demonstrates.

Figure 7: Supply Curve for a Coal Producer

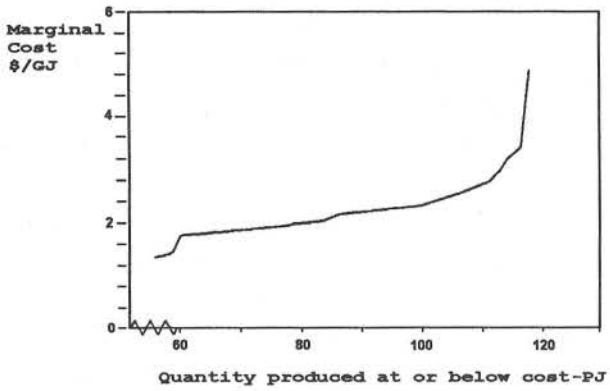
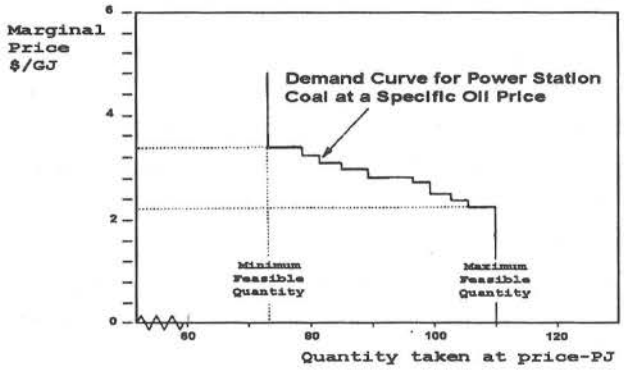


Figure 8: Demand Curve for a National Power Generation System



Reducing coal prices would progressively displace hydrocarbon fuels by changing the pattern of use of the power stations, and coal consumption would increase up to a maximum imposed by installed generating capacity.

(iii) Finally ORE maintains a database of information on transport costs for coal freight routes, which depend on ship size, distance travelled, ports used and other factors.

The whole is capable of analysis within a mathematical programming framework using a computer program to derive:

- optimal flows, and their price implications.
- estimates of perturbation effects/sensitivity.

All of this forms part of the ORE/BMCL consultancy package.

This section of the paper has demonstrated the broad range of contributions which OR/SR can make to the analysis of markets and prices. An example of how these strands come together into a coherent structure of support for decision makers is provided by one of the consultancy studies carried out by ORE/BMCL for the Hungarian Government.

ORE/BMCL were asked to develop a comprehensive, market–oriented pricing system for coal and manufactured solid fuels to replace the former structure of central prices. We used the market analysis techniques listed in Figure 5 to build a detailed understanding of the mechanisms of coal demand in Hungary, the extent of competition with other fuels in the various markets and the elasticities of sales to price. From this analysis, we were able to identify the overall economic levels of coal price reflecting true market mechanisms — most importantly, competition with imported hydrocarbons in the electricity generating system. However, coal is not a homogeneous commodity: there are many types, of different values to various users. Within the large–scale economic analysis, we built a detailed price structure for coal types corresponding to the different use–values to consumers, analysing also the supply costs of Hungarian coal producers to identify the likely nature of practical operation which would be realised under a market economy.

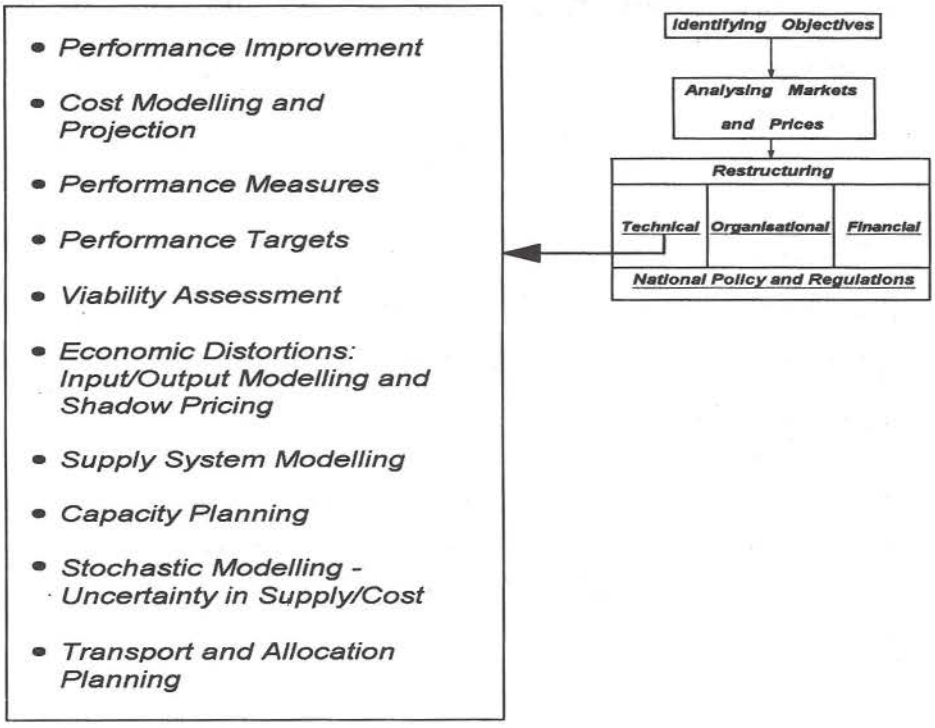
The ORE/BMCL study did not recommend immediate and total freeing of coal prices in Hungary. The existing coal markets feature only a small number of producers and also have buyers with monopsony power. Instead the new system aims to align prices for coal types with the theoretical equilibrium market levels taking account of differences in use–value. Margins for negotiation are built into the structure, and — for major customers — the whole is bound into a system of contract negotiation. As negotiating skills and decentralised organisational structures evolve, there is scope for gradually increasing the margins for negotiation to move closer — safely — to a true market structure.

This form of pricing is a good model for all strategic commodities in transitional economies where monopoly/monopsony distortions exist.

5. Technical restructuring

Moving on to technical restructuring, we remain with what the modern jargon calls "hard" areas of OR/SR involvement [Figure 9]. Technical restructuring is

Figure 9: OR/SR and Technical Restructuring



the process of adjusting productive capacity to an economically efficient level consistent with market demand. It includes the development of optimal plans, viability assessment and capacity/investment planning. Although this area is generally familiar from the central command economy experience, the market economy introduces a new factor; huge uncertainty.

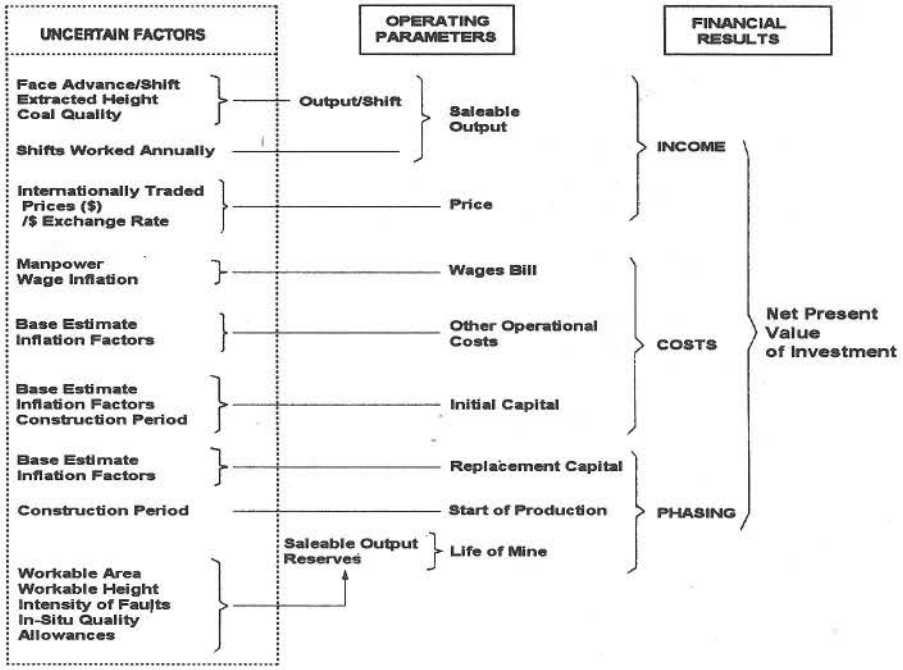
One set signals has been replaced by four, and they may move in conflicting directions. Further, the central edicts tend to neglect their own inherent uncertainty. This is a fact close to the hearts of those of us who have worked in mining. Geology may be fairly good, or bad (or very bad!). It is never what one expected, let alone what central directives assumed.

OR/SR can take quantitative account of this uncertainty. This is the second topic to be discussed in some detail. The appropriate technique is risk analysis.

Its logic is simple:

(i) Examine the probable uncertainties in all operational factors.

Figure 10: How Uncertain Factors Determine the Result of a New Mine



(ii) See what result comes from particular combinations of operational factors.
(iii) Derive probability distributions for the likely outcome.

The problem is to combine a set of uncertain contributory factors into a probabilistic statement of the outcome. To describe the ORE approach, we will run briefly through a probabilistic risk assessment of a new mine prospect.

As Figure 10 shows, there are very many uncertain factors in the planning of new mine. Some are internal; some are external; all — in mining — are somewhat less certain than the next throw of a dice. The first task is to try to establish an understanding of each factor's inherent uncertainty: formally, to establish a probability distribution. For a few of these factors — geological disturbance for example — we have relevant historical experience and statistical analysis has a role to play. For most of the factors, however, a more subjective approach is necessary. We aim to estimate probability distributions from the judgement of the relevant experts on each uncertain factor.

Figure 11: OR/SR and Technical Restructuring: Risk Analysis for a New Mine

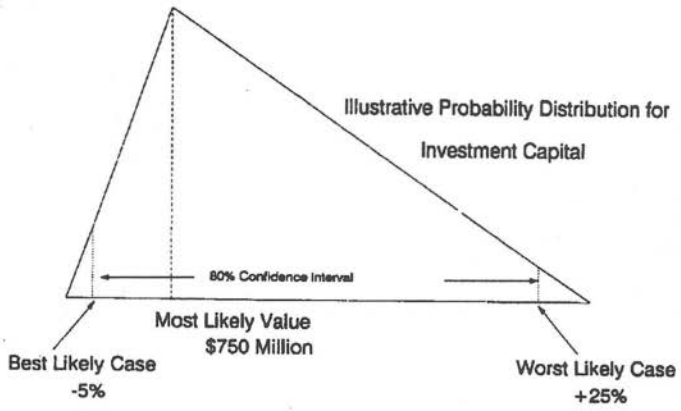


Figure 11 gives an example of such a judgemental distribution. An appraisal of the investment necessary to establish the mine suggests a most likely capital requirement of \$750 M, and sets limits of confidence for the likely variation from this figure.

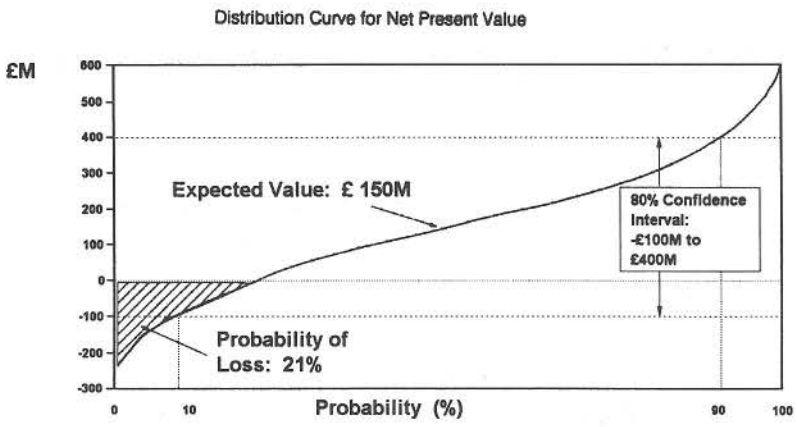
When probability distributions have been estimated for each uncertain factor they are combined — via computer simulation — to give a distribution for the result, taking proper account of interdependence between some of the uncertain factors. In this case the required result is the net present value of the new mine project [Figure 12]. Such analyses are of great value in deciding whether or not to proceed with an investment. They provide for the decision–maker not only a best estimate of average return, but also a fully quantified assessment of the overall risk attached to the investment.

Because of constraints of time and space, the remaining facets of restructuring will be examined much more briefly. This is not intended to minimise their importance, which is great.

6. Organisational restructuring

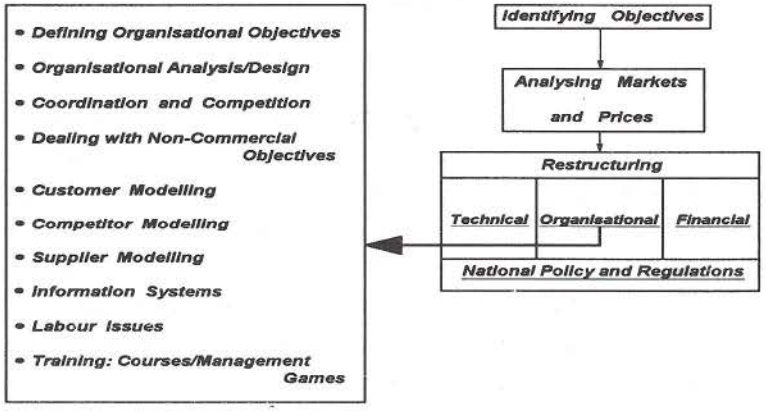
This facet of restructuring defines organisational forms which best support sustained operation in a market economy [Figure 13]. Here OR practitioners are, generally speaking, in much "softer" areas of analysis — organisational de-

Figure 12: OR/SR and Technical Restructuring: Risk Analysis for a New Mine



sign, behavioural modelling — but computer support for management comes to the fore.

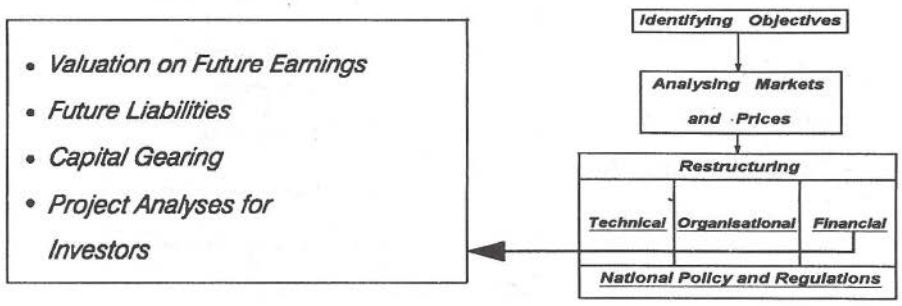
Figure 13: OR/SR and Organisational Restructuring



The practice of management is inseparably linked to information flows, and in large modern companies that of course means computers in nearly all aspects of the business. The challenges and opportunities are clear.

Figure 13 mentions labour issues. Good labour relations are essential for company success; an excellent start can be made by involving trade unions in the restructuring process, seeking their views on company structure and operation at an early stage.

Figure 14: OR/SR and Financial Restructuring



7. Financial restructuring

Financial restructuring provides a capital base suitable for the operation of a restructured industry in a market economy free from any burden of debts and unviable assets created by earlier uneconomic investments.
Some recognised areas of OR/SR support are shown in Figure 14. It must be recognised, however, that financial restructuring in Central and Eastern Europe presents certain special difficulties.

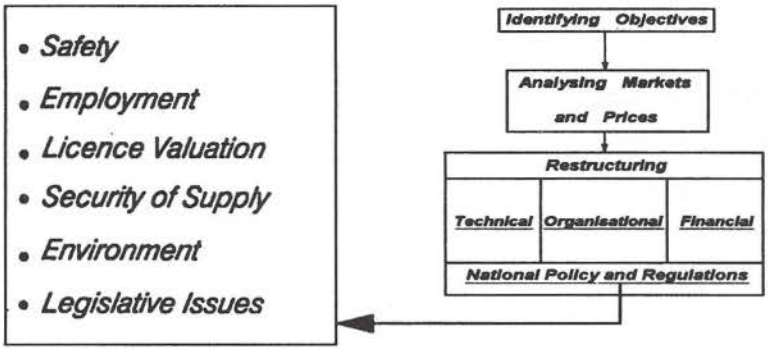
A major problem is that capital markets are not well developed. Local personal savings are too low for share purchase to match the degree of capitalisation required by major state industries. Western companies and institutions are apparently put off by a number of uncertainties affecting investment opportunities:

- property laws
- company valuation
- unfamiliar/deficient accounting practices
- potential costs of rationalisation
- problems of currency conversion/repatriation of profits
- problems with efficiency of banking systems.

8. National policy and regulation

Finally, national policy and regulation set the framework in which the restructured industry will do business. In established market economies the problems

Figure 15: OR/SR and National Policy/Regulatory Issues



for OR/SR are generally limited to tuning company operations for best results within fixed Government requirements. In the emergent market economies of Central and Eastern Europe, the scope is much broader. National policy and regulatory legislation are in a state of flux. The opportunity exists to extend consultancy support beyond the individual company: to help establish a regulatory framework which will promote economic efficiency within a company and also aid the achievement of national goals.

Figure 15 shows a few of the regulatory areas where OR/SR has already contributed. In all of these, OR/SR can assist in suitable restructuring to improve commercial operation while keeping step with national needs.

Employment is an example of particular interest. It must be recognised that restructuring many state industries will involve considerable job losses — for example, 136,000 jobs have been lost in British Coal over the last 5 years. Labour reductions on this scale need careful management: counselling, retraining, job creation. British Coal set up a subsidiary company for this task — British Coal Enterprise (BCE) — which has been extraordinarily successful in helping ex–miners set up new, small companies in affected regions. BCE required initial founding from Government, but is now self–financing on loan interest, rent from workshops etc. It has so far been involved in helping about 60,000 people find new jobs.

9. Key points

In summary, there are two key points to bring out:

- firstly, restructuring of large state–owned companies will be high on the economic agenda of all Central and Eastern European countries.
- secondly, OR/SR has an enormous contribution to make across the whole range of restructuring activities, both within the individual company and in its external working environment.

10. Acknowledgement

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