PHILOSOPHICAL TRANSACTIONS — OF — **THE ROYAL SOCIETY** A | MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES

Setting Objectives in a Business Enterprise - a Cybernetic Approach

J. J. De Jong

Email alerting service	Receive free email alerts when new articles cite this article - sign up in the box at the top right-hand corner of the article or click **here**

Setting objectives in a business enterprise – a cybernetic approach

By J. J. de Jong

Koninklijke/Shell-Laboratorium, Amsterdam, (Shell Research B.V.), The Netherlands

One of the most vital types of managerial decision is the formulation of business objectives. For top management, functioning at the interface between the company they run and the society in which they have to operate, the setting or objectives requires many viewpoints to be taken; the emerging pictures have to be harmonized into a balanced overall representation of what should contribute best to the company's ongoing success.

This harmonization of economic, financial, social, political, legal, technological and moral issues is a complex mental process; a systematic approach to this process of complexity reduction is presented. The method put forward encompasses checks on consistency (for internal acceptance), on strategic feasibility and on social responsibility.

Introduction

I will speak to you this afternoon as a research man who spent most of his career in engineering science. As the department head of a control engineering research group I studied the possibilities of applying cybernetic principles to line management. I found myself faced with a problem where many scientific, societal and philosophical notions interfered. Nevertheless, I hope that some contribution from my part will help to obtain a better view of the management problem.

This presentation will raise, I hope, curiosity and, I fear, also disappointment. The management problem of formulating business objectives is one of such complexity that a cure-all method cannot be expected to be presented here. Nevertheless I shall try to formulate the problem as generally and as precisely as required for the demonstration of a methodology which, perhaps, may ultimately lead to improvement in the quality of management. This dissemination of a different way of looking at an old problem is itself a difficult process of trial and error: I must admit that in my own company, the Royal Dutch/Shell Laboratory, Amsterdam, only the first cautious steps have been taken in applying the methodology which I will now outline.

The management team of any medium to large commercial organization devote a great deal of their time to the setting of business objectives, disseminating them throughout the organization and reviewing them in the light of progress made.

In this rôle they act as information processors combining information about the environment – particularly about the opportunities and threats from the environment – with information about the company's internal characteristics – especially its strengths and weaknesses. The formulation of objectives is a mental process of matching in which the two pictures, the environmental and the internal picture, are combined into a harmonious and balanced representation of what should contribute best to the company's future success. These objectives will then form the basis for further strategic thinking and planning.

In the past, economic, financial and technological aspects have received abundant attention in business planning and, as much of the associated data could be quantified without great

difficulty, management aids such as business models, simulation and other types of computer-based systems were developed.

Nowadays, however, in an era of change, the most important issues are of a social and political character. The political and social dimensions of management have leapt into prominence and are, in fact, becoming more and more decisive in determining the future environment within which the company will have to operate. But these political and social issues are rarely quantifiable. An added dimension that management have to content with is the efforts made by various social and political groups in society to try and exert influence on the business organization. I am sure that we can all call to mind examples of how difficult it is to quantify the relations which govern the process of the setting of objectives by management. Periodical negotiations with trade unions on labour contracts involve much more than a simple financial cost/benefit calculation. Confidence, power, participation and authority are some of the factors involved.

In the pursuit of their social and political objectives governments exert great influence on the siting of industrial units, the degree of priority given to different products and even the destination of the end products. As I understand that 'a week is a long time in politics' I suppose it is to be accepted that government priorities may change rapidly, and at short notice. Calls for more open debate on commercial objectives and standards and a sharing of business power – variously labelled as 'industrial democracy', 'co-determination', 'employee participation', etc. – are other factors that management must accommodate.

It is clear that the social and political dimensions of management are increasing and that managers have to find answers – and good answers at that – to all these interactions. But the computer is hardly a great help here.

I hope that in this introduction I have demonstrated that there is room for further study of how quantifiable and non-quantifiable information can be balanced by management, how the economic, financial and technological issues on one side and the social and political issues on the other can be combined and how effective communication regarding the outcome can be established.

What follows is intended to be a contribution towards these purposes; it should be regarded as no more than an attempt at 'finding the way'.

ANALYSIS OF BUSINESS OBJECTIVES

As was stated by Drucker (1973), in formulating business objectives there is only one focus: the customer; the commercial organization's primary purpose is to serve the customer. Actually there are many foci, such as shareholders, employees, suppliers, creditors. All of them have to be given ample attention. But the primary focus should be, I think, the customer, whoever or whatever this may be.

Now, it is inherent in our culture that once an organization has been created and has successfully developed a market there are very many and varied pressures directed towards keeping an organization in existence. Consequently, it may generally appear that continuity is the most usual overall, commercial objective. There may, however, be circumstances in which 'continuity' is overruled by an objective of even higher priority: for example, when a company voluntarily decides to stop trading when it considers the circumstances and conditions not attractive enough for continuity. In this presentation, however, I shall restrict myself to cases

where such infeasibilities do not exist and the company tries to maintain and even improve its position in the country in which it is operating. This also serves the purpose of the promised demonstration of a methodology.

I shall consider the objectives of a large business organization in more detail, make an attempt at structuring the many and often conflicting objectives, and finally describe a systematic procedure for dealing with those objectives – individually as well as in combination with and in relation to each other.

TABLE 1. HIERARCHY OF OBJECTIVES
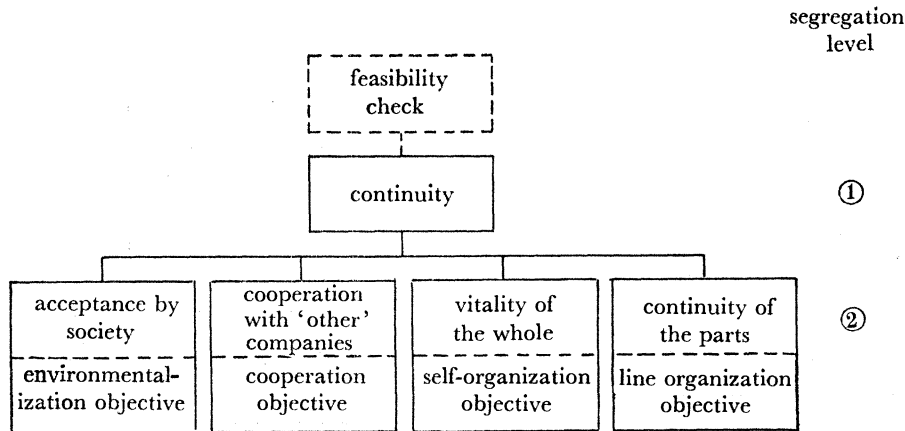
Ackoff (1974) translated the general objective of top management into three subobjectives:

(1) to serve the purposes of a larger system of which they are a part so as to serve their own purposes (environmentalization objective);

(2) to keep their organization so vital that it will more effectively pursue its own objectives (self-organization objective);

(3) to serve the purposes of the parts of the company with a view to better serving their own objectives (line organization objective).

We shall carve out from the first one, the environmentalization objective, a separate piece. When a company forms part of a larger group of companies operating within one country and having common shareholders, the environment has two distinctly different appearances. One is formed by the 'other' companies, the rest is the environment in Ackoff's sense.

Our prime objective of continuity has thus been divided into four subobjectives (see table 1).

Now each of these can again be divided into a number of sub-subobjectives and by a further split a hierarchy of objectives can be constructed in which every business objective, however small, can find its place. Of course, there are limits to what should be taken into consideration, practical implementation setting the constraint. It should also be remembered there that the fact that one objective appears at a lower level of segregation than another does not mean that its importance, urgency or value is lower as well.

In the rest of this presentation the prefix 'sub' will be omitted from the term subobjective. I shall simply speak of objectives whenever I mean any from the hierarchy just described.

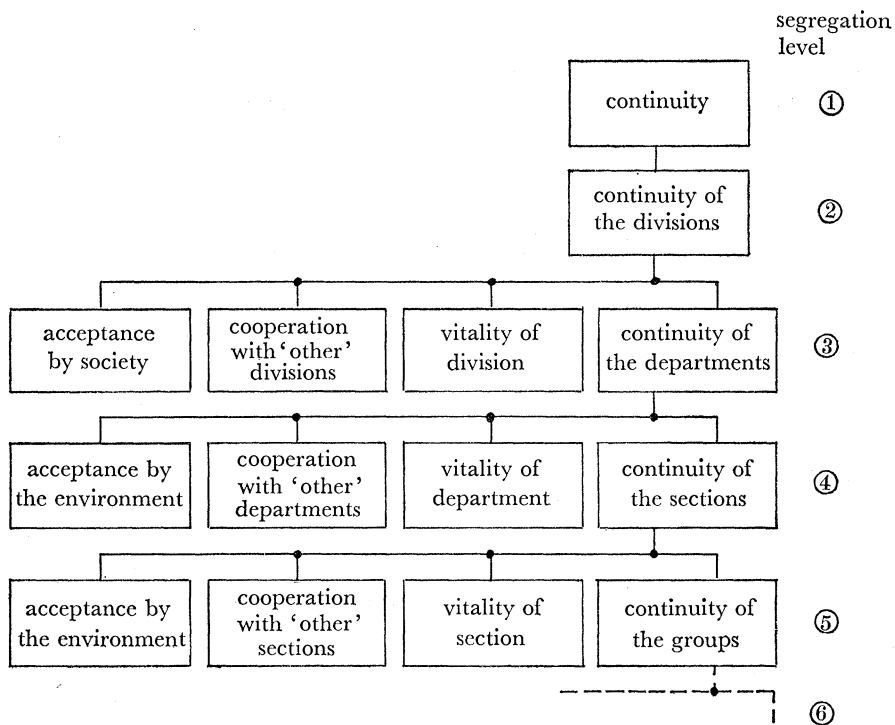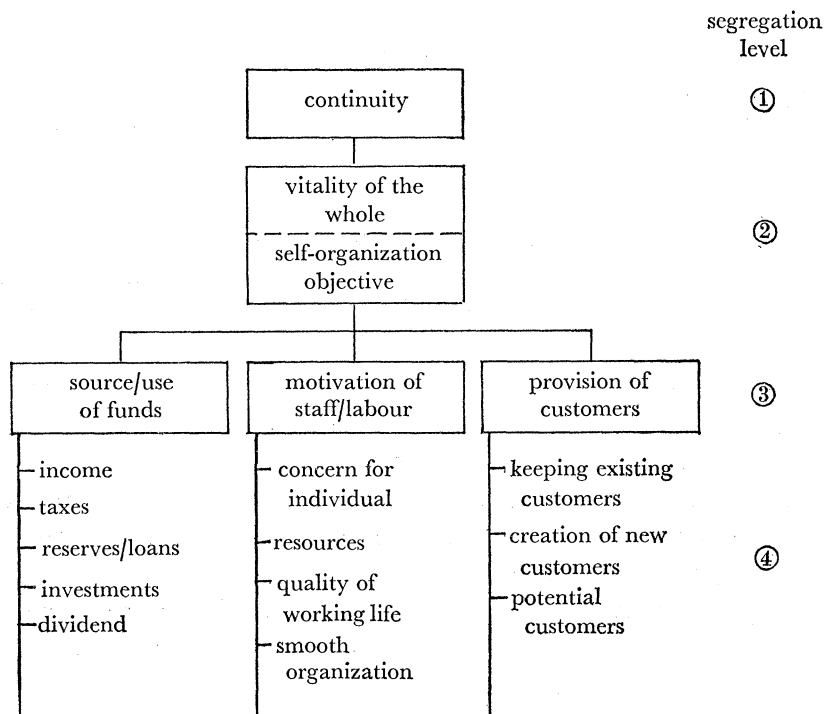TABLE 2. RECURRENT HIERARCHY OF LINE ORGANIZATION OBJECTIVES

segregation
level

			continuity	①
			continuity of the divisions	②
acceptance by society	cooperation with 'other' divisions	vitality of division	continuity of the departments	③
acceptance by the environment	cooperation with 'other' departments	vitality of department	continuity of the sections	④
acceptance by the environment	cooperation with 'other' sections	vitality of section	continuity of the groups	⑤
				⑥

TABLE 3. THE SELF-ORGANIZATION OBJECTIVE

segregation
level

|			
	continuity		①
	vitality of the whole self-organization objective		②
source/use of funds	motivation of staff/labour	provision of customers	③
— income	— concern for individual	— keeping existing customers	
— taxes	— resources	— creation of new customers	④
— reserves/loans	— quality of working life	— potential customers	
— investments	— smooth organization		
— dividend			

The line organization objective

The line organization, which deals with many differentiated operations, such as marketing, production, etc., can be handled in a fairly straightforward way. The management problem of a part of the company, such as a division, department or section, is in principle identical with the management problem of the whole company. Therefore, our hierarchy of objectives will have a recurrent nature, as described earlier by Beer (1972) (see table 2).

The self-organization objective

This objective was defined as: to keep the company so vital that it will more effectively pursue its own objectives. This means that it is capable of coping with disappointments and setbacks from competition, of surviving periods of stress and of reacting promptly to sudden opportunities; that it is willing to take risks; and that it is willing and able to develop in interaction with its environment. In table 3 this has been worked out further.

Not all the blocks in the diagram will be explained in detail here, since most of them speak for themselves. The motivation objective will be treated in some depth (see table 4) since of the

Table 4. The self-organization objective
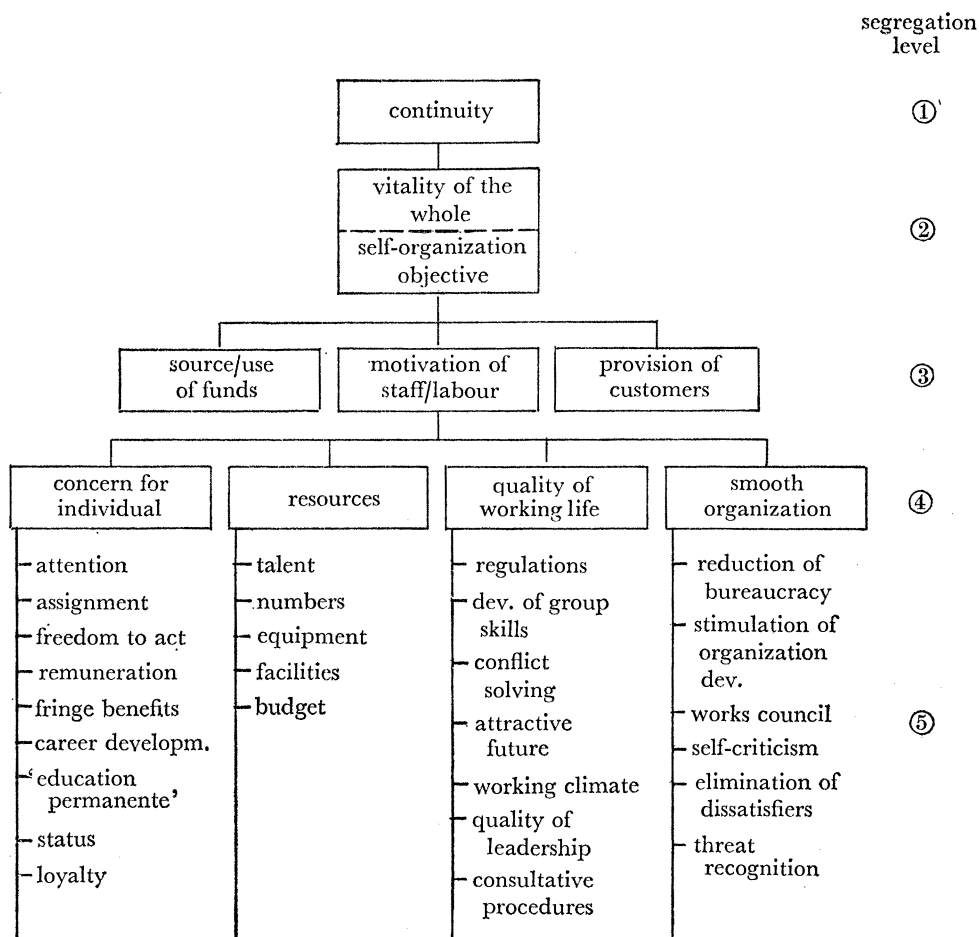
three objectives at the same level this one tends to get the least attention. The other two, source and use of funds, and provision of customers, which is the ongoing demand for goods and services, are normally well understood.

Under the heading 'smooth organization' a number of objectives have been brought together, some of which require further explanation.

Self-criticism

By developing a climate in which employees can air their views without being disloyal, management could learn much about the standing of the enterprise both in society and as seen from within. The younger employees in particular might put forward views that otherwise could easily escape the management's attention.

Threat recognition

The same can be said of the generation of mechanisms that are to forewarn against those developments, both within and outside the company, which may constitute a threat to some of the vital objectives.

THE ENVIRONMENTALIZATION OBJECTIVE

Under this objective four different forms of acceptance by society have been brought together: the social, the political, the economic and the professional acceptability (see table 5). Most of the terms in this figure speak for themselves; a few need further explanation.

Under social acceptability is mentioned, *inter alia*, the following item:

Split loyalty

It should be realized that it is not always easy for an employee to reconcile his loyalty to the company with other loyalties. This problem demands considerable understanding and it should be a management objective to help develop a climate which favours the resolution of conflicts arising from split loyalty.

Under political acceptability we find:

Power sharing

Government, trade unions and business companies have many common interests, but since priorities are often different, there are numerous areas of potential conflict. It is obviously in the interest of management to help develop a domain in this triangle of forces in which the three partners find it mutually attractive to continue to seek coexistence. But this means that issues and objectives have to be debated exhaustively and that all three should be willing to accede to some form of power sharing.

THE COOPERATION OBJECTIVE

As touched upon earlier, when a company forms part of a larger group of companies operating within one country and having common shareholders, the management of the company under review should not ignore the potential benefits that can be obtained from multiple contacts between those companies. In a larger group of companies various forms of relation exist. These may be direct, such as that between a manufacturing company supplying goods to

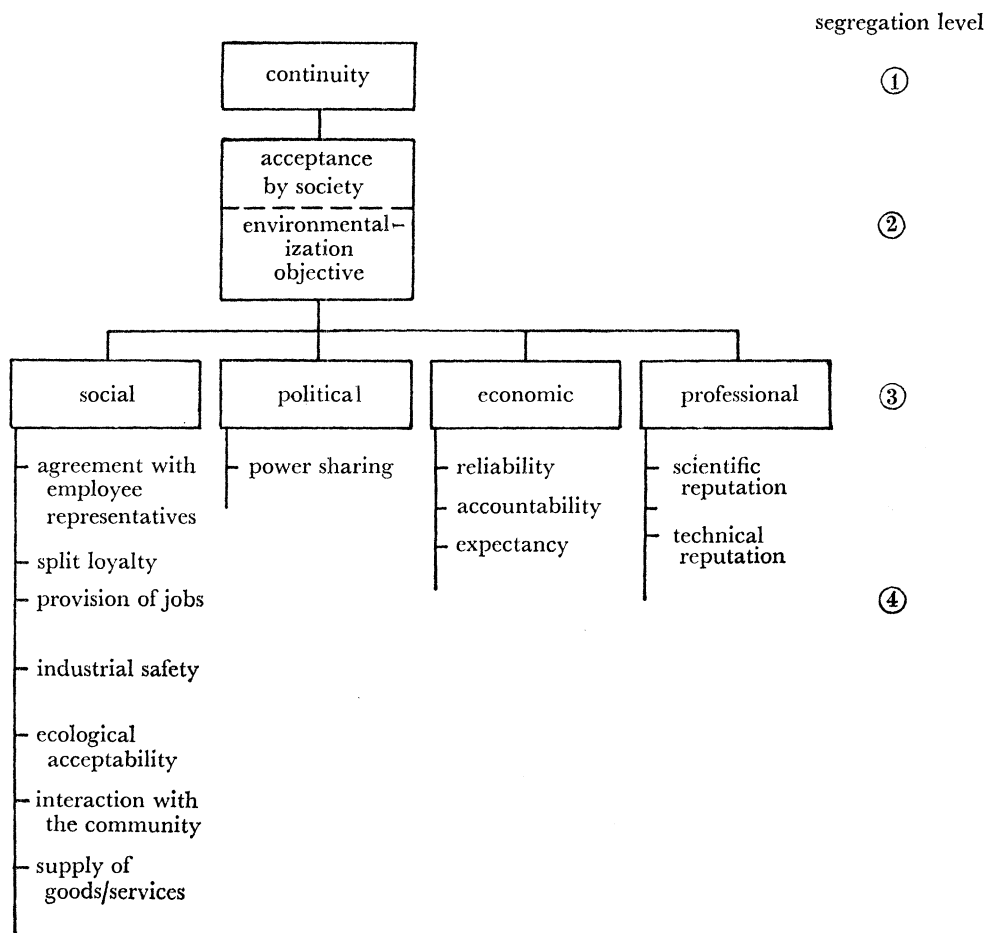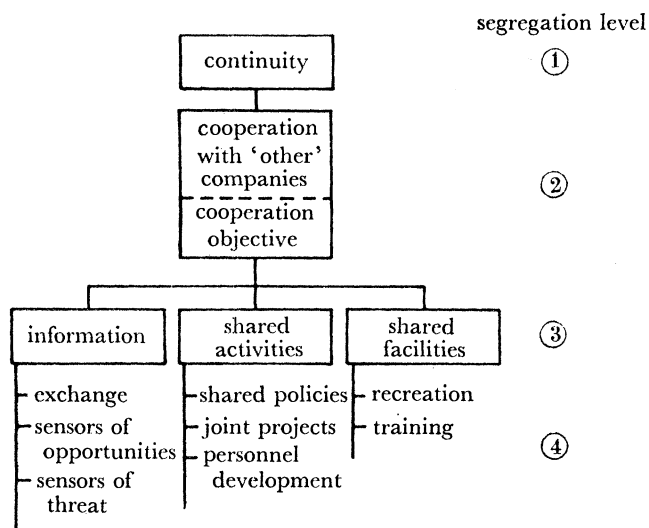TABLE 5. THE ENVIRONMENTALIZATION OBJECTIVE

segregation level

```
┌─────────────────┐
│   continuity    │                                          ①
└────────┬────────┘
┌────────┴────────┐
│   acceptance    │
│   by society    │
│- - - - - - - - -│                                          ②
│ environmental-  │
│     ization     │
│    objective    │
└────────┬────────┘
```

| social | political | economic | professional | ③ |

- agreement with
  employee
  representatives

- split loyalty
- provision of jobs

- industrial safety

- ecological
  acceptability

- interaction with
  the community

- supply of
  goods/services

- power sharing

- reliability
- accountability
- expectancy

- scientific
  reputation

- technical
  reputation

④

TABLE 6. THE COOPERATION OBJECTIVE

segregation level

```
┌──────────────────┐
│    continuity    │                        ①
└────────┬─────────┘
┌────────┴─────────┐
│   cooperation    │
│  with 'other'    │
│    companies     │
│- - - - - - - - - │                        ②
│   cooperation    │
│    objective     │
└────────┬─────────┘
```

| information | shared activities | shared facilities | ③ |

- exchange
- sensors of
  opportunities
- sensors of
  threat

- shared policies
- joint projects
- personnel
  development

- recreation
- training

④

a sales company, and the sharing of costly operations, such as computer facilities, training, and recreation facilities (see table 6). But there are quite a few instances where links are not so obvious. A company may not always fully use the additional channels of communication and means of interaction with society which are accessible to it by being a member of a family of companies rather than operating as a single entity. Such facilities may include a common information network giving companies access to centres of scientific and technical knowledge and data banks. Naturally, since this is a sensitive field, such contacts have to be on an arm's length commercial basis.

Use of the objectives hierarchy

It is inherent in our western culture that difficult problems are treated in an analytical way: the problem is decomposed into parts which are split further into ever smaller items until the fragments can be understood by the investigator. This has worked perfectly well in natural science and technological problem areas, but considerable difficulties have been encountered as soon as social elements and social linkages have entered the picture. We shall therefore abandon the rather analytical way in which we have so far treated our problem and try to do just the opposite with the fragments we have obtained, that is to say, we shall try to synthesize them into meaningful groups.

However, the hierarchy presents the objectives at various levels of segregation. The numbers of objectives at the various hierarchical levels are as follows:

segregation level	number of objectives
1	1
2	4
3	11
4	approx. 32
5	approx. 100

I know that I have oversimplified the picture by taking the line organization as just a single objective. Obviously, it is impossible for management to deal with 100 different objectives (level 5). The number of objectives at the fourth level of our hierarchy (approx. 32) seems to be reasonable and will be used as a starting point for further complexity reduction.

We all know that an objective seldom exists in isolation; very often it has many links with other objectives and it is the task of management to come up with a balanced set of objectives which in their opinion will best serve the purposes of the enterprise as a whole. However, it will appear that in this balance many an objective will be set so as to be less desirable than it would be in the situation in which it appeared in isolation. Objectives will have to be moderated to some extent. So the management problem is transformed into a problem of balanced distribution of all moderations. Of course, capable management will to a large extent do this intuitively and through the process of learning. Unfortunately, there are only few systematic aids and it can hardly be assumed that, particularly under conditions of stress, relevant objectives will not be overlooked.

Summarizing, at this moment the problem of management is:

(i) to identify a case of managerial interest, or, as we shall call it, a company state. The word 'state' is used here in the cybernetic sense;

(ii) to select the objectives pertaining to that company state;

(iii) to note the various relations between those objectives;

(iv) to balance moderations of all these objectives;

 (v) to formulate a first draft of the overall objective for the company state.

The hierarchy of objectives provides the elements from which the state networks can be constructed, adapted and updated as frequently as required by circumstances and management's initiative.

GROUPING OF OBJECTIVES

As suggested above, the moderation of a specific objective has to be considered in relation to all other moderations. This means that in a managerial consideration a grouping of objectives has to be applied. The question then remains: which objectives should be selected for groupings under which circumstances?

To answer this question we put the case that the behaviour of management and the organization can be described as a series of different states, each state resulting from management initiative as the effect of developments inside or outside the organization.

For instance, the management of a business firm may show concern about one of the problems listed – non-exhaustively – below (see table 7). The identification of a problem is, in fact, the result of a mental process of matching by the management of the environmental picture, i.e. opportunities and threats, and the internal picture, i.e. strengths and weaknesses. As soon as action is being taken the company and its management are in the corresponding state.

TABLE 7. EXAMPLES OF COMPANY STATES

problem	state
escalation of expenditure	cost reduction
the company is production-limited	debottlenecking of its manufacturing facilities
the market grows quickly	business expansion
the market contracts	contraction
new technology has become available	innovation
the organization is inefficient	reorganization
tension among groups of personnel	conflict resolution

For each of these states a number of objectives are relevant; the hierarchy serves as the inventory from which they can be selected. Let us take one of these states as an example and work it out further.

THE REORGANIZATION STATE

Let us assume that management have become concerned about the slowness with which their requests for advice are complied with by the staff organization and about the quality of the advice given. With the retirement of some of the senior staff members in the offing they have found it necessary to reconsider the set-up of the staff organization. Management also hold the view that the company's reputation for meeting the customer's desires needs improvement and they consider an increase in the quality of the staff organization the right approach. A much less formal working arrangement, in which authority and responsibility are to be delegated to much lower levels than before, has proved to be effective elsewhere.

Management therefore decide to try this approach in their own company; in consequence of this decision we have now moved into the reorganization state.

As was mentioned before, in a particular state only a limited number of objectives are relevant. Selecting these objectives for the reorganization state (see table 8), we arrive at the following list when we use the fourth level of the hierarchy (approx. 32 objectives):

TABLE 8. OBJECTIVES IN THE REORGANIZATION STATE

relevant objectives in
the reorganization state (10)

provision of jobs
expenditure
reputation
concern for the individual
resources
quality of working life
smooth organization
agreement with employee representatives
interaction with the community
exchange of information
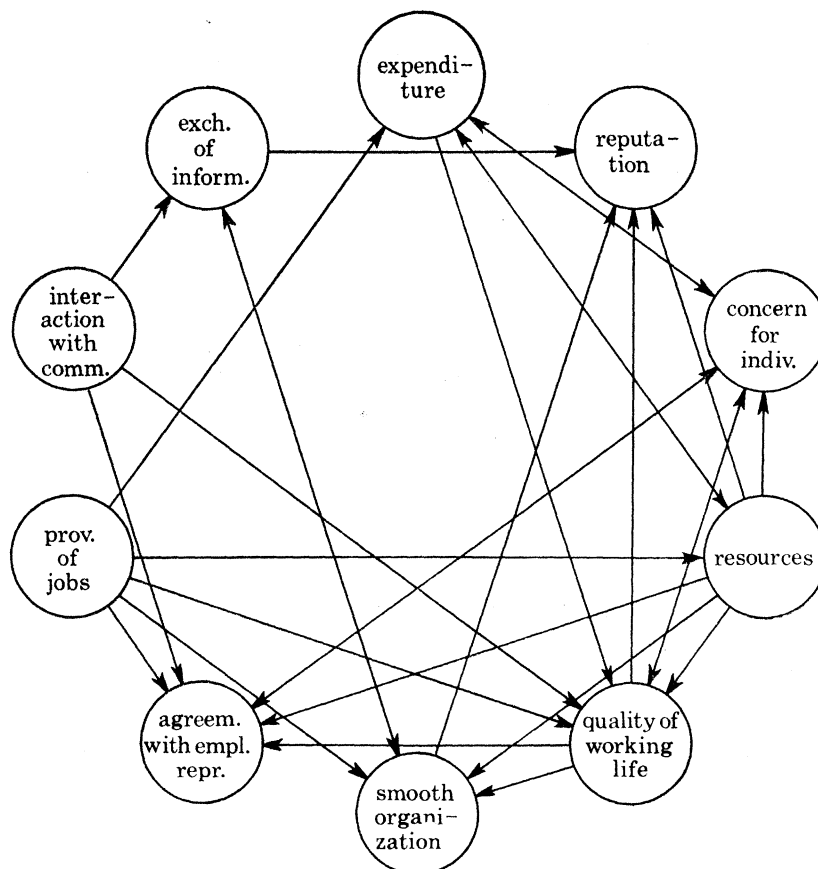
FIGURE 1. Network for the reorganization state.

The number of objectives in this state – 10 – means a substantial reduction in complexity compared with the original total number of 32. Nevertheless, a further reduction is necessary for the problem to become manageable conceptually.

These ten objectives are not independent of each other. This is illustrated in figure 1, where an arrow indicates the existence of a linked relation. This network is characteristic of the reorganization state; it is an illustration of the mental, conceptual problem of objectives formulation. Let us remember that it was this particular group of managers who have characterized their problem by selecting the objectives and indicating the way in which they are interrelated. Obviously, a different management team could have made a different selection and have arrived at a different set of objectives and interrelations.

Broadbent (1971), among others, has described the extent of the limitations to what the human brain can handle and has drawn our attention to the very many capacity constraints on the processing, transport and retrieval of information. Therefore, it is questionable whether a manager can be expected to conceptually handle information, some of it quantified, some of it not, related to the ten different categories – the individual objectives, each of which can take various shapes and showing considerable variety – in an effective manner. However, the problems have to be solved nevertheless, and all too often a way out is sought in irrational complexity reduction, which results in objectives being just forgotten, variety being ignored, and influences from one objective on others being disregarded. Particularly under conditions of stress, not uncommon within management teams, such behaviour is liable to occur.

Balancing moderations of objectives

Operational research has provided us with techniques which enable the structure of networks as shown in figure 1 to be analysed. Kevorkian & Snoek (1973) have developed a structural analysis method which allows us to convert figure 1 into figure 2. The networks are identical in that every element and every relation existing in one network is also present in the other. The difference lies in the manner of presentation.

Starting at the top, with the objectives Provision of jobs and Interaction with the community, the management team can work through the problem by dealing separately with somewhat smaller, although still very complicated, blocks of related objectives. In this case there is a block A of five objectives, followed by a block B of two. One objective – Reputation – is at the bottom; it is only influenced by others and does not itself influence other objectives.

With the exception of what happens inside the blocks A and B all arrows point from the top to the bottom, which enables the management team to work through the problem in stages.

Inside the blocks A and B some arrows point from the bottom to the top, thus providing internal feedback. Here, qualitative structural analysis cannot do much more for us and the management team has to handle such a block as an entity in a holistic way. When a balanced distribution has been found of the moderations on all the objectives inside one block, the next can be tackled.

Finally, the primary results have to be recorded for further checks on consistency, feasibility and morality. The latter point in particular requires further explanation.

If the structural analysis does not yield much simplification – and with a very densely interrelated system this may be the case – other methods of complexity reduction have to be used. One of these involves the introduction of priorities into the various objectives. However, such refinements are beyond the scope of this presentation.
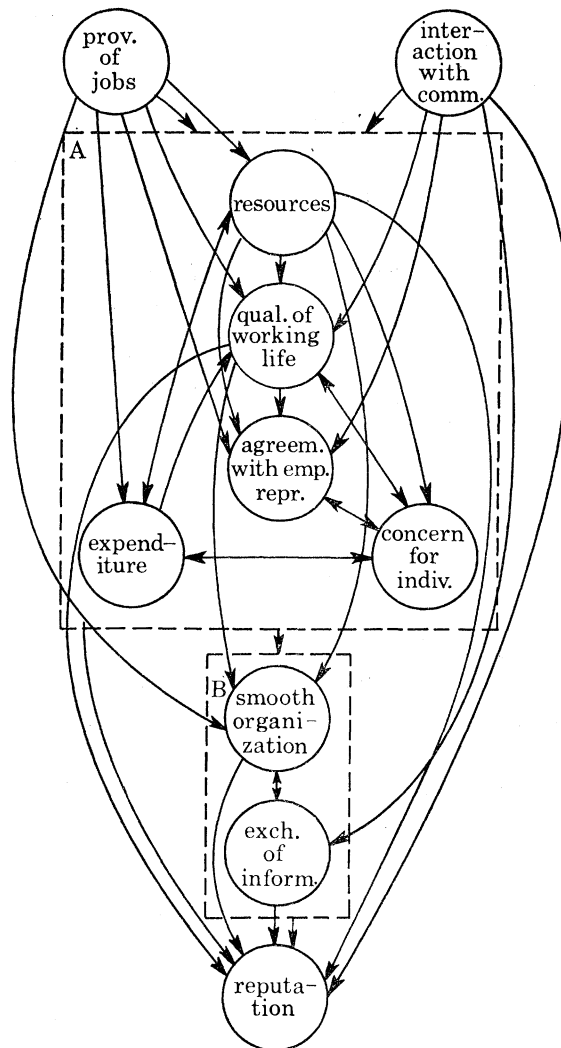
FIGURE 2. Restructured network for the reorganization state.

THREE CHECKS ON PRIMARY (RAW) RESULTS

It will be clear that the first round of objectives setting will not always result in plans that can be executed straightforwardly. It is therefore necessary to carry out a number of checks which should guarantee that the objectives can reasonably be expected to be pursued by the line and staff organizations of the company and that full attention is given to company policy and the standards required by society.

The first and second checks concern the expectation that the objectives can be pursued by the organization. The first deals with *consistency*. It could well be that one of the objectives developed in the first round would mean a substantial deviation from the policies adopted by the company to date, which can be read off from the files kept of all previous objectives. Sudden deviations may be difficult to explain to the line and staff organizations and in certain circumstances it might therefore be necessary to modify the objectives.

The second check deals with *feasibility*. It is not very fruitful for management to formulate a set of objectives without there existing any reasonable strategy to pursue these objectives.
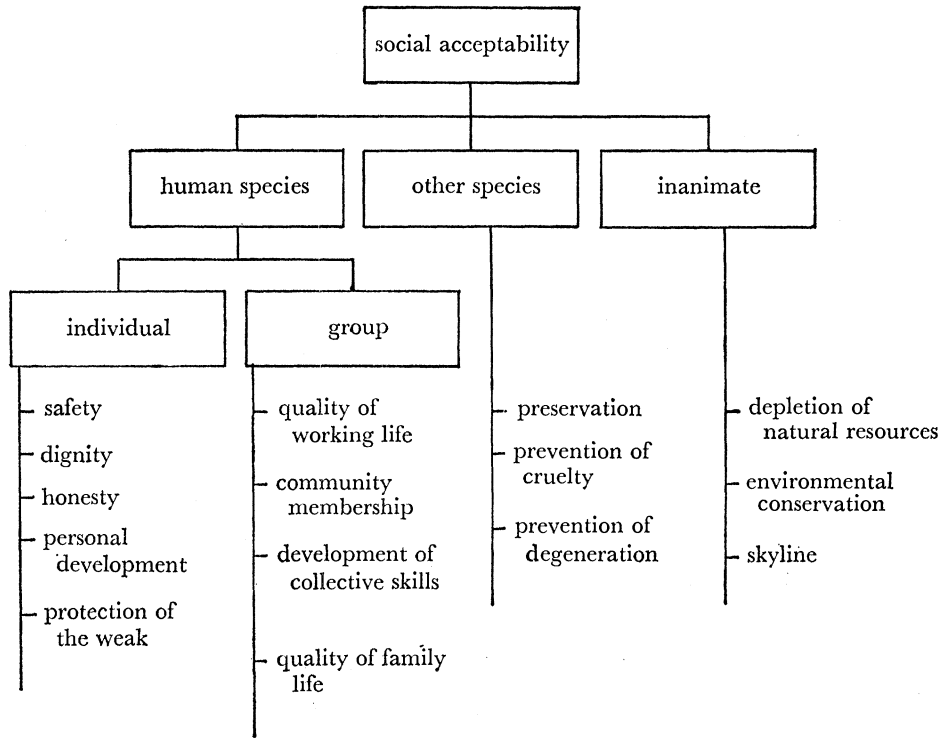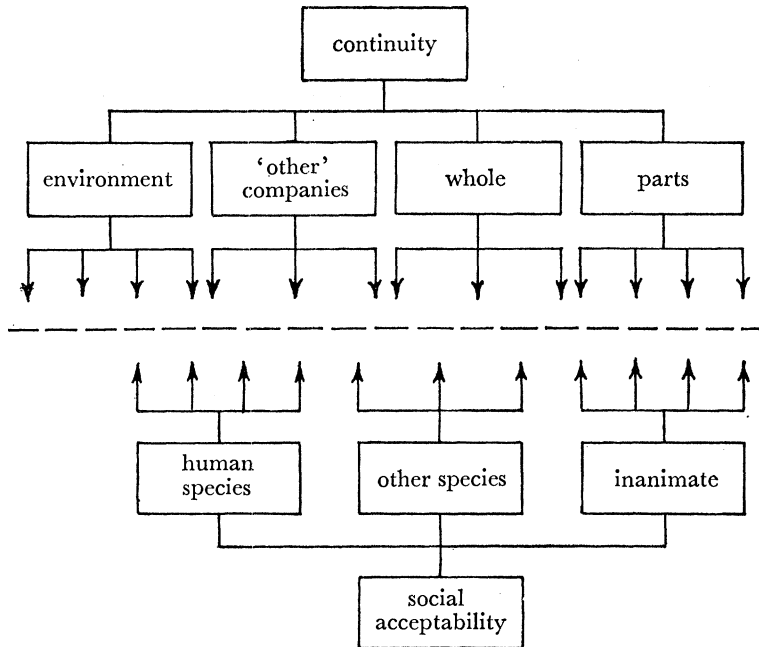
TABLE 9. MORALITY CHECK

TABLE 10. TEST FOR COMPATIBIILTY

The third and final check is on *social compatibility* or, alternatively, on *morality*. As we all know, the term morality has a meaning which may differ from individual to individual. In this context I use the term in the positivistic way, which means that a human being is always held responsible for his or her conduct and has to face repercussions when he or she violates accepted cultural standards. In this meaning the term can be extended to the managerial conduct of a business enterprise. A separate check on morality does not suggest that this aspect has not been checked systematically throughout the whole process of objectives setting, but simply that top management should stand back and view their proposed objectives from the widest possible angle encompassing, as I have stressed, the internal and environmental considerations so as to ensure compatibility with corporate social and moral standards.

A method taken from cybernetic theory which might assist in this process is the anticipatory or feedforward control mechanism. The easiest way to carry out this anticipatory function is to subject any of our selected objectives (and, of course, later on our activities too) to a social compatibility check and eliminate or modify any objective which fails the test.

Since morality is a very general concept, for the purposes of illustration and simplicity I have tried to work it out somewhat further by describing some of the considerations to be taken into account. In table 9 such a segmentation of morality is presented; a compatibility check is illustrated in a simplified diagrammatic form in table 10.

SUMMARY OF THE PROCEDURE

Summarizing, in our process of objectives setting, which is one of complexity reduction, we have taken the following steps:

(1) On the basis of the information brought to their attention, management select a problem on which they want to spend effort. The problem is transformed into what is termed a state.

(2) From the objectives hierarchy those objectives are selected which are relevant to the particular state (reduction of objectives).

(3) From all the interactions between the selected objectives the most direct ones are taken into account (first relation reduction).

(4) An analysis of the structure provides a network of relations which is easier to digest conceptually (structural simplification).

(5) A balanced set of objectives is produced.

(6) This set is subjected to a consistency check.

(7) The set is checked for feasibility.

(8) Objectives are subjected to a final morality check.

(9) When the set has passed all these tests – after being modified where necessary – the final set of objectives is formulated.

(10) The final set is registered, which may be done in the form of a policy statement.

CONCLUSION

Having come to the conclusions of my presentation I realize that the thoughts offered are by no means ready for direct consumption.

There are two ways to stimulate their implementation. One is by persuading managers to use the inventory of objectives brought forward and to make certain that they have not overlooked objectives which should have been taken into account. Once they have embedded this

check in their regular line of thought it may perhaps come naturally to them to accommodate the various interrelations.

The second approach is via the educative process in which we teach young managers how to conceptually handle complex unquantifiable problems in an effective manner. It is thought that case studies may contribute to this educational approach.

This presentation is not intended to teach managers how to make the right decisions. Rather, the methods and procedures described might assist in the identification of key issues to be raised and debated, and in the handling of the problems. I have been describing a sort of check list which helps management in taking a holistic view of their task.

The entire process is aimed at avoiding a situation where individual management members, *vis-à-vis* the ultimate set of objectives, think about different problems under different sets of circumstances. It is all right for them to differ in view but then they should know of each other that they do.

The morality check should be incorporated throughout management's considerations. By putting this on their check list the chance is reduced of this particular aspect being inadvertently overlooked because the issue was not raised explicitly. There is a world between an open rejection of a morality claim and leaving the matter unreviewed.

One of the purposes of this presentation is to assist management in the setting of objectives by leaving full room to the individual prominence but at the same time enabling management members to subject their views to scrutiny by the team so that they learn to widen their horizon, enlarge the range of their cognitive capabilities and thus take a holistic rather than a fragmented view of their jobs. But – and the author realizes that this will not easily be accepted – it supposes a willingness with every member of the management team to internalize the thoughts and views described above, which means to incorporate them into his normal thinking processes.

REFERENCES (de Jong)

Ackoff, R. L. 1974 *Redesigning the future.* New York: Wiley.
Beer, S. 1966 *Decision and control.* New York: Wiley.
Beer, S. 1972 *Brain of the firm.* New York: Herder and Herder.
Beer, S. 1975 *Platform for change.* New York: Wiley.
Broadbent, D. E. 1971 *Decision and stress.* London: Academic Press.
Churchman, C. W. 1975 *The new rationalism and its implication for understanding corporations.* Lecture held at the University of California at Berkeley, U.S.A.
Drucker, P. F. 1973 *Management.* London: Heinemann.
Kevorkian, A. K. & Snoek, J. 1973 Decomposition in large-scale systems: theory and application of structural analysis in partitioning, disjointing and constructing hierarchial systems. In *Decomposition of large-scale systems, Proc. Cambridge Conference U.K.,* 1973 (ed. D. M. Himmelblau). Amsterdam: North Holland Publishing Company.
Mulder, M. & Stemerding, A. 1963 Threat, attraction to group, and need for strong leadership. *Human Relations* **16**, 317–334.